



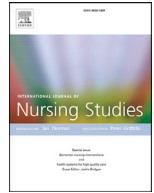
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Contents lists available at ScienceDirect

International Journal of Nursing Studies

journal homepage: www.elsevier.com/ijns

The evidence base of nurse-led family interventions for improving family outcomes in adult critical care settings: A mixed method systematic review

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ARTICLE INFO

Article history:

Received 21 January 2021

Received in revised form 5 September 2021

Accepted 25 September 2021

Keywords:

Critical care

Family-centered care

Family outcomes

Nursing intervention

Systematic review

Mixed method

ABSTRACT

Background: The COVID-19 pandemic has exacerbated the consequences of a patient's admission to critical care settings, causing families to face more psychosocial issues than in previous years. Thus, nurses and other clinicians need to keep abreast of interventions that support the families of critical care patients. **Objective:** To provide evidence of nurse-led family interventions and their family outcomes in adult critical care settings.

Design: A mixed method systematic review in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis checklist.

Data sources: The search included both a screen of relevant databases (PubMed, Scopus, Cumulative Index of Nursing and Allied Health Literature, and the Cochrane Library) and the screening of citations in relevant articles. Studies published in the English language between January 2010 and October 2020 were considered. The final database searches were performed on 20 October 2020.

Methods: Screening and eligibility assessment were conducted using the Rayyan software. Studies describing the family outcomes of nurse-led interventions in adult critical care settings through either qualitative or quantitative methods were included, i.e., the mixed method synthesis permitted the inclusion of either qualitative or quantitative findings. Article quality was evaluated by three authors using the Joanna Briggs Institute's critical appraisal tools.

Findings: A total of 15 studies – two trials, eight quasi-experimental studies, four qualitative, and one mixed method met the inclusion criteria. The described interventions were organized into five categories: educational/informational; family involvement in care; diary; communication; and bundled interventions. These categories varied in terms of elements, delivery, and family outcomes. Nurse-led interventions that resulted in small to medium improvements in family outcomes included educational interventions with digital storytelling, a bundled approach, informational nursing interventions, and nurse-driven emotional support. The included studies ($n = 2$) that investigated family rounds in the ICU reported that this approach did not noticeably influence family outcomes.

Conclusion: The differences in the intervention elements, tools, and outcomes evaluated in this review reflect the diversity of family needs, and that numerous interventions have already been developed to promote family health in critical care settings. The evidence suggests that interdisciplinary nurse-led family interventions can improve family outcomes.

Tweetable abstract: Interprofessional nurse-led family interventions draw on diverse approaches and improve family outcomes in adult critical care settings

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What is already known

- Family members of patients admitted to critical care settings experience distress during and after discharge.
- Although family interventions cross disciplinary boundaries, nurses are well situated to provide support due to the frequency of their interactions with family members.

What this paper adds

- In critical care settings, nurse-led interventions improve family outcomes; notably, educational interventions, family involvement in care, the use of a diary, communication, and bundled interventions improved various family outcomes. However, family rounds did not noticeably influence any family outcomes.
- Caring for critically ill patients can – when appropriate – be extended to families, and nurses should be utilized more efficiently to deliver interventions targeting specific family needs.

1. Introduction

The admission of a patient to the Intensive Care Unit (ICU) often triggers enormous emotional, financial and social distress in the patient and their family (Al-Mutair et al., 2014; Imanipour et al., 2019). The experience can alter the patient's or their family members' health by causing anxiety, depression, complicated grieving, post-traumatic stress disorder (PTSD), and Post-Intensive Care Syndrome-Family (PICS-F). Petrinc and Martin (2018) revealed that 45.8%, 25% and 11.1% of family decision-makers experienced anxiety, depression, and PICS-F, respectively, after a family member was admitted to the ICU. Likewise, Alfheim et al. (2019) showed that upon admission, up to 54% of family members experience PTSD symptoms. The family members of ICU patients also have diverse needs, including information, flexible ICU visits, hope and assurance (Jacob et al., 2016). Moreover, the COVID-19 pandemic has heightened the psychosocial issues that the families of critically ill patients face. Azoulay et al. (2020) described how the pandemic has made it more difficult to support families of critically ill patients, namely, the suspension of family visits in ICUs, hospital staff reluctance to share scarce personal protective equipment with the family members of ICU patients, and stress among clinicians – which could reduce their ability to support the family members of ICU patients. This warrants a review of the current evidence on interventions with family outcomes as the primary outcome. Thus, this mixed method systematic review aimed to describe nurse-led family interventions, as well as their outcomes, in adult critical care settings.

2. Background

Current guidelines and published literature (reviews and meta-analyses) describe several interventions that target the family members of ICU patients (Davidson et al., 2017 (Davidson et al., 2017)⁶; Goldfarb et al., 2017; Lee et al., 2019; Mackie et al., 2018; Zante et al., 2020). Clinical practice guidelines for family-centered care in the ICU recommend interventions involving family presence in the ICU, family support, communication, specific consultation with ICU team members, as well as operational and environmental issues (Davidson et al., 2017). However, these guidelines offer weak recommendations, and the authors argue that further evidence of family-oriented interventions is necessary. A review by Goldfarb et al. (2017) indicated that patient- and family-centered care (PFCC) interventions reduce the length of an ICU stay by an average of 1.21 days; however,

the authors highlighted that the effectiveness of PFCC interventions should be further evaluated in critical care settings. The results of a review by Lee et al. (2019) confirmed that family support interventions improve communication and shared decision-making, as well as reduce ICU length of stay (LOS) and hospital LOS among critically ill patients by –0.89 and –3.78 days, respectively. Moreover, another recent review reported that interventions which promote family involvement in care can improve patient outcomes in acute care settings (Mackie et al., 2018). The review by Zante et al. (2020) revealed that end-of-life conferences can reduce the prevalence of PTSD, anxiety, and depression, while condolence letters worsen PICS-F. However, the authors did highlight that the evidence base for positive patient outcomes due to family involvement in care is presently weak.

Although current guidelines (Davidson et al., 2017) and previous reviews (Goldfarb et al., 2017; Lee et al., 2019; Mackie et al., 2018; Zante et al., 2020) have discussed family-centered interventions in adult acute care settings, some aspects of these interventions remain vague. For example, researchers have voiced concerns about the limited evidence regarding the efficacy of family-centered interventions. Secondly, the empirical evidence of family outcomes following the implementation of nurse-led family interventions is rather unclear. This makes it challenging to identify specific nursing elements that will make family-centered interventions beneficial for adults in the ICU setting. In addition, previous reviews have noted that objective measures for the efficacy of family-centered interventions often use either qualitative or quantitative findings. However, the complexity of family member needs – which may not be fully captured using only quantitative outcomes – may require mixed method approaches to widen the evidence base concerning nurse-led interventions. Thus, efforts to broaden the evidence base of nurse-led interventions ought to utilize mixed method evidence synthesis. This also increases the methodological inclusiveness and evidence that is usable by a wider range of stakeholders ((Sandelowski et al., 2013). This suggests that there is a need for a mixed method review.

