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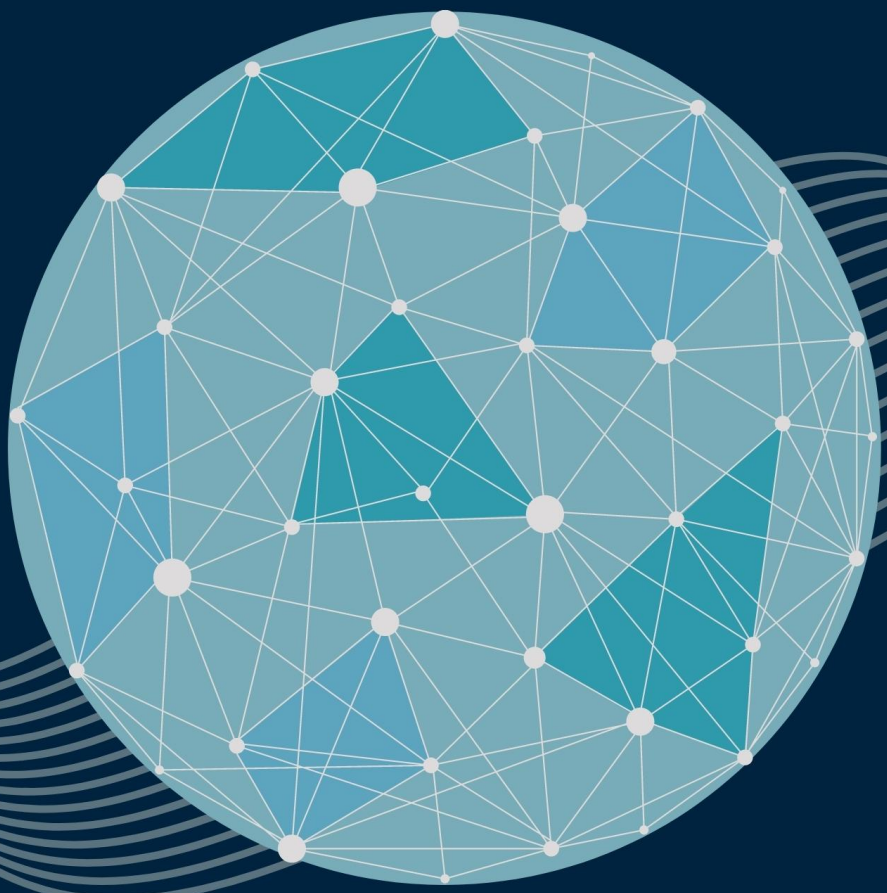

OFFICIAL JOURNAL OF THE
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# Letter from the editors
## *A New Journal for a New Era*

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Critical care practice has never been more impactful than it is today. On the back of the worst pandemic in over 100 years, critical care clinicians are being exemplified as people who save and restore lives every day in communities worldwide, as never before. It is important to maintain a long-lasting and robust focus on the vital contribution of critical care practice in the health and wellbeing of each community and nation globally and to share our intellectual and practical resources to ensure a better and safer future for all.

To this end, the World Federation of Critical Care Nurses (WFCCN), as the global representative of critical care nurses and their organisations, seeks to inform and guide international policy, practice, innovation, and excellence in the world of critical care.

As the official journal of the WFCCN, the *International Journal of Critical Care (IJCC)* builds on the legacy and successes of *Connect*, and endeavours to be a truly global vehicle for sharing the latest research, initiatives, policy advice, and achievements in critical care.

The emergence of a new and powerful international critical care journal to profile the work of our colleagues and organisations in our field and the innovations necessary to continue to advance the impact of critical care on lives and families is essential. *IJCC* represents a new and fresh beginning for WFCCN and its partner organisations to be a voice for critical care practitioners globally.

*IJCC* has an editorial team supported by diverse critical care leaders to ensure universal knowledge, capability, reach, and representation. WFCCN aims to position *IJCC* as a premier international journal that attracts clinicians, researchers, educators, leaders, and managers from all facets of critical care practice and from all parts of the world to share and engage in contemporary and necessary discussions that will shape future health care practice.

There has never been a more pressing time than now for critical care professionals to lend their voices to the global community as we are on the front line of the COVID-19

pandemic, the non-communicable disease pandemic, wars, and civil conflicts, as well as significant disadvantages and disease within the many communities and families we serve.

