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REVIEW

Effects of Patient and Family-Centered Care on Quality of Care in Pediatric Patients: A Systematic Review

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Abstract

Background: Patient and family-centered care is one approach that is applied in pediatric care in various hospital settings to improve the quality of care. However, information related to the results of the entire study and its intervention model has not been identified effectively in child health care.
Purpose: This study aimed to describe and assess the effects of patient and family-centered care on the quality of care in pediatric patients.
Methods: A systematic review was used as a method in this study. Seven databases were used, including ScienceDirect, Scopus, ProQuest, EBSCO, Sage Journal, Tailor and Francis, and PubMed to search the literature for relevant published reviews that determined patient and family-centered care interventions between 2011 and 2021. The synthesis without meta-analysis guidelines was used to analyze the data in this review. The data were further analyzed by critically assessing the quality of the articles using the JBI and CASP checklists.
Results: From a total of 29.780 articles identified, fifteen articles were included in this review. Several models of patient and family-centered care interventions were identified, such as family-centered care, family-centered communication program, family-integrated care, family nurture intervention, family empowerment, parent participation, close collaboration, mother-nurse partnership program, and the newborn individualized developmental care and assessment program. From those models, the outcomes for quality of care were related to the pediatric quality of life, length of stay, patient safety, parent satisfaction, parent psychological response, and parent involvement and partnership with staff.
Conclusion: The shreds of evidence indicate that patient and family-centered care can improve the quality of care in the pediatric patients. It is recommended that patient and family-centered care can be implemented in pediatric care by increasing the participation of family during treatment.

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1. Introduction

Children are hospitalized when there is a change in health conditions caused by having an acute or chronic disease that requires health care services (Witt et al., 2014). Young human children are more susceptible to disease because the body's defense system is generally in the growth process compared to adults (Simon et al., 2015). A study stated that children aged 0-3 years experienced 14 types of infections in their lives, of which 71% suffered from respiratory infections, and it was reported that the main cause of these infections came from the host (Vissing et al., 2018). Besides, research reported that a large proportion of mortality in hospitalized children occurs early during admission (Bohn et al., 2016).

During hospitalization, it is important to develop and implement an intervention that is feasible, acceptable, and positively impacts health outcomes (Geerligs et al., 2018). One of the most fundamental changes in pediatric health care is the recognition of the importance of patients' and families' involvement in health care (National Association of Pediatric Nurse Practitioners, 2013). Patient and Family-Centered Care (PFCC) is an approach that recognizes the role of the family in the patient's life and encourages mutually beneficial collaboration between patients, families, and health care professionals (Brown et al., 2008).

PFCC emphasizes partnership in the health care system to improve health quality, safety, and care delivery (Brown et al., 2015). A better understanding of the factors influencing the implementation of the PFCC is an important element in improving its delivery. A study revealed that factors from a health care professional such as inadequate level of experience, high workload, time pressure, and unsupportive attitude are the barriers to patient and family-centered care (Lloyd et al., 2018). This new perspective must overcome perceived barriers and foster a culture of partnership with patient relatives (Van Mol et al., 2017).

PFCC consists of four core components that are associated with outcomes in pediatric patients, i.e., information sharing, social-emotional support, providing care based on family background, and shared decision-making (Gallo et al., 2016). Moreover, Institute for Patient-and Family-Centered Care (2017) states that dignity and respect, information sharing, participation, and collaboration are the core components of PFCC. Previous studies have widely developed some of these components as an intervention model in pediatric care services. The study conducted by Hassanian et al. (2018) and Heo and Oh (2019) used parental participation as a component of PFCC in pediatric care. Meanwhile, Toivonen et al. (2020) used collaboration between parents and staff as an intervention model in PFCC. Although many studies have used PFCC as an intervention model, it needs to be studied more deeply through systematic reviews to obtain solid and reliable scientific evidence. Previously, research related to PFCC intervention models in improving the quality of care had been carried out using a systematic review approach; nevertheless, the focus of the respondents was adult patients. Therefore, the PFCC needs to be further identified related to existing intervention models and its outcomes. Accordingly, this review was conducted to describe and assess the effects of patient and family-centered care on the quality of care in pediatric patients.

2. Methods

2.1 Research design

A systematic review was used as a method in this study. The researchers used PICO (Patient, Intervention, Comparison, and Outcomes) to determine the clinical questions (Table 1). PICO is a widely used framework for developing research questions on systematic review (Considine et al., 2017). The research question in this study was “How are the effectiveness of patient and family-centered care in improving the quality of care?”