The objective, search strategy, inclusion criteria, and methods of analysis underlying this review were all specifically chosen to identify evidence-based nurse-led interventions that can be optimized to support the family members of ICU patients as well as describe the family outcomes of such interventions. Nurse-led family interventions were conceptualized as interventions that target the whole family or individuals in the family, occur as a collaborative, non-hierarchical interaction between a family and health care professionals, and are directed and/or delivered by a nurse(s) to address a family need (Eustance et al., 2015).

Healthcare professionals are often unprepared to implement agile procedures – such as family-witnessed cardiopulmonary resuscitation – into clinical practice (Sak-Dankosky et al., 2018). However, nurses are well situated to care for family members due to their proximity to families and the ample time they spend with both patients and families. The knowledge provided in this review will enable researchers and healthcare organizations to develop family-centered interventions that target specific meaningful family outcomes.

3. Aim

This mixed method systematic review aimed to provide evidence of nurse-led family interventions and their family outcomes in adult critical care settings. To address this aim, the following questions guided our review:

What types of nurse-led family interventions are used in adult ICUs?

¹ Please replace: Davidson et al., 2016 to Davidson et al., 2017

Table 1
Inclusion criteria.

Inclusion
<ul style="list-style-type: none"> • <i>Types of studies</i>: quantitative (randomized controlled trials (RCTs), quasi-experimental & prospective studies) and qualitative studies. • <i>Setting</i>: adult critical care/intensive care settings • <i>Outcomes</i>: the study reported family outcomes linked to a nurse-led intervention, e.g., coping, anxiety and/or depression, stress levels, comprehension of information, support, satisfaction, comfort, communication, education) • <i>Interventions</i>: nurse-led intervention involving and delivered by a nurse, with the family as the main recipient • <i>Geographical scope</i>: studies in any country • <i>Language</i>: studies reported in English • <i>Population</i>: family members (children included) of patients admitted in adult critical/ intensive care units as the primary recipients of the intervention

Do nurse-led family interventions improve family outcomes in adult critical care settings?

4. Methods

4.1. Design

A mixed method systematic review in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement (Moher et al., 2009) was performed. The mixed method review approach was chosen because it enhances the utility and impact of the review results by integrating quantitative and qualitative evidence from different types of studies (Harden, 2010).

4.2. Information sources and search strategy

To ensure that no similar review had already been conducted, the Cochrane Library, Google Scholar and the TRIP Database were initially searched. An information specialist was consulted to develop the most effective search strategy.

Electronic searches of four databases – PubMed, Scopus, the Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Cochrane Library – along with the Cochrane Central Register of Controlled Trials (CENTRAL) were performed. The search syntax and results are provided in supplementary information I.

An information specialist was consulted to ensure that a comprehensive literature search was performed. The following keyword variations were considered in the search strategy: “family nursing, family health care nursing, family-centered care, family-centered nursing, and nursing interventions or family nursing interventions, intensive care unit, critical care unit, family meetings, diaries, adult”. Moreover, the reference lists of studies included in the final analysis were also manually screened to identify relevant articles that were overlooked in the initial literature search. Studies published from 2010 to October 2020 were considered. The final database searches were performed on 20 October 2020.

4.3. Selection criteria

The inclusion criteria are summarized in Table 1. The following definitions were applied when assessing identified studies: *Family* refers to the people who the patient considers his/her family. This includes family members along with those related by ancestry, social ties such as friends, and legal caretakers such as surrogate caregivers notwithstanding contextual differences (legal, biological, sociological, and psychological) in the definition of family across different countries and cultures (Kaakinen et al., 2015). To be included in the review, a study had to have either developed or assessed family nurse-led interventions (as defined in this review). *Family nurse-led interventions* are time bound, target the family or individual as the “unit of intervention” and occur as a collaborative,

non-hierarchical interaction between a family and an interprofessional team in which a nurse(s) directs and/or delivers the intervention (Eustance et al., 2015). To be included in the qualitative synthesis, a study had to have reported family members’ opinions (e.g., their views and/or experiences of an intervention).

4.4. Search outcomes and study selection

Articles retrieved through the literature screen were exported to a database created in Rayyan software (Ouzzani et al., 2016). The removal of duplicates and initial inspection of the titles and abstracts of 279 articles were performed in this database. After the removal of duplicates, two review authors (FK and YHA) independently inspected the titles and abstracts of 239 articles for congruence with the inclusion criteria. A total of 82 full-text studies were screened for eligibility. The main reason for exclusion was that interventions were not nurse-led, or if they were, did not report the family outcomes of the intervention. The final analysis included a total of 15 articles (Fig. 1).

4.5. Data abstraction

The generic characteristics of each study were extracted into a series of researcher-developed tables. For each study, generic elements (author(s), date of the study, country, study design, sample size, aim and methodology) and topic-specific content (intervention, outcome measures and family outcomes) were recorded. Data abstraction was performed by one of the authors, while one review author (FK) extracted and charted the data. Another review author (TK) cross-checked the abstracted data and missing data, while ambiguity was discussed and resolved among the research team members.

4.6. Quality appraisal

The quality assessment was performed by two review authors (FK and TK) who always managed to reach a consensus in cases of initial doubt. The quality appraisal applied three design-specific Joanna Briggs Institute (JBI) critical appraisal tools, more specifically, the checklists for quasi-experimental studies, qualitative studies, and RCTs (JBI, 2017). Supplements II - IV indicate how the identified studies were appraised for quality using the JBI appraisal tools. A point was assigned to a study if the presented research answered the appraisal question, whereas no points were awarded to the study if the methodology was not relevant to the appraisal tool item. The overall quality scores were categorized into three categories: high; moderate; and low. Studies were rated as high quality if $\geq 70\%$ of the appraisal tool items had received a point, as moderate quality if $\geq 65\%$ of the appraisal tool items had received a point, and low quality if $\leq 55\%$ of the appraisal tool items had received a point.