Being a critical care nurse, doctor, or other health care provider brings an enormous honour and responsibility. The communities and people we serve expect us to bring quality to everything we do. Error is our enemy, and excellence is our goal. So too, *IJCC* will work side-by-side with our colleagues and friends to profile innovations and improvements that help reduce error and inequities in care and strive for excellence with applications that can be shared between the richest and poorest countries in the world and everyone in between.

The *IJCC*/WFCCN pledge is to provide:

- A strong profile of practical and intellectually rigorous content
- Policy advice from WFCCN and other international authorities
- A journal free of charge to authors and readers
- PubMed Indexation and an Impact Factor

We look forward to working with you and your colleagues to realise the vision of *IJCC* and WFCCN.

# Review article

# *Effectiveness of Current Interventions to Alleviate Parental Distress in the NICU: A Rapid Review*

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**ABSTRACT**

**Background**: The birth of a premature infant and admission to the NICU is often unexpected and traumatic for families, leading to increased distress and can negatively impact parental-infant attachment. Appropriate interventions can help to lessen the negative impact of a NICU admission on families, improving parental mental health, reducing distress, enhancing parent- infant relationships, and improving the long-term physical, cognitive, emotional, and social development of the infant.

**Aims:** The purpose of this study is to examine and evaluate research evidence on the effectiveness of current interventions for improving parental distress in the NICU.

**Methods:** A rapid review was conducted utilizing a protocol based on the Virginia Commonwealth University guidance. Keyword searches were conducted on CINAHL, MEDLINE, and PsychINFO, and studies were selected according to pre-defined eligibility criteria, published between January 2015 and January 2020. The literature search included primary studies of interventions with parental stress and/or anxiety reduction as outcomes.

**Results:** A total of 14 articles were included, evaluating the effectiveness of 13 different interventions, including narrative writing, art therapy, structured nursing interventions, anxiety counselling, spiritual care, organizational change, music therapy, relaxation, and mindfulness techniques. With the Pexception of three, all the studies found significant results in the reduction of stress and/or anxiety levels of the subjects, with mothers having overall higher levels of stress indicated by higher stress scores on standardized measurement tools.

**Conclusion:** There is a need for ongoing assessment of parental distress and integration of appropriate interventions within the NICU settings. In this review, both individualized and group interventions including narrative writing, art therapy, music therapy, spiritual care, activity-based group therapy, music therapy, audio-assisted relaxation techniques, mindfulness based neurodevelopmental care, cognitive behavioral based counselling, family nurture intervention and a structured nursing intervention were shown to be effective in reducing parental stress and/or anxiety in the NICU. The small scale of the studies included in this review impact generalizability to a broader audience and emphasizes the need for larger scope, multi-center studies at an international level to build on and broaden our level of knowledge on how to better support families and reduce parental distress in the NICU.

***Key words:*** Parental stress, neonatal intensive care, interventions, review, premature, mental health

**BACKGROUND**

Premature birth (birth before 37 weeks gestation) is the leading cause of infant mortality and morbidity, and is associated with numerous complications, including brain injury, chronic lung disease, necrotizing enterocolitis, cerebral palsy, neurodevelopmental and academic impairments (Canadian Neonatal Follow-up Network [CNFUN], 2019; Johnston et al., 2014; McBryde et al., 2020; Polin & Yoder, 2020; Toral-Lopez et al., 2016). Advances in reproductive and healthcare knowledge and technologies have resulted in increased rates of prematurity and increased survival of those born at the extreme cusp of human viability, as early as 22 weeks gestation (Canadian Neonatal Network [CNN], 2017; Green et al., 2017; Lemyre & Moore, 2017).