Table 1. Description of PICO

Patients	Pediatric patients (aged 0-18 years) and their families
Intervention	Aspects of patient and family-centered care, such as those focused on the patient, the family, or both. Also, interventions included components of patient and family-centered care (participation, information sharing, collaboration, and shared decision-making)
Comparison	Usual care
Outcomes	Quality of care resulting from patient and family-centered care interventions for patients and families

2.2 Search methods

Literature searching was conducted using seven databases: ScienceDirect, Scopus, ProQuest, EBSCOhost, Sage Journal, Tailor and Francis, and PubMed within the year from 2011 to 2021. Determination of keywords was conducted by using the Boolean operators’ technique, i.e. AND and OR to combine words when searching. In addition, the author also used quotations or quotation marks (“) and also grouping on similar concepts symbolized by ( ). The keywords used: *(“patient and family-centered care” OR “patient-centered care” OR “family-centered care”) AND (intervention OR effect) AND (“usual care”) AND (“quality of care” OR “clinical outcome”) AND (newborn OR children OR adolescent OR teenager).*

2.3 Inclusion and exclusion criteria

The inclusion criteria in this study were (1) studies that included pediatric patients aged 0-18 years and their families, (2) accredited international journal, (3) publication year of the journal from 2011 to 2021, (4) articles with experimental design such as quasi-experimental, true experimental, and Randomized Controlled Trials (RCTs), (5) articles are written in English. Meanwhile, the exclusion criteria were (1) articles written in the form of reviews, conference proceedings, protocols, case reports, surveys, and thesis/dissertation, and (2) articles that cannot be downloaded (not fully accessible).

2.4 Screening of articles

Screening articles were conducted by two reviewers (TS and DW). The screening was carried out through several stages, such as identifying keywords in seven available databases, selecting the appropriate title and abstract, and identifying the availability of the full text and its suitability with the existing inclusion criteria. In case of disagreement between TS and DW, a third reviewer (NN) would be involved. NN would reconcile the disagreement to identify and ensure that both reviewers have done the screening process correctly. Reconciliation can play a significant role in ensuring that abstract screeners make the right decision at each stage of the screening process (Polanin et al., 2019).

2.5 Data extraction

Fifteen selected articles were extracted by all reviewers using a grid synthesis format. This format contained some information, i.e., authors, year of publication, country, objective, design, hospital setting, intervention model, duration, results, and components of the patient and family-centered care. All reviewers identified all included articles based on the foregoing information and summarized them in a table (Table 2, Appendix 1).

2.6 Quality assessment of the selected article

The assessment of the quality of studies in this review used tools from the Joanna Briggs Institute (JBI), i.e., the critical appraisal checklist for quasi-experimental research through https://jbi.global/critical-appraisal-tools. JBI critical appraisal tools were created by the JBI and partners and were subsequently accepted by the JBI Scientific Committee after undergoing thorough peer assessment (Joanna Briggs Institute, 2020). Meanwhile, the quality of studies for RCT design was measured using the Critical Appraisal Skills Programme (CASP) through https://casp-uk.net/casp-tools-checklists/ (Table 3, Appendix 2). The CASP RCT checklist was initially developed based on the Journal of the American Medical Association (JAMA) Users' Guides and piloted with medical professionals (Critical Appraisal Skills Programme, 2020). A critical appraisal of the article was conducted by TS and DW. If there was disagreement, NN would involve in reconciling the process based on guidelines from JBI and CASP.

2.7 Risk of bias

The risk of bias in individual studies for quasi-experiment design was determined with the following cutoffs: low risk of bias if 70% of answers scored yes, moderate risk if 50 to 69% of questions scored yes, and high risk of bias if yes scores were below 50% (Goplen et al., 2019). On the results of the risk assessment bias, it was found that of the nine articles reviewed, seven articles had a low risk of bias, two included a moderate risk, and none had a high risk of bias (Table 4). Meanwhile, assessment of the risk of bias in RCT studies was conducted using the Cochrane collaboration tool (Higgins et al., 2011). Of five articles on RCT design, one study used single-blind, two studies did not show clear blindness, and two were non-blind studies (Table 5).

2.8 Data analysis

The authors used synthesis without meta-analysis (SWiM) guidelines in analyzing the data (Campbell et al., 2020). The SWiM guidelines were used to synthesize quantitative data in the form of intervention effects and present it in nine reporting items. Item 1 was grouping the studies into several sections such as authors and year of publication, country, objective, design, hospital setting, intervention model, duration, results, and components of the patient and family-centered care. Items 2-6 were reviewing full-text articles that meet the inclusion criteria to answer the clinical review questions. The article analysis was carried out by reviewing the study design, intervention methods, assessment tools, and intervention effects. The findings are presented in the form of a summary table (item 7), and then the similarities and differences of the outcomes are reported in the form of a narrative (item 8). Furthermore, reporting on the limitations of this study was presented as the final stage of data analysis (item 9).