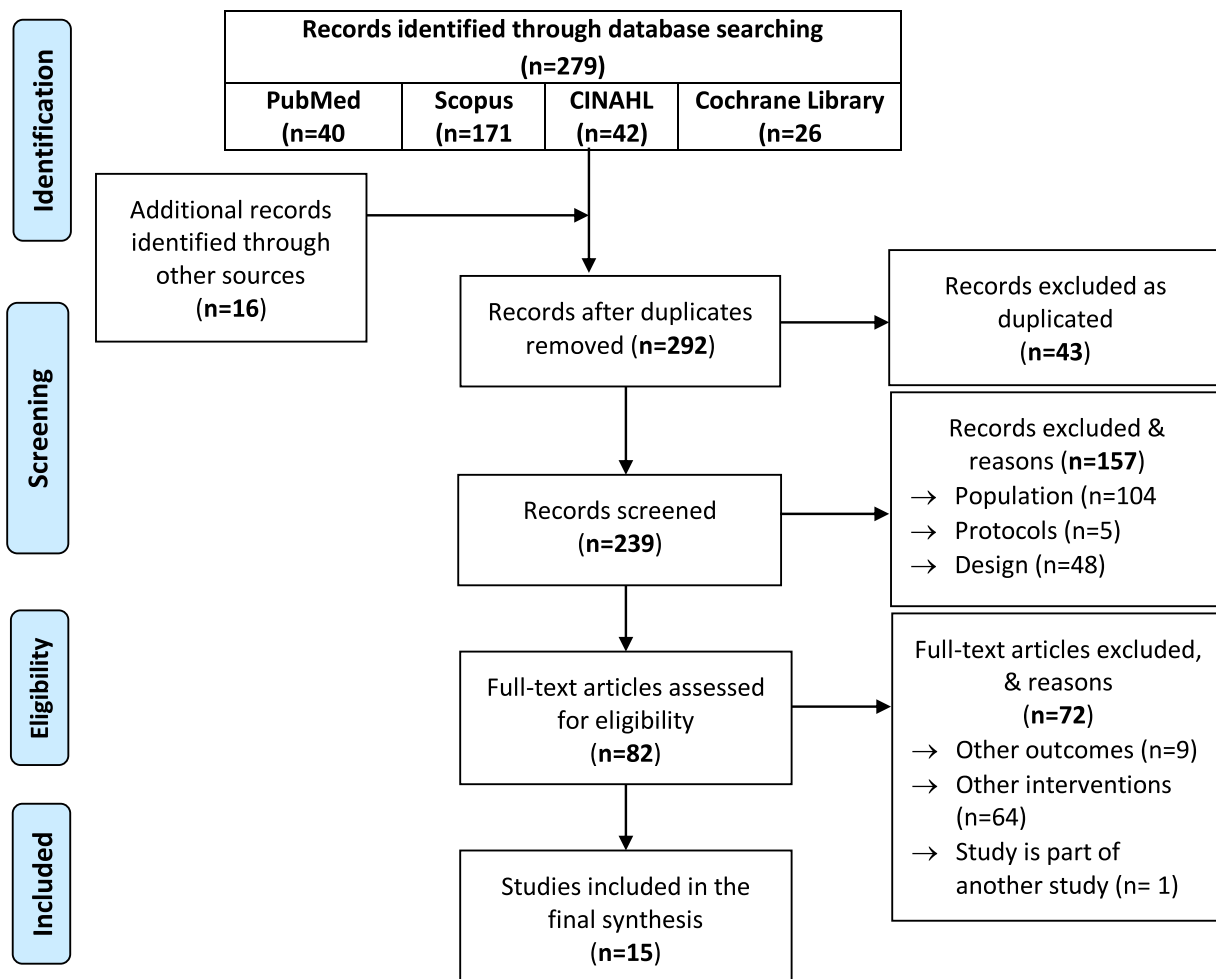


Fig. 1. Flow diagram showing study selection.

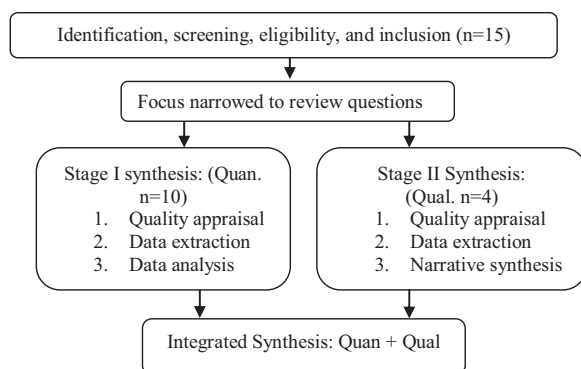


Fig. 2. Process for mixed method synthesis (Harden, 2010).

4.7. Data synthesis

The mixed method approach used in this review is illustrated in Fig. 2. Mixed- methods approaches allow for a comprehensive conceptualization and more methodologically inclusive synthesis of evidence (Harden, 2010). A segregated data synthesis approach, initially presented by Sandelowski et al. (2013), was performed in three stages. The first stage involved separate quantitative and qualitative synthesis. For example, when sufficient quantitative data were available, effect sizes were computed in terms of Cohen's d (Cohen, 1998) or Hedges g (Hedges and Olkin, 1985) to infer whether an intervention improved family outcomes. The

interpretation of effect sizes followed the recommendations of Cohen (1998), namely, $d = 0.2 - 0.4$, $d = 0.41 - 0.8$, and $d > 0.8$ denoted small, medium, and large effects, respectively. The data reported in six studies enabled the calculation of effect sizes, while the other quantitative studies ($n = 5$) did not report the statistics required to calculate effect sizes. Other data, such as percentage of families showing a certain outcome or the difference in means between the interventional and control group, were reported whenever provided in a study. The second stage of synthesis involved the qualitative results relevant to the review questions. For qualitative synthesis, narrative synthesis of textual data presenting nurse-led intervention and family outcomes was done in a tabular form. In the final stage of synthesis, the two types of findings were integrated (Fig. 2) into a single synthesis of the quantitative and qualitative results on nurse-led family interventions and their outcomes in adult critical care settings. A *fit-for-purpose* mixed method narrative synthesis suggested by Gough et al. (2017) was conducted.

5. Findings

5.1. Characteristics of included studies

The present review included a total of 15 studies (Table 2), with 10 of these being quantitative (Bishop et al., 2013; Hanley and Piazza, 2012; Huynh et al., 2017; Knapp et al., 2012; Jacobowski et al., 2020; Rodriguez-Huerta et al., 2019; Shelton et al., 2010; Weber et al., 2019; White et al., 2018; Wu et al., 2016), four qualitative (Frisman et al., 2018; Johansson et al., 2018; Naef et al., 2020;

Table 2
Summary of included studies.