The neonatal intensive care unit (NICU) is a fast paced, highly technical, and medically focused area specializing in the care of premature and critically ill infants. Admission into this foreign, intensive care environment is often an "unexpected and traumatic event for families" (Del Fabbo & Cain, 2016, p. 281). Parents often experience high levels of psychological distress, guilt, anxiety, fatigue, loss of control, sadness, feelings of helplessness, emotional distancing, uncertainty and worries about their infant's future, and these symptoms have been shown to still be present up to one year after the birth of their premature infant (Obeit et al., 2009; Petteys & Adoumie, 2018; Roque et al., 2017; Toral-Lopez et al., 2016; Treherne et al., 2017). The persistence of these symptoms and the physical, emotional, and psychological separation between infants and their parents within the NICU can lead to lack of bonding, parental self-confidence and parent-infant attachment, which has the potential to negatively impact the infants' cognitive, motor and social development during hospitalization and beyond (Del Fabbro & Cain, 2016; Jubinville et al., 2012; Makela et al., 2018; Obeidat et al., 2009; Petteys & Adoumie, 2018). Additional challenges include socioeconomic status, education, age, pregnancy factors (ex. fertility treatments), history of depression or high anxiety, financial concerns, juggling family responsibilities and life demands that carry on outside the NICU (Ayers et al., 2019; Carter et al., 2007). These challenges are further complicated by prognostic uncertainties and barriers of the NICU setting itself, including space, equipment, loud noises, lack of accommodations for family members, visiting restrictions, long hospital stays and lack of privacy, which can obstruct the emotional needs of parents to be close to their infants (Makela et al., 2018; Petteys & Adoumie, 2018; Treherne et al., 2017). Elevated stress levels in parents in the NICU are associated with higher levels of stress at three-months post discharge, which can adversely affect their ability to cope and care for their infant once at home (Fotiou et al., 2016). Appropriate interventions can help to lessen the negative impact of a NICU admission on families (Fotiou et al., 2016; Loewenstein et al., 2019). Although interventions have been studied, there is little literature comparing the effectiveness of different interventions.

The few published reviews on interventions focused almost exclusively on developmental care and family-centered care interventions and/or did not focus on parental stress, or anxiety as primary outcomes (Benzies et al., 2013; Ding et al., 2019; Lavalle et al., 2019; Vetcho et al., 2020). Other reviews were restrictive in the types of interventions evaluated. Dol et al. (2017) and Ebstein et al. (2016) performed reviews of eHealth

interventions and communication technology, respectively, finding mixed results on their effectiveness to reduce parental stress and/or anxiety within the NICU setting. Family centered care interventions and developmental care interventions have been extensively studied within the literature and have been shown to be effective at reducing parental stress and anxiety; however, despite the known benefits, implementation and utilization within the clinical setting has been lacking (Vetcho et al., 2020). There is a need to increase our awareness of the clinical utility of the different types of interventions to reduce parental stress and/or anxiety, including evaluating the current literature to inform healthcare professionals, guide practice and improve both parent and infant health and well-being.

## PURPOSE OF RAPID REVIEW

The purpose review was to critically review and evaluate evidence on the effectiveness of different interventions for improving parental distress in the NICU, identifying any methodological limitations or biases, as well as potential gaps in the current literature regarding interventions for parental distress, to inform practice and guide future research. This review builds on and adds to a previous review and meta-analysis conducted by Sabnis et al. (2019) who evaluated interventions studied prior to 2016, and their impact on parental distress levels. This review found that with the exception of family centered care interventions, which are the most extensively studied and a target for ongoing implementation, that further study and evaluation of parental interventions is needed going forward.

For this review, distress was defined as a negative emotional state or negative stress response that overwhelms one's ability to cope leading to physical and/or psychological maladaptation (American Psychological Association [APA], 2020). Stress was defined as a psychological or physiological response(s) to external or internal stressors (APA, 2020). Anxiety was defined as an emotion or emotional response manifesting as feelings of dread, marked apprehension, and somatic symptoms of tension in which the body mobilizes to meet the perceived threat (APA, 2020). The definition of stress and/or anxiety is based on standardized tools used in most of the included studies, each of which has different characteristics and definitions of what is normal versus abnormal. Although distress can encompass several physical and psychological constructs, within the scope of this review, the focus will be on evaluating the effectiveness of interventions on parental stress and/or anxiety within the NICU setting.

## METHODS

### Rapid Review Protocol

A rapid review was conducted utilizing a protocol outlined by Virginia Commonwealth University (2018). A rapid review follows the basic structure of a systematic review; however, it makes concessions in relation to methodology in order to be conducted in a more accelerated fashion and by a single reviewer. This review is less comprehensive than a full systematic review in that the literature search was restricted to the following three databases: CINAHL, MEDLINE, and PsychINFO. Grey literature was excluded from

the review. The literature search was completed in January 2020 and RefWorks Citation Manager ® was utilized to manage citations. A health sciences librarian was consulted to review the search strategy and to provide assistance and expertise with the literature search (see Appendix A for search summary). A PRISMA flow diagram (Figure 1) was utilized to increase transparency in the literature search and study selection (Higgins et al., 2019; Moher et al., 2009).

**Inclusion Criteria**

Primary published experimental and quasi-experimental studies taking place within the NICU setting were included in the review. Intervention studies focusing on parents of infants born prematurely (<35 weeks gestational age [GA]), with parental (maternal and/or paternal) stress and/or anxiety reduction as the primary outcome were included. No selection criteria with regards to the country of origin or level of NICU was used. As this review focuses on current trends in managing parental distress in the NICU, study inclusion was limited to English literature published between January 2015 and January 2020.