Table 4. Risk of bias assessment for quasi experiment design

Author	JBI assessment tools										
	Q1[a]	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	% Yes	Interpretation[b]
(Ladak et al., 2013)	Yes	Yes	Unclear	Yes	Yes	No	Yes	Yes	Yes	78%	Low risk of bias
(Uhm & Kim, 2019)	Yes	Yes	Unclear	Yes	Yes	No	Yes	Yes	Yes	78%	Low risk of bias
(Sannino et al., 2016)	Yes	Yes	Unclear	Yes	No	No	Yes	Unclear	Yes	56%	Moderate risk of bias
(Minooei et al., 2016)	Yes	Yes	Unclear	Yes	Yes	No	Yes	Yes	Yes	78%	Low risk of bias
(He et al., 2018)	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	78%	Low risk of bias
(Khan et al., 2018)	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	89%	Low risk of bias
(Toivonen et al., 2020)	Yes	No	Unclear	No	Yes	No	Yes	Yes	Yes	56%	Moderate risk of bias
(Peyrovi et al., 2015)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	89%	Low risk of bias
(Rostami et al., 2017)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	89%	Low risk of bias
(Nurhaeni et al., 2018)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	89%	Low risk of bias

Notes:

[a] Q1 – Q9 indicate questions 1 to 9 based on the JBI risk assessment

[b] The risk of bias was ranked as high when the study reached up to 49% of "yes" scores, moderate when the study reached from 50 to 69% of "yes" scores, and low when the study reached more than 70% of "yes" scores

Table 5. Cochrane risk of bias tool for RCT

Cochrane risk-of-bias domain	Randomization process	Allocation concealment	Blinding of participants and researchers	Blinding of outcome assessment	Incomplete outcome	Selective reporting	Other bias
(Heo & Oh, 2019)	+	+	?	-	+	+	+
(Hassanian et al., 2018)	+	+	?	-	+	+	+
(Bastani et al., 2015)	+	+	+	-	+	+	+
(Welch et al., 2013)	+	+	-	-	?	+	+
(Verma et al., 2017)	+	+	-	-	+	+	+

Note: (+) indicates a low risk of bias, (-) indicates a high risk of bias, (?) shows unclear risk of bias

3. Results

3.1 Characteristics of the selected studies

Fifteen articles were included in the review process. The researchers identified 29,780 articles from seven databases, and 28,473 articles were excluded according to limiters (year of publication, type of article, subject area, and open access). Fifty-three articles were selected for review after the remaining 1,307 papers were filtered based on their titles and abstracts. Finally, fifteen articles were included in this review after assessing their eligibility and adding articles from the reference list (Figure 1).

Five of the reviewed articles came from Iran, two from South Korea, and one from Columbia, China, Finland, India, Indonesia, Italy, North America, and Pakistan. All of the articles in this study were conducted in the hospital setting. There were eight studies implemented in the NICU room, two studies in the PICU room, four in the pediatric ward, and one in the pediatric nephrology office (see Table 2). Moreover, this review produced six outcomes related to the quality of care, including pediatric quality of life, length of stay, patient safety, parent satisfaction, parent psychological response, and parent involvement and partnership with staff.

3.2 Participants

The participants in this study were in the age range from 0 to 12 years. The majority (9 of 15 articles) of published studies involved newborn participants and their families in the intervention. The highest number of participants was 3106 children (1574 pre-intervention and 1532 post-interventions), and the number of parents was 2148 (Khan et al., 2018). In comparison, the lowest number of participants was 43 children (21 in the intervention group and 22 in the control group) (Sannino et al., 2016).

3.3 Characteristics of the intervention and components of the PFCC

The implementation of the treatment consists of several models including family-centered care (Ladak et al., 2013; Rostami et al., 2017; Bastani et al., 2015; Verma et al., 2017), mother–nurse partnership program (Uhm & Kim, 2019), the newborn individualized developmental care and assessment program (Sannino et al., 2016), the family empowerment model (Minooei et al., 2016; Peyrovi et al., 2015; Nurhaeni et al., 2018), family integrated care (He et al., 2018), family centered communication program (Khan et al., 2018), the close collaboration (Toivonen et al., 2020), and parent participation/participatory care (Heo & Oh, 2019; Hassanian et al., 2018). The duration of the intervention varied in this review, ranging from the longest 18 months (Toivonen et al., 2020) to the shortest 30-45 minutes (Bastani et al., 2015; Nurhaeni et al., 2018). The others have a duration of eight months (Khan et al., 2018), two weeks (Heo & Oh, 2019), two days (Ladak et al., 2013), two hours (Verma et al., 2017), and 30 minutes twice a day (Uhm & Kim, 2019). Each session used a duration from 0.5 to 1 hour (Peyrovi et al., 2015; Hassanian et al., 2018; Minooei et al., 2016) and as many as possible or warranted by the infant's distress (Welch et al., 2013). There was also implementation, starting from the first admission to discharge (Sannino et al., 2016; He et al., 2018). However, there was a study where the duration of the intervention was unclear (Rostami et al., 2017). PFCC components of the intervention include participation (patient and family), partnership, information sharing, collaboration, communication, family empowerment, and decision-making (Table 6).