Author(s), Year, Location	Aim of the study	Study design	Participants	Intervention and delivery	Measurements and Main results	Quality appraisal
Quantitative studies						
Bishop et al. (2013), USA	To improve communication, discharge readiness and satisfaction of burn patients and families.	Quasi-experimental (before and after study)	Nurses and family members (response $n = 35$ before and $n = 37$ after)	Family presence during dressing change <i>Delivery:</i> nurse provided information/ education prior to other intervention elements and intra-intervention	Instrument: Press Ganey Satisfaction Survey after discharge Main results: After the intervention, there was percentage difference in satisfaction across: staff attitudes towards visitor ($\Delta 7.5\%$); information ($\Delta 6.5\%$); rating of nursing care ($\Delta 4.3\%$); inclusion in treatment decision making ($\Delta 3.9\%$); instructions for care at home ($\Delta 2.4\%$); readiness for discharge ($\Delta 1.5\%$).	5 out of 9 (Low quality; ≤ 5)
Hanley and Piazza (2012), USA	To facilitate pediatric visitations in an adult ICU.	Quasi-experimental posttest design	Staff ($n = 20$), family specifically parents ($n = 14$)	Booklet entitled <i>A Visit to the ICU</i> <i>Delivery:</i> a staff nurse with experience in pediatric visitation in the ICU undertook the intervention program	Measure: a 5-point Likert scale and 5-question study-specific tool for parental evaluation of the book. Main results: the book eased fears among children and facilitated coping mechanisms: helpful in preparing children (score = 4.8/5 points); eased parents fears (score = 4.5/5); answered our questions (score = 4.7); more comfortable bringing child to visit (score = 4.6/5); child seemed more prepared (score = 4.7/5)	4 out of 9 (Low quality; ≤ 5)
Huynh et al. (2017), USA	Measuring outcomes of an intensive care unit family diary program.	Quasi-experimental (before and after design)	Family members before=93, after= 107	ICU family diary <i>Delivery:</i> ICU dairy team consisting of ICU nurses with AACN National Teaching Institute training and experience of the effect of diaries globally.	Measure: Family Satisfaction with Care in the ICU (FS-ICU) Survey Main results: family satisfaction with care and decision making did not increase after the intervention on a scale of 0–100; (pooled standardized mean scores satisfaction with care scores before intervention = 90.5, after= 91.2; (pooled mean difference satisfaction with decision making scores before intervention = 90, after = 89.7). The percentage of positive comments on family satisfaction before intervention 73%, after 71%.	7/9 (High quality)
Jacobowski et al. (2010), USA	To assess the impact of family attendance at structured interdisciplinary family rounds would enhance communication at end-of-life planning	Quasi-experimental- Before and after design	227 family members	Family rounds <i>Delivery:</i> nurses and other ICU team members	Measure: FS-ICU Main results: overall family satisfaction with care and decision making did not increase after the intervention for family members whose patient survived or died during the ICU stay: median FS-ICU scores (81, IQR: 62–95, $P > 0.05$) Decision-making also did not increase after the intervention: median FS-ICU scores (80; IQR = 63–93, $p > 0.05$)	9 out of 9 (High quality)
(Knapp et al., 2013), USA	To evaluate the impact of the EPICS family bundle on stress and coping.	Quasi-experimental non-equivalent control group	Family members ($n = 84$)	EPICS family bundle <i>Delivery:</i> staff nurses, & staff nurse champions aided implementation.	Measure: State-Trait Anxiety Inventory and the Ways of Coping Questionnaire. Main results: the intervention showed small effect sizes on distancing (<i>Hedges' g</i> = 0.4) and acceptance of responsibility (<i>Hedges' g</i> = 0.1).	9 out of 9 questions (High quality)
Rodriguez-Huerta et al. (2019), Spain	To evaluate whether an informative intervention by nursing professionals through Short Message Service (SMS) improved patients' family members' satisfaction with the intensive care experience.	Exploratory, two-armed, randomized, non-pharmacological, prospective study.	Family members-intervention group $n = 34$; control $n = 36$	Informational nursing intervention <i>Delivery:</i> provided by nurses on the research team.	Measure: Critical Care Family Needs Inventory. Main results: the intervention had a medium effect on family satisfaction with care (<i>Hedges' g</i> of 0.6)	10 out of 13 (High quality)

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Table 2 (Continued).

Author(s), Year, Location	Aim of the study	Study design	Participants	Intervention and delivery	Measurements and Main results	Quality appraisal
Shelton et al. (2010) USA	To examine the effect of adding a full-time family support coordinator to the surgical intensive care unit team on family satisfaction, length-of-stay, and cost in the surgical intensive care unit.	Quasi-experimental	Family members before intervention ($n = 114$) after intervention ($n = 113$)	Family Support coordinator Delivery: an experienced ICU nurse	Measures: Critical Care Family Assistance Program Family Satisfaction Survey Main results: the intervention had significant mean differences on (i) family satisfaction with communication increased for physicians (Δ mean = 0.39, $p = 0.003$); social workers (Δ mean = 0.36, $p = 0.006$) and respiratory therapists (Δ mean = 0.29, $p = 0.02$); (ii) understanding tests, treatments, and condition of the patient (Δ mean = 0.33); (iii) consideration of family needs (Δ mean = 0.42, $p = 0.001$) The intervention also had differences in mean LOS (Δ mean = 0.37 days), cost saving per patient of \$3164 overall savings of \$591,728.	8 out of 9 (High quality)
Weber et al. (2018) USA	Hypothesis: It was hypothesized that adding dedicated afternoon rounds for patients' families to supplement standard family support would improve overall family satisfaction with care in a neuroscience ICU.	Quasi-experimental (Pre- and post implementation) design.	Families (146 pre-I) and 141 post-I) were collected.	Scheduled Family rounds Delivery: ICU staff nurses	Measures: FSC-ICU Main results: no difference in mean FSC-ICU between groups (pre and post intervention: $89.289.2 \pm 11.2$; 87.4 ± 14.2 respectively; $p = 0.6$).	7 out of 9 (Moderate quality)
(White et al., 2018), USA	To compare a multicomponent family-support intervention delivered by the interprofessional ICU team with usual care.	Multicenter, stepped-wedge cluster-randomized trail.	Surrogates ($n = 807$; control group $n = 501$; intervention group $n = 308$), patients ($n = 1420$), Four to six nurses called partner nurses delivered the intervention in each ICU (five ICUs).	Nurse-driven emotional support and relationship building paired with re-engineered ICU teams Delivery: interprofessional ICU team	Measures: HADS, IES, QOC, Modified PPPC Main results: There was no significant difference in the surrogates' mean anxiety, depression, and clinician-family communication. Whilst the intervention had a small effect size on the surrogates' quality of communication (<i>Hedges' g</i> = 0.27) as was the effect on the perceived patient-centeredness of care (<i>Hedges' g</i> = 0.23). The mean length of stay in the ICU was shortened by 0.7 days	9/13 (Moderate quality)
Wu et al. (2016), USA	To develop, implement and evaluate the impact of a nurse-led family meeting intervention in a neuroscience ICU.	Design: Quasi-experimental (before and after)	nurses ($n = 23$), family members ($n = 31$).	Nurse-led family meetings Delivery: nurse manager and charge nurses.	Measure: a study-specific 6-question tool (four questions relating to communication, one question relating to fulfillment of needs and one question relating to satisfaction) Main results: Family members felt that communication improved; they had appropriate information for decision-making, allowing them to feel in control; there was an increase in family satisfaction. The intervention showed a statistically significant impact on communication, the family's ability to make decisions and levels of satisfaction ($p < 0.02$). Generally, family members commented positively on the nurse-led family meeting.	6/9 (Moderate quality)
Qualitative studies						
(Frisman et al., 2018), Sweden	To identify and describe the outcomes of a nurse-led intervention regarding family functioning and well-being in families with a member who was critically ill.	Qualitative inductive-descriptive design	Family members ($n = 8$)	Health-promoting conversations with families Delivery: Two ICU nurses	Measure: interviews Main results: three outcome classification were made on the intervention – strengthening togetherness, caring attitude, and confirmation through health-promoting conversations	9/10 (High quality)
(Johansson et al., 2018), Sweden	To explore how family members experienced the use of a diary when a relative does not survive the stay in the ICU.	Qualitative using a hermeneutic approach	Family members of non-survivors ($n = 9$)	Diary written by relatives for themselves, encouraged by a nurse	Measure: interviews Main results: diaries promoted social interactions, rational understanding, and provided information.	9/10 (High quality)