**Exclusion Criteria**

Review articles, dissertations, studies published in languages other than English and prior to 2015 were excluded from this review. Studies focusing on healthcare workers, grandparents and those that did not evaluate stress or anxiety reduction as the primary outcomes were also excluded. Articles which focused exclusively on parents of late preterm infants (35-37 weeks GA) were also excluded, as these infants often have short NICU admissions (Braun et al., 2020).

**Screening and Study Selection**

Search results were combined in RefWorks Citation Manager ® and duplicates were removed. Title and abstracts were screened by the investigator (DSS), and full text studies examined and evaluated based on the aforementioned criteria. Data were extracted from the studies, including: study design; subject characteristics and demographics; NICU and infant characteristics and demographics; outcome measures defined within the studies; study size; types and description of interventions; measurement tools; results of selected studies based on anxiety and/or stress scores of chosen measurement tools. This data is summarized in a rapid review matrix table, see Appendix C (Virginia Commonwealth University, 2018)

**Risk of Bias**

Critical appraisal of selected articles was carried out utilizing the Cochrane handbook for systematic reviews of interventions (Higgins et al., 2019). This tool was used to assess bias as a judgement of low, high, or unclear risk. This judgement was applied to individual elements within six domains (random sequence generation, allocation concealment, selective reporting, blinding, incomplete outcome data and other), appraising an overall risk of bias to the individual studies. When assessing risk of bias, an unclear risk was considered moderate

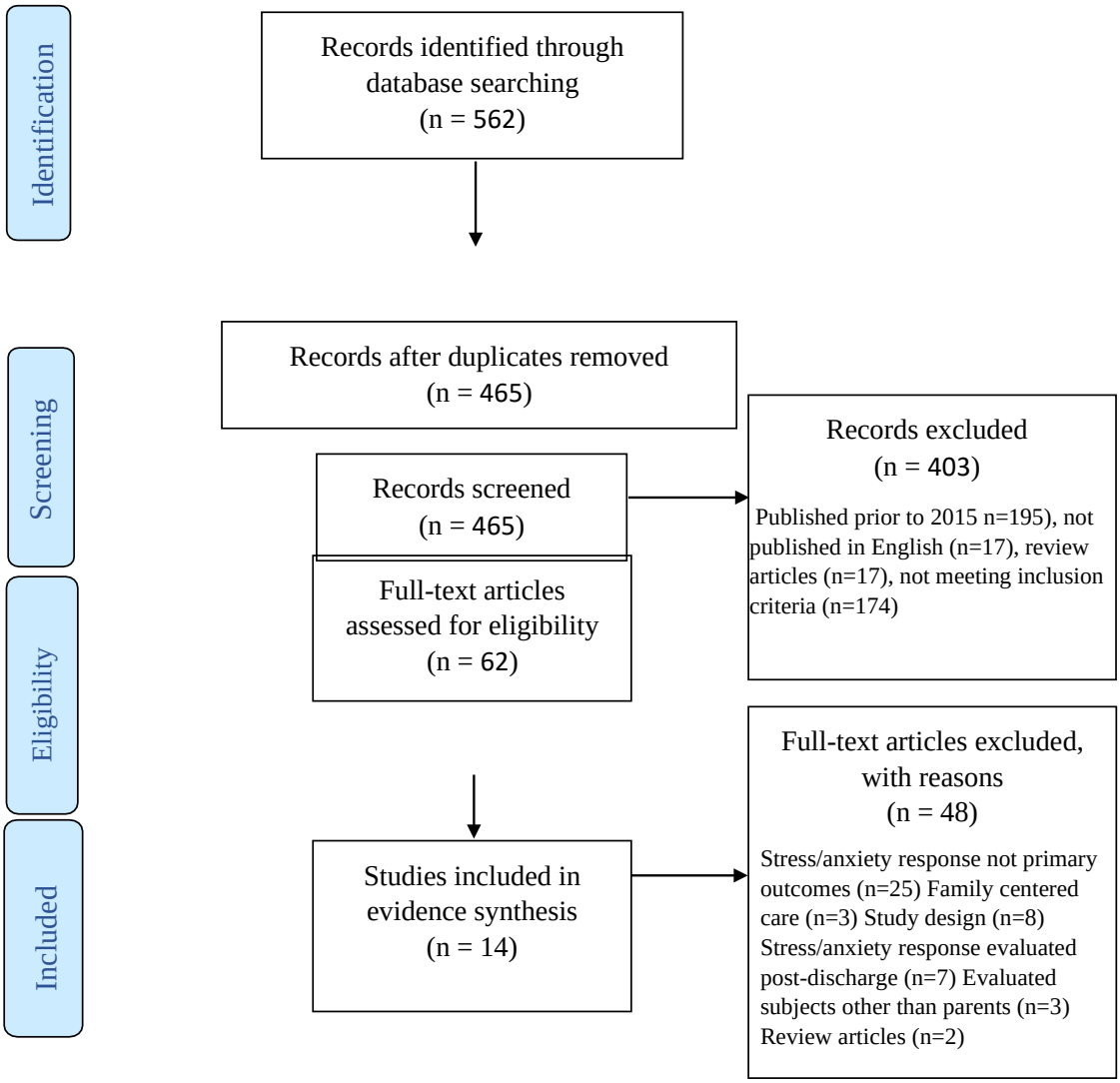
with an average of risk used to determine the overall risk of bias. Evaluation of publication bias, time-lag bias, language bias and location bias were not addressed in this review.