Table 6. Findings of the quality of care outcomes with PFCC intervention

Quality of care outcomes	Number of studies (f)	Significant effects f (%)	No significant effects f (%)
Pediatric quality of life	5	4 (80)	1 (20)
Length of stay	4	3 (75)	1 (25)
Patient safety	3	1 (33.33)	2 (66.67)
Parent satisfaction	6	6 (100)	-
Parent psychological response	2	2 (100)	-
Parent involvement and partnership with staff	6	6 (100)	-

3.4 Quality of care outcomes

Of the 15 articles reviewed, six outcomes were obtained related to the quality of care, i.e., pediatric quality of life, length of stay, patient safety, parent satisfaction, parent psychological response, and parent involvement and partnership with staff (see Table 2). The outcome measurement of this review refers to the quality of care domain issued by WHO (2018), including effectiveness, safety, and people-centredness. Outcome indicators of effectiveness consist of hospital readmission rate, improvement in health status, and death prevention. Meanwhile, outcome indicators of patient safety may include treatment complications or incidence of hospital-acquired infections. Patient satisfaction, activities of daily living, and readiness to recommend the hospital are the outcome indicators of patient-centredness (European Observatory on Health Systems and Policies, 2019).

3.4.1 Pediatric quality of life

There were five (33.33%) published studies that reported quality of life as an outcome of PFCC intervention. The study by Minooei et al. (2016) claimed that there were significant differences in the mean score of the children's QoL, including physical and psychosocial domain, and the total QoL score in the intervention group before and after the training ($p<0.05$). In the physical domain, the percentage of normal visual orientation development in infants aged 40 weeks was higher (81%) in the intervention group compared to the control group (52.4%), and neurofunctional assessment at three months had normal scores of 66.6% of children compared to 47.6% of the control group (Sannino et al., 2016). Moreover, there was a significantly reduced respiratory support time, a significant positive weight gain, and a significant increase in breastfeeding for infants in the intervention compared with the control group (He et al., 2018; Verma et al., 2017). However, There was no difference in infants' weight between the intervention and control groups during the parent's participation program in the NICU setting (Heo & Oh, 2019).