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Table 2 (Continued).

Author(s), Year, Location	Aim of the study	Study design	Participants	Intervention and delivery	Measurements and Main results	Quality appraisal
Naef et al. (2020) Switzerland	To investigate family and health professional experience with a nurse-led family support intervention in intensive care	Qualitative	Family members (n = 19); health professionals (n = 19)	APN-delivered family support Delivery: Advanced practice nurse	Measures: interviews with families, focus group interviews with health professionals Main results: the intervention was valuable, essential part of ICU care; the APN was experienced as one who facilitates staff-family interaction and communication.	9/10 (High quality)
Nielsen et al. (2019) Denmark	To explore patients' and relatives' perception and use of a diary written by relatives for the critically ill patient.	Qualitative hermeneutic phenomenological study	Patients (n = 12); Relatives (n = 12)	Diary written by relatives for critically ill patients	Measures: in-depth interviews Main results: diary strengthened the relationship between the family and the patient.	9/10 (High quality)
Mixed-methods studies						
White et al. (2012), USA	To assess the feasibility, acceptability, and perceived effectiveness of a multifaceted nurse-led intervention to improve surrogates' decision-making in ICUs.	Single-arm interventional study with mixed methods	Family members (n = 35), 15 physicians, one nurse delivered the intervention. Interviews: family (n = 10)	Four Supports: emotional, communication, decision, anticipatory grief support Delivery: a trained nurse interventionist with at least 3 years of experience in the study ICU.	Measures: Quality of Communication and the Decision Self-Efficacy Scale Main results: Improved quality and timelines of communication. Improved patient-centeredness of care. Facilitated dialog on patient's values and preferences. Discordance between physician's and surrogates' estimates of the patient's likelihood of having severe long-term functional impairment after discharge decreased (p = 0.01). Qualitative findings: the intervention provided emotional support, timely communication, increased PPPC, maintained family availability, and bridged lay and medical knowledge.	6/9 (Moderate quality)

APN: Advanced Practice Nurse, ICU: Intensive Care Unit; Δ: difference; IICE-FPSQ: Iceland Family Perceived Support Questionnaire, IES: Impact of Event Scale, QOC: Quality of Communication Scale, HADS: Hospital Anxiety and Depression Scale, PPPC: Patient Perception of Patient Centeredness Scale.

Nielsen et al., 2019) and one mixed method study (White et al., 2012).

Of the identified studies, 10 were conducted in the United States, two were performed in Sweden (Frisman et al., 2018; Johansson et al., 2018), while Denmark (Nielsen et al., 2019), Spain (Rodriguez-Huerta et al., 2019) and Switzerland (Naef et al., 2020) were covered in one study each.

The included quantitative studies employed a variety of designs (Table 2). The quasi-experimental design was the most common design (n = 9) (Bishop et al., 2013; Hanley and Piazza, 2012; Huynh et al., 2017; (Knapp et al., 2013); Jacobowski et al., 2010; Shelton et al., 2010; Weber et al., 2018; White et al., 2012; Wu et al., 2016). Among the nine quasi-experimental studies, three studies (Bishop et al., 2013; Huynh et al., 2017; Wu et al., 2016) used the before and after approach. A further two studies (Rodriguez-Huerta et al., 2019; White et al., 2018) were randomized controlled trials.

The sample sizes of the included quantitative studies also varied noticeably. Four studies enrolled less than 100 participants. Whilst eight studies had more than 100 participants; of these, two studies had more than 200 participants. The smallest sample size among the quantitative research was 14 parents, who were recruited for the Hanley and Piazza (2012) study, while the largest sample size was the 1106 surrogates and 1420 patients used in the White et al.'s study (2018). The sample sizes also varied across qualitative studies – ranging from 8 to 28. The study by Naef et al. (2020) had the largest sample size, i.e., 28 participants. All qualitative studies (n = 4) used interviews for data collection from family members.

The studies also provided insight into diverse circumstances of family members of ICU patients, including family members of non-ICU survivors ((Johansson et al., 2018); Naef et al., 2020), child vis-

itations to adult ICUs (Hanley and Piazza, 2012; (Johansson et al., 2018)), end-of-life counselling (Jacobowski et al., 2010), and usual family members of critically ill patients.