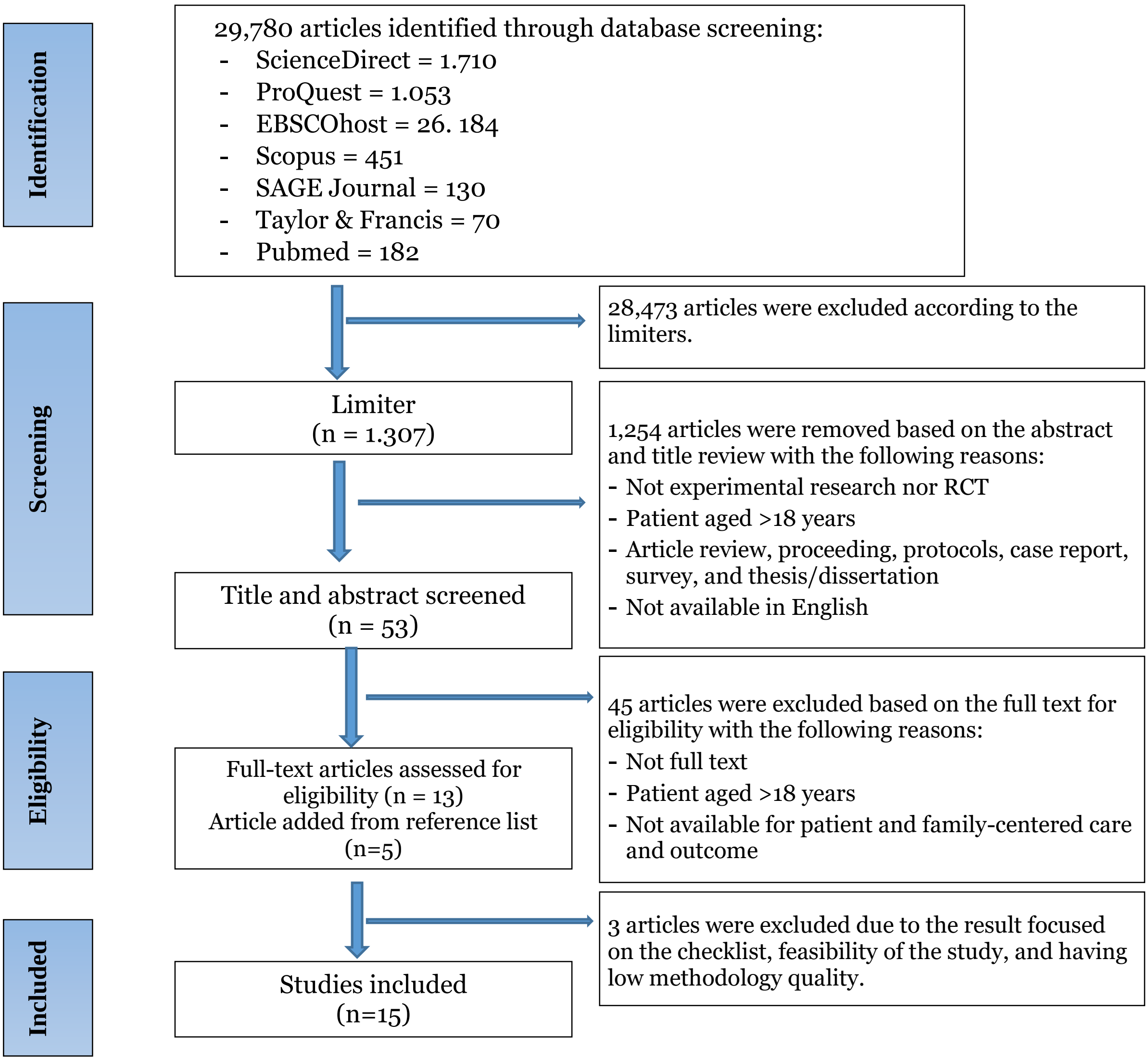

Figure 1. PRISMA flowchart

3.4.2 Length of stay

Of 15 articles reviewed, four studies (26.67%) described length of stay as an outcome of this research. The results of 3 studies revealed that there was a significant decrease in the length of stay in children during hospitalization (Ladak et al., 2013; Nurhaeni et al., 2018; Bastani et al., 2015). Meanwhile, one article confirmed no significant difference between the intervention and control groups (Welch et al., 2013).

3.4.3 Patient safety

There were three (20%) published studies that proclaimed patient safety as a result of this study, including medical complications and nosocomial infection. There was an unchanged rate of medical errors, but harmful errors (preventable adverse events) went down after intervention significantly by $p<0.01$ (Khan et al., 2018). However, the other study stated no significant difference between groups in medical complications (Welch et al., 2013) and nosocomial infection (Verma et al., 2017).

3.4.4 Parent satisfaction

There were six (40%) published studies announced that parental satisfaction increased significantly with $p<0.05$ after PFCC intervention and its components for children hospitalized

(Bastani et al., 2015; Hassanian et al., 2018; Ladak et al., 2013; Nurhaeni et al., 2018; Rostami et al., 2017; Uhm & Kim, 2019).

3.4.5 Parent psychological response

There were two (13.33%) reviewed articles that presented the psychological responses of parents as a result of the intervention in this study. There was a significant decrease in mothers' anxiety with $p<0.001$ and increased parent self-efficacy with $p<0.008$ after the implementation of the partnership model between mothers and nurses (Uhm & Kim, 2019). Furthermore, mothers reported an emotional readiness in preparing to care for their infant on discharge from NICU to home (Peyrovi et al., 2015).

3.4.6 Parent involvement and partnership with staff

There were six (40%) published studies reported that parent involvement and partnership with health professionals as the result of the PFCC intervention. Parents reported that there was an increase in parental involvement (Khan et al., 2018; Ladak et al., 2013; Welch et al., 2013) and a significant raised in parent-staff partnership during child care in hospitals with $p<0.001$ (Heo & Oh, 2019; Uhm & Kim, 2019). This partnership is demonstrated through the support of doctors and nurses in helping them how to care for their infants (Sannino et al., 2016).

4. Discussion

This study aimed to describe and assess the effects of patient and family-centered care on the quality of care in the pediatric patients. There were six outcomes related to the quality of care, including pediatric quality of life, length of stay, patient safety, parent satisfaction, parent psychological response, and parent involvement and partnership with staff. The majority of the components of the PFCC in the articles reviewed used family participation as a research intervention. PFCC in nursing is about treating patients and their families as a partner in care with fostering their participation or collaboration (Seniwati et al., 2023). Family participation in taking care of hospitalized children is a mutual relationship between parents and nurses in providing children's health information and decisions making to improve the quality of care (Vasli & Salsali, 2014). Parental participation can be in the form of involvement in daily care during hospitalization (Melo et al., 2014). Feeding the child or preparing the food tray, changing their clothes, assisting in elimination and sleeping, bathing/wiping with a washcloth, and performing oral care are forms of parental participation in nursing care delivery (Abdelkader et al., 2016).

Improving children's quality of life is an outcome resulting from the PFCC intervention in this review. In the physical domain, PFCC interventions are reported to improve children's clinical outcomes by decreasing oxygen support time (He et al., 2018), promoting better motor, visual, and auditory development (Sannino et al., 2016), and increasing breastfeeding rates pre-discharge (Verma et al., 2017). Quality of life in children is associated with the role of the family in terms of parent-child interactions (Santos et al., 2015). During hospitalization, parents have an important role in child care by providing physical comfort, physiological needs, and psychosocial support and facilitating children to develop abilities in line with the stages of development (Suparto et al., 2020).

Regarding the impact of PFCC on parents, there was a significant increase in the level of parent satisfaction, parent involvement, and parent-staff partnership scores. Parental satisfaction is associated with the attitude of the professional staff, the treatment provided, information, and parental participation during the child's care (Cintra et al., 2022). Nurses as a team in implementing PFCC have a role in involving children and families in the nursing process to improve the quality of care (Palokas et al., 2015; Uhl et al., 2013). A previous study reveals that involving parents in a child's care leads to enhancing their satisfaction in health care (Cimke & Mucuk, 2017). Furthermore, PFCC also has an impact on the psychological response of parents. According to Aljabari et al. (2022), parental involvement in childcare can reduce anxiety in parents. Parental involvement in care will provide opportunities for them to care for their children directly, receive information on their children's health conditions, and improve relationships with care providers (McCabe, 2014).

In addition, the results showed a decrease in length of stay, a negative parent's psychological response, and the incidence of side effects in children during hospitalization. The previous review using an adult sample also stated that the results obtained after the PFCC intervention included decreased length of stay, family satisfaction, and achievement of medical goals (Goldfarb et al., 2017). Likewise, increasing quality of life, reducing the length of the hospital stay, reducing anxiety in family members, and increasing family satisfaction and relationship with healthcare providers an outcomes of PFCC intervention in adult patients (Park et al., 2018). A study revealed that the positive impact of reducing the length of hospital stay in children is related to improved psychological well-being (Segers et al., 2019). Improved psychological conditions such as decreased anxiety, depression, and stress in children are due to the presence of families who accompany children during hospitalization (Adineh et al., 2016). The presence of the family is considered to bring comfort to the patient. It has also been demonstrated that being able to stay in the moment while a family member is in the hospital helps them deal better (McCabe, 2014).

The strength of this review is that the articles were selected using an experimental design, including quasi-experimental and RCT. The results of the risk assessment bias also show that 80% of the quasi-experimental design and about 71% in the RCT included the low risk of bias in the 15 reviewed articles in this study. A study categorized as low risk of bias indicates confidence on the part of the reviewer that the outcome shows the true treatment impact (study results are considered valid). The study informing is capable of judging that no major or minor sources of bias are likely to consequence results (Viswanathan et al., 2012).

5. Implications and limitations

The results of this study have implications for childcare delivery during hospitalization. This review has provided evidence that patient and family-centered care can be an appropriate approach for improving the quality of care for the patient, family, and health care professional. Nurses as a team in health care providers encourage families to be involved in child care, including planning, implementation, and evaluation based on partnerships.

The limitation of this research is generalizations in the research setting and not specific to a particular treatment room. In addition, the types of childhood diseases are also screened in general, and there are no criteria for certain conditions that are included in this review. However, the researcher included all possible interventions within the PFCC components and included RCTs and quasi-experimental designs to analyze the highest quality of evidence. Therefore, recommendations for future research to conduct PFCC reviews by equalizing the research setting and diagnosis of diseases in children.

6. Conclusion

This review conclude that patient and family-centered care intervention is effective in improving the quality of care. The results of this study found that there was an increase in the quality of care in terms of pediatric quality of life, parental satisfaction, parental involvement, and parent-staff partnership scores. Moreover, there was a decrease in the length of stay, the incidence of harmful errors, and a negative parent's psychological response during hospitalization. Family participation is the most component of the PFCC that was applied as an intervention in this study.