Quality of the included studies

The strength of evidence in the included studies was related to research design (supplementary information II & III) and data analysis. Each included study was subjected to a quality assessment using questions related to methodological aspects, with the response options being 'Yes', 'No', 'Unclear', or 'Not Applicable'. The total quality assessment score of each study was used to stratify evidence from high to low quality. Most studies (n = 9) (Frisman et al., 2018; Huynh et al., 2017; (Johansson et al., 2018); Knapp et al., 2013; Jacobowski et al., 2010; Naef et al., 2020; Nielsen et al., 2019; Rodriguez-Huerta et al., 2019; Shelton et al., 2010) were classified as high quality. Two studies (Bishop et al., 2013; Hanley and Piazza, 2012) were classified as low quality and four (Weber et al., 2018; White et al., 2012, 2018; Wu et al., 2016) were classified as moderate quality.

5.2. Segregated synthesis of findings: types of interventions

The interventions described in the included studies were classified into five types according to their core components, with interventions that involved more than one core element classified as bundled interventions. The types included: (i) educational/informational (Hanley and Piazza, 2012; Rodriguez-Huerta et al., 2019); (ii) family involvement/presence in care (Bishop et al., 2013); (iii) diary (Huynh et al., 2017; (Johansson et al., 2018); Nielsen et al., 2019); (iv) communication (Frisman et al., 2018; Jacobowski et al., 2010; Weber et al., 2018; Wu et al., 2016); and (v) bundled interventions ((Knapp et al., 2013); Naef et al., 2020; Shelton et al., 2010; White et al., 2018, 2012).

5.2.1. Educational/informational interventions

The intervention described by Hanley and Piazza (2012) focused on providing information to enhance children's ICU experiences. More specifically, the authors described how a booklet ("A Visit to the ICU") can address the unique informational needs of children visiting the ICU. The book was co-authored by a nurse responsible for pediatric visitation to the ICU, and covers stimuli expected for the ICU, e.g., smells, feelings, medical equipment (monitors, ventilators, and IV lines), and patient circumstances (Hanley and Piazza, 2012). In a study by Rodriguez-Huerta et al. (2019), a nurse provided ICU patients' family members with information about the patient's situation through Short Message Service (SMS) messaging.

5.2.2. Family involvement/presence in ICU care

The intervention presented by Bishop et al. (2013) involved the family in care by inviting patients' family members to a burns unit to witness dressing changes. The intervention was delivered by nursing staff with the aim of increasing opportunities for communication and education, enhancing the patient's readiness for discharge and improving patient and family satisfaction with care (Bishop et al., 2013).

5.2.3. Diaries

The studies belonging to this category ($n = 3$: Huynh et al., 2017; Johansson et al., 2018; Nielsen et al., 2019) investigated the use of diaries. The most common approach described in these studies was that ICU patients' family members would record their thoughts and feelings in a tangible diary. For instance, the quantitative study presented by Huynh et al. (2017) assessed the outcomes of recording thoughts, experiences, and feelings in a 45-page spiral bound notebook including an invitation, instructional page exemplifying the nature of information, section on common ICU terms, and information about a post-ICU recovery program. In contrast, Johansson et al., 2018 and Nielsen et al. (2019) used a hermeneutic approach to determine the family outcomes of using a diary. More specifically, the authors assessed how family members perceived the importance of using diaries for documenting ICU patients' everyday activities.

5.2.4. Communication with family members

This category included health-promoting conversations (Frisman et al., 2018), family rounds in the ICU (Jacobowski et al., 2010; Weber et al., 2018), and nurse-led meetings (Wu et al., 2016). Health-promoting conversations were delivered by two ICU staff nurses and involved narrating the actual family situation and asking each family member to articulate their ICU experience. This approach aimed to create a context for change related to the families' identified problems and resources. The conversations took place at the family's home following discharge from the ICU. The interventions presented by Jacobowski et al. (2010) and Weber et al. (2018) investigated family rounds of the ICU, which included the presentation of vital signs by nurses, daily patient-related events, a summary for the family using simple explanations, along with a possibility for family members to ask the ICU team questions. In the study by Weber et al. (2018), these family rounds were scheduled in the mid-afternoon. In this case, the neuroscience ICU nurses distributed flyers describing the family rounds to the family of each newly admitted patient. The nurses participating in the rounds were trained and conducted the rounds with a neuroscience intensivist. During the rounds, staff responded to family member questions, discussed certain suggestions for how to improve care, presented updates on care plans, and organized ad-hoc family meetings for further discussions. Wu et al. (2016) developed and investigated nurse-led family meetings which focused on communication, decision-making, emotional support and understanding the illness trajectory.

5.2.5. Bundled family interventions

These interventions involved two or more types of interventions. They included the EPICS (Evaluate, Plan, Involve, Communicate and Support) family bundle (Knapp et al., 2013), nurse-driven emotional support (White et al., 2018), family support roles (Naef et al., 2020; Shelton et al., 2010). The effectiveness of the Evaluate, Plan, Involve, Communicate and Support family bundle (EPICS bundle) was tested by Knapp et al. (2013). This intervention serves to guide nurses on how to tailor their actions to the specific needs of individual family members in varying situations. EPICS is implemented by a nurse at the first encounter with the family member; the initial evaluation guides subsequent steps with the aim of alleviating stress and fostering coping. The role and actions of family support nurses were described in two studies (Shelton et al., 2010; White et al., 2012). The nurse-led decision-making support intervention entitled "The Four Supports Intervention" was based on the dual-process theory of decision-making and involved an ICU nurse who acts as a family support specialist in the ICU team. The nurse in this intervention focused on four domains of support (Emotional, Communication, Decision-making and Anticipatory: see White et al., 2012). Naef et al. (2020) and Shelton et al. (2010) discussed family support coordinator interventions, an approach that was further tested in a study by Moore et al. (2012). The review authors excluded the study of Moore et al. (2012) as it further examined the intervention presented by Shelton et al. (2010). This was done to ensure distinctiveness and avoid redundant publication. The intervention introduced by Naef et al. (2020) established a new role, namely, the Advanced Practice Nurse (APN), who implements APN-delivered family support. In another study, Shelton et al., 2010 developed and investigated a family support coordinator intervention which was conducted in surgical ICUs in an interprofessional way.