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Author contribution

TS was responsible for the conception and design of the study, screening articles, data extraction, data analysis, quality appraisal, drafting the manuscript, and revising the manuscript. While DW and NN were in charge of screening articles, data extraction, and assessing the quality of each included article. All authors have read and approved the manuscript and take full responsibility for its content.

Conflict of interest

The authors have no conflict of interest regarding this article.

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Appendix 1.

Table 2. Data extraction of the selected studies

No	Authors, year of publication, and country	Design	Hospital Setting	Intervention model	Duration	Results	Components of PFCC
1	(Ladak et al., 2013), Pakistan	Quasi-experimental	Pediatric ICU and pediatric cardiac ICU	Family-centered rounds	Two days	There was a significant increase in terms of parental satisfaction, use of simple language, feeling involved in care, making decisions, and precedence in rounds. In addition, Length of stay was significantly reduced after intervention	Family participation
2	(Uhm & Kim, 2019), South Korea	Quasi-experimental	Paediatric cardiac ICU	Mother–nurse partnership programme (MNPP) that delivered in four phases (orientation, information sharing, negotiation, participation)	30 minutes twice a day	In the intervention group, the infant's mother reported significantly higher parental satisfaction, parental self-efficacy, perceived partnership, and lower anxiety compared to the control group.	Partnership between nurse and mothers. Consist of 3 components : information sharing, negotiation, and participation
3	(Sannino et al., 2016), Italy	Quasi experimental	Neonatal intensive care unit	The Newborn Individualized Developmental Care and Assessment Program (NIDCAP)	First admission until discharge NIDCAP assessment was measured from birth to discharge every 10±2 days	Percentage of motor, visual and auditory development of infants to be normal at term increased in infants who received treatment compared to the control group. Maternal support in infant care is higher than the control group	Involving mothers participation in infant health care
4	(Nurhaeni et al., 2018), Indonesia	Quasi experimental	Pediatric wards	Family empowerment model through health education using a flipchart and booklets	Maximum 45 minutes	There was significant differences between the intervention and control groups in empowerment and satisfaction aspects after the intervention. Length of stay indicates a significant difference be- tween the intervention and control groups	Family empowerment
5	(Hassanian et al., 2018), Iran	Clinical trial study	Pediatric wards	Participatory care through skill training to parents	A 1-hour session in the presence of 5 parents per session	All aspects of parental satisfaction including welfare services, medical services, and nursing care in the intervention group was significantly higher than the control group	Parents participation in children's wards

Table 2. Continued

No	Authors, year of publication, and country	Design	Hospital Setting	Intervention model	Duration	Results	Components of PFCC
6	(Khan et al., 2018), North America	Prospective, multicenter before and after intervention study	Pediatric inpatient units/pediatric wards	Family centered communication programme	Nine-month intervention implementation	The overall rate of medical errors was unchanged, but harmful errors (preventable adverse events) decreased by 37.9%. Non-preventable adverse events also decreased. Family engagement and nurse engagement improved on rounds	Communication and Collaboration between health care provider and family Family participation
7	(Minooei et al., 2016), Iran	quasi-experimental	Pediatric nephrologist's office	The family empowerment model through four organized steps; knowledge enhancement, self-efficacy enhancement, self-esteem enhancement through participatory training, and process evaluation	Seven 45-minute sessions	There was a significant difference in the mean score of the children's QoL from their own perspectives in the physical and psychosocial domains and the total QoL score in the intervention group before and after the training	Information sharing through knowledge enhancement, self-efficacy enhancement, Patient and family participation
8	(He et al., 2018), China	A pre-post intervention study	Neonatal intensive care unit	Family integrated care (FIC) through training; hand hygiene, neonatal feeding, neonatal contact, patting on the back of the infant, parents involvement of care	21 hours a day in the first admission until discharge	Compared with control group, the FIC group had significantly increased breastfeeding rates, breastfeeding time, enteral nutrition time, weight gain, and significantly lower respiratory support time. Oxygen Exposure Time decreased but not significant.	Parents participation in infant's care Information sharing
9	(Toivonen et al., 2020), Finland	A mixed-method pre–post intervention study	Neonatal intensive care unit	The Close Collaboration with Parents training program through educational intervention	The training was delivered in 18 months	The quality of family-centered care, as assessed by staff and parents, increased significantly after the intervention. The intervention was able to help staff define and apply elements of family-centered care, such as shared decision making and collaboration between parents and staff.	Shared decision making and collaboration between parents and staff

Table 2. Continued

No	Authors, year of publication, and country	Design	Hospital Setting	Intervention model	Duration	Results	Components of PFCC
10	(Heo & Oh, 2019), South Korea	Randomized controlled trial	Neonatal intensive care unit	Parent participation improvement that consisting of three stages: an individualized interaction stage, a pre-participation stage, and an active participation stage	Two- weeks	Both the mothers and fathers in the intervention group reported significantly higher scores in partnership, and attachment, as well as significantly higher scores within all partnership subscales except communication. However, there was no difference in infants' weight between the intervention and control groups.	Parents participation Partnership nurse-parents
11	(Bastani et al., 2015), Iran	Randomized controlled trial	Neonatal intensive care unit	Family-centered care program which consisted of information about neonatal care, maternal presence, and participation in the care process	30-45 minutes	In the FCC group, the mean score of satisfaction increased after intervention, the mothers were more satisfied with maternal presence in the neonatal intensive care unit, the number of neonatal readmission was less, and the mean duration of hospitalization was lower compared with control groups	Participation Sharing information
12	(Peyrovi et al., 2015), Iran	Quasi-experimental	Neonatal intensive care unit	Empowerment program through training for mothers	Each phase was conducted during a 0.5–1 hour session regularly (consisting of 3 phases)	At discharge time, there was a statistically significant difference in technical readiness and emotional readiness of mothers between control and experimental groups according to mothers' self-report and nurse evaluation	Family empowerment
13	(Welch et al., 2013), Columbia	Randomized controlled trial	Neonatal intensive care unit	Family Nurture Intervention (FNI) through calming session activities that involving mother and infant. Calming session consisting scent cloth exchange, calming touch, and holding	Each session was comprised of as many of the calming procedures as possible or warranted by the infant's distress	There was no significant difference between groups in medical complications. The mean length of stay was not significantly affected by FNI. Mothers were willing to involve in this intervention, and that FNI was compatible with routine care in NICU	Patient and parent engagement

Table 2. Continued

No	Authors, year of publication, and country	Design	Hospital Setting	Intervention model	Duration	Results	Components of PFCC
14	(Rostami et al., 2017), Iran	Quasi-experimental	Pediatric wards	Family-centered care	Not mentioned	In the FCC group, the mean score of satisfaction was increased among the parents after intervention. Besides, there was a significant difference in satisfaction scores between the control and experimental groups, where all parents of the experimental group expressed high satisfaction.	Family participation Collaboration
15	(Verma et al., 2017), India	Randomized controlled trial	Neonatal intensive care unit	Family-centered care through trained for parents using a simple audio-video tool that covered domains of personal hygiene, hand washing, danger signs recognition and feeding of the sick neonate	Training conducted between 10 AM to 12 noon (2 hours)	Incidence of nosocomial episodes of sepsis was not different between groups. Exclusive breastfeeding rates pre-discharge were significantly higher in intervention group compared with control group.	Parents participation Sharing information

Appendix 2.

Table 3. Critical appraisal for RCT with CASP

No	Critical appraisal for RCT (Critical Appraisal Skills Programme, 2020)	(Heo & Oh, 2019)	(Hassanian et al., 2018)	(Bastani et al., 2015)	(Welch et al., 2013)	(Verma et al., 2017)
1	Did the study address a clearly focused research question?	Yes	Yes	Yes	Yes	Yes
2	Was the assignment of participants to interventions randomised?	Yes	Yes	Yes	Yes	Yes
3	Were all participants who entered the study accounted for at its conclusion?	Yes	Yes	Yes	Yes	Yes
4	Were the participants 'blind' to intervention they were given?	Can't tell	Can't tell	Yes	No	No
	Were the investigators 'blind' to the intervention they were giving to participants?	No	No	No	No	No
	Were the people assessing/analysing outcome/s 'blinded'?	No	No	No	No	No
5	Were the study groups similar at the start of the randomised controlled trial?	Yes	Yes	Yes	Yes	Yes
6	Apart from the experimental intervention, did each study group receive the same level of care (that is, were they treated equally)?	Yes	Yes	Yes	Yes	Yes
7	Were the effects of intervention reported comprehensively?	Yes	Yes	Yes	Yes	Yes
8	Was the precision of the estimate of the intervention or treatment effect reported?	No	No	No	Yes	Yes
9	Do the benefits of the experimental intervention outweigh the harms and costs?	Yes	Yes	Yes	Yes	Yes
10	Can the results be applied to your local population/in your context?	Yes	Yes	Yes	Yes	Yes
11	Would the experimental intervention provide greater value to the people in your care than any of the existing interventions?	Yes	Yes	Yes	Can't tell	Yes