5.3. Segregated synthesis: family outcomes of nurse-led family interventions

Of the 15 reviewed studies, more than 21 family outcomes were investigated; there are more quality of care-related outcomes (e.g., family satisfaction with care) relative to other outcomes (Table 3). A majority ($n = 11$) demonstrated improved family outcomes, one study reported deteriorated changes after the intervention (Table 3). From the quantitative studies, eight reported positive outcomes, with six interventions exerting small to medium positive effects on family outcomes. Of these, educational/informational nurse-led interventions positively impacted family support, family satisfaction with care and alleviated fears among children visiting adult ICUs. An informational nursing intervention (Rodriguez-Huerta et al., 2019) showed a medium effect on family satisfaction with care. The informational booklet "A Visit to the ICU" positively impacted five domains of visiting the ICU with children (preparing a child, easing family fears, answering questions on the ICU, bringing a child to visit, and a child's preparedness to visit the adult ICU; Hanley and Piazza, 2012). The EPICs family bundle intervention (Knapp et al., 2013) showed small effect (Hedges' $g = 0.4$) on distancing (i.e., cognitive response of detaching oneself and minimizing the significance of a situation; Folkman and Lazarus, 1988) and acceptance of responsibility (Hedges' $g = 0.1$).

When considering the results related to family involvement/presence in care, family presence during dressing changes influenced staff attitudes towards visitors, information sharing, rating of nursing care, inclusion in treatment decision-making, instructions for care at home, and readiness for discharge (Bishop et al., 2013).

Diaries promote a rational understanding of the severity of an illness, provide information and support emotional well-being

Table 3
Summary of interventions and family outcomes.

Intervention (Authors)	Family outcomes investigated	Comparisons of outcomes after the intervention		
		Improved (+)	Remained unchanged (±)	Deteriorated (-)
Family presence during dressing change (Bishop et al., 2013)	Satisfaction with the PFCC core concepts: information sharing, collaboration, dignity and respect, treatment decisions and discharge	(+)		
Booklet entitled A Visit to the ICU (Hanley and Piazza, 2012)	Preparing children to visit an adult ICU	(+)		
ICU family diary (Huynh et al., 2017)	Family satisfaction with care			(-)
Family rounds (Jacobowski et al., 2010)	Decision making, satisfaction with care		(±)	
EPICS family bundle (Knapp et al., 2013)	Stress and coping	(+)		
Informational nursing intervention (Rodriguez-Huerta et al., 2019)	Satisfaction levels in ICU.	(+)		
Family Support coordinator (Shelton et al., 2010)	Family satisfaction	(+)		
	Cost of ICU stay per patient	(+)		
	Length of stay	(+)		
Scheduled Family rounds (Weber et al., 2018)	Family satisfaction with care		(±)	
Nurse-driven emotional support and relationship building paired with re-engineered ICU teams (White et al., 2018)	Long-term psychological distress (anxiety and depression at six months)		(±)	
	Quality of decision-making		(±)	
	Clinician/family communication	(+)		
	The perceived patient-centeredness of care	(+)		
	Length of stay	(+)		
Nurse-led family meetings (Wu et al., 2016)	Family satisfaction	(+)		
Health-promoting conversations with families (Frisman et al., 2018)	Family functioning and well-being			
Diary written by relatives for themselves, encouraged by a nurse (Johansson et al., 2018)	Experience of using a diary when a relative does not survive the stay in the ICU	(+)		
APN-delivered family support (Naef et al., 2020)	Family and health professionals' experiences with support	(+)		
Diary written by relatives for critically ill patients (Nielsen et al., 2019)	Perceptions and use of a diary written by relatives for the critically ill patient	(+)		
Four Supports: emotional, communication, decision, anticipatory grief support (White et al., 2012)	Communication and decision-making process	(+)		

among family members (Huynh et al., 2017; Johansson et al., 2019). In the aftermath of a traumatic event, diaries have been shown to help families appreciate the critical illness experience (Nielsen et al., 2019) and provide bereavement coping strategies when a patient did not survive (Johansson et al., 2018; Johansson et al., 2019). Contrary to the previous positive findings from qualitative studies (Johansson et al., 2018; Nielsen et al., 2019), quantitative data from Huynh et al. (2017) indicated that family satisfaction with ICU care and decision-making did not increase after a diary intervention (pooled standardized mean satisfaction with care before intervention = 90.5, after = 91.2; pooled mean satisfaction with decision-making before intervention = 90, after = 89.7). Moreover, the percentage of positive feedback about family satisfaction decreased during the intervention, from 73% before the intervention to 71% after the intervention (Huynh et al., 2017).

Improvements in communication were noted for two interventions (health-promoting conversations and nurse-led decisional support), whereas the family rounds implemented in two studies had no significant impact on family outcome measures (Jacobowski et al., 2010; Weber et al., 2018). The qualitative results presented by Frisman et al. (2018) revealed that health-promoting conversations strengthen togetherness and foster a positive caring attitude, which provided family members with an opportunity to talk about their thoughts and feelings. Nurse-led family meetings improved communication ($p < 0.05$), the ability of family members to make informed decisions ($p = 0.002$), and family satisfaction with care ($p < 0.01$) (Wu et al., 2016). The nurse-led decisional support intervention assessed in this review enhanced confidence and the quality of communication, as well as reduced the degree of decision-making discordance between clinicians and family members about the patient's prognosis (after the intervention, the mean value of decisional confidence was 3.4 ± 0.4 on a 0–4 scale with higher scores reflecting more confidence). Wu et al. (2016) re-

ported similar results, i.e., the tested intervention significantly reduced the degree of decision-making discordance between clinicians and family members about the patient's prognosis (mean: 16.4 ± 16.8 on a 0–100 scale, $p = 0.01$), while the mean value for the quality of communication was 7.6 ± 1.8 (on a 0–10 scale) after the intervention.

Bundled interventions reduced distancing, improved acceptance of responsibility, family satisfaction with communication, understanding tests, treatment(s), patient condition, and consideration of family needs. These interventions also decreased the length of stay (LOS) and resulted in cost savings. Nurse-driven emotional support positively affected the quality of communication and perceived patient-centeredness of care (White et al., 2018); however, it should be noted that these effects were small (Hedges' $g = 0.27$; Hedges' $g = 0.23$, respectively). The Four Supports Intervention (White et al., 2012) led to significant changes in family members' perceived communication, decision-making and emotional support. For example, the intervention group demonstrated a higher mean score for the quality of communication than the control group (69.1 vs. 62.7; 95% CI 2.57–10.20, $p < 0.01$). The inclusion of a family support coordinator resulted in increased family satisfaction with communication ($p < 0.05$), cost savings, and an average LOS reduction of 0.37 days.

6. Discussion

This review aimed to provide evidence of nurse-led family interventions and their family outcomes in adult critical care settings. Identified studies provided low, moderate, to high-quality level of evidence on eleven interventions including educational/informational interventions, family presence in ICU care, diaries, communication, and those with bundled components. We note that there is substantial evidence that quality of care-related

indicators (e.g., satisfaction, communication/ information sharing, decision making) improved after various interventions. This partly implies integrating communication with family members into the ICU environment is associated with higher family-perceived quality of care. To support family health and well-being in ICU, such interventions can be considered to establish mutual understanding, along with empathetic and therapeutic relationships, are often the result of nurses' proactivity in addressing families (Wu et al., 2016). Most of the evidence per study-specific quality appraisal constitute high quality evidence. Thus, nurses and other clinicians can choose from different nurse-led interventions that are likely to improve quality of care-related indicators. Other outcomes included family psychological health indicators (e.g., depression, stress, coping, anxiety). Although it seems that one study (Knapp et al., 2013), improved family psychological health indicators whilst another intervention (White et al., 2018) showed no changes, we note there is lack of research on this category of family outcomes. Family functioning indicators and cost-related outcomes (e.g., length of stay; cost of ICU stay) were least frequently investigated.

Among the various types of analyzed interventions, this review strengthens the potential of nurse-driven emotional support and a family support coordinator in reducing LOS in the ICU. Support coordinators may alleviate the confusion about expectations that can arise from the insufficient engagement of family members. Hutchison et al. (2016) notes that well-structured and role-specific interventions (e.g., nurse-driven emotional support and family support) enhance the target population's understanding of the intervention and build trust between the implementor and the target group. This finding is in line with what was reported by Lee et al. (2019), i.e., protocolized family support interventions reduce LOS in the ICU. This finding also supports the guidelines published by Davidson et al. (2017), which call for communication and family presence in the ICU. However, there is limited evidence to fully understand the impact of nurse-role-specific interventions on LOS thus, highlighting the nascency of future research.

Evidence of the impact of nurse-led interventions on cost of ICU stay is reported after a family support coordinator intervention. Only one quasi-experimental study (Shelton et al., 2010) of high quality assessed outcomes related to cost of ICU stay. However, there is inadequate reporting in the cost-measures reported in the study. Thus, studies evaluating the impact of nursing interventions on this important outcome are lacking.

In general, the literature examined in this review presented a diverse set of intervention elements targeting family outcomes in adult critical care settings. These elements relate to those described in an earlier review by Kynoch et al. (2016). However, empirical findings regarding the benefits of family rounds contradict the guidelines on family-centered ICU care (Davidson et al., 2017). It is important to note that conclusions about the effect of family rounds (i.e., minimal effect) were based on only two original studies (i.e., Jacobowski et al., 2010; Weber et al., 2018). Furthermore, the intervention effects for studies with small sample sizes can lead to a certain degree of bias. For this reason, future studies should replicate the described interventions to confirm the results reported by other researchers. The analysis of family outcomes identified interventions that could be beneficial for the future development of ICU-specific interventions. While diaries, family meetings, communication, educational materials, and specialist roles - such as coordinators - have been substantially integrated into family-based interventional studies, novel elements should also be considered when designing family interventions for critical care settings.

The inclusion of both qualitative and quantitative evidence in this review is valuable in terms of translating research findings into practice. The instruments used to generate quantitative data are of-

ten limited in scope and collect only a specific type of data. The evaluation of various interventions has made it apparent that complementary data is necessary, e.g., those provided by qualitative methods, to comprehensively explain how family members cope with the admission of a loved one into the ICU. In other words, complementarity seeks to elaborate, enhance, and clarify the results from quantitative approaches with qualitative data. Thus, combining these two approaches generates evidence that can be useful to practitioners and others who might be interested in implementing or replicating the intervention in other settings.

6.1. Limitations

The present review of previous research includes some inherent limitations. Most importantly, the review revealed a paucity of rigorous studies related to nurse-led interventions in the ICU setting. This limits the evidence base that can be used to support the translation of nurse-led family interventions into wider practice. The studies also lacked well-defined approaches for describing recruitment, comparisons, and clear outcome measures. The small sample sizes and non-randomized approaches underlying most of the analyzed studies also limit the credibility of using the subsequent findings as a basis for practical recommendations. The studies mainly utilized quasi-experimental designs making the evidence prone to the low for confidence in observational pre-posttest designs in assessing outcomes of interventions. However, randomized studies cannot solely be used to develop clinical practice. Furthermore, it is likely that the decision to include only research published in English (language bias) caused some relevant publications to be overlooked. Lastly, mixed data integration across all types of interventions was not achieved, as most categories of interventions were only supported by quantitative data. This compromises the rigor of a mixed method systematic review.

7. Conclusions

Our review suggests that nurse-led interventions have small to medium improvements in family outcomes; specifically, educational/informational interventions improve family support, enhance family satisfaction with care and alleviate fears among children visiting adult ICUs. Further, treatment processes, decision-making, and readiness for discharge improved following nurse-led interventions that enhanced family involvement/presence in care. Previous research has presented conflicting results about the benefit of diaries however, most studies presented in this review suggest that diaries foster family understanding of the severity of an illness, provide information, and promote emotional well-being among family members. Communication-based interventions enhance confidence and the quality of communication. Benefits from bundled nurse-led interventions have cost saving, improved quality of communication and patient-centeredness of care. Lastly, it should be noted that the existing evidence, although compelling, was rather limited; hence, we are cautious to make any strong conclusions about the effectiveness of nurse-led interventions for family members of ICU patients. In this way, we conclude by suggesting that the research presented in this review serves as an excellent foundation for amassing more evidence (both qualitative and quantitative) concerning the family outcomes of nurse-led interventions in critical care settings.

Declaration of Competing Interest

The authors declare no conflict of interest.

CRediT authorship contribution statement

Frank Kiwanuka: Conceptualization, Investigation, Writing – review & editing, Data curation, Formal analysis, Visualization, Validation. **Natalia Sak-Dankosky:** Conceptualization, Investigation, Writing – review & editing, Supervision. **Rose Clarke Nanyonga:** Conceptualization, Investigation, Writing – review & editing, Supervision. **Tarja Kvist:** Conceptualization, Investigation, Writing – review & editing, Supervision.

Acknowledgments

We wish to acknowledge Mrs. Kirsi Vahakangas, librarian, University of Eastern Finland, who helped us with database search.

Funding

FK received grants from the Finnish National Agency for Education (EDUFI fellowship grant), and support from the Department of Nursing-University of Eastern Finland, Kuopio. Research Training and capacity Building for Rose Clarke Nanyonga was supported in part by the Fogarty International Center of the National Institutes of Health, U.S. and the Department of States Office of the U.S. global AIDS Coordinator and Health Diplomacy (S/GAC); presidents Emergency Plan for AIDS Relief (PEPFAR) grant number 1R25TW011213. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ijnurstu.2021.104100.

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