## RESULTS

### Study Selection

Of the 562 articles retrieved in the database searches, a total of 62 full articles were screened for eligibility and based on the selection criteria, 14 studies were included in this review (Figure 1).

**Figure 1: PRISMA Flow Diagram (Modified from Moher et al., 2009)**




### Study design

Selected studies included seven randomized controlled trials (RCTs) (Dabas et al., 2019; Jouybari et al., 2018; Koochaki et al., 2017; Kucuk Alemdar et al., 2018; Petteys & Adoumie., 2018; Ribeiro et al., 2018; Welch et al., 2016) and seven quasi-experimental designs (Akbari et al., 2019; Gustafson et al., 2016; John et al., 2018; Kadivar et al., 2016; Mansson et al., 2019; Noergaard et al., 2018; Ong et al., 2018). One of the RCT studies was blinded (Jouybari et al., 2018). The majority of studies were single centered, with the exception of Jouybari et al. (2020) and Kadivar et al. (2017). Six of the quasi-experimental studies utilized sequential pretest post-test designs (Akbari et al., 2019; Gustafson et al., 2016; John et al., 2018; Kadivar et al., 2017; Ong et al., 2018) and one a prospective longitudinal study design (Mansson et al., 2019). Five of the RCT studies utilized a pretest post-test design, with control and intervention arms occurring concurrently (Dabas et al., 2019; Jouybari et al., 2020; Koochaki et al., 2017; Kucuk Alemdar et al. 2018; Petteys & Adoumie, 2018). One of these studies had three arms occurring concurrently (Jouybari et al., 2020)

**Subject Characteristics**

The chosen studies evaluated the effectiveness of the various interventions on stress and/or anxiety levels on mothers and/or fathers. In total, 1,335 parent participants were involved in the identified studies. The majority of studies looked exclusively at mothers (Dabas et al., 2019; John et al., 2018; Jouybari et al., 2018; Kadivar et al., 2016; Koochaki et al., 2017; Kucuk Alemdar et al., 2018; Ong et al., 2018; Ribeiro et al., 2018; Welch et al., 2016). Two of the studies evaluated the effects on fathers only (Akbari et al., 2016; Noergaard et al., 2018), and five recruited both mothers and fathers as subjects (Gustafson et al., 2016; Mansson et al., 2019; Petteys & Adoumie, 2018). Gustafson et al. (2016) evaluated the effects on mothers and fathers as a parental group, as well as differences between mothers and fathers within both control and experimental groups. The total number of subjects (control and intervention) in the studies varied between 34 and 231, with control groups between 17 and 130 subjects and intervention groups between 17 and 101 subjects.

**NICU and Infant Characteristics**

Study locations included NICUs in hospitals in India (Dabas et al., 2019; John et al., 2018), Iran (Akbari et al., 2019; Jouybari et al., 2018; Kadivar et al., 2016; Koochaki et al, 2017), United States (Gustafson et al., 2016; Petteys & Adoumie, 2018; Welch et al. 2015), Turkey (Kucuk Alemdar et al., 2018), Sweden (Mansson et al., 2019), Denmark (Noergaard et al., 2018), Malaysia (Ong et al., 2018) and Brazil (Ribeiro et al., 2018)

This review includes studies carried out in Level II, III and IV NICUs. This classification is based on the gestational ages of the infants and the level of intensive care that can be provided, including surgical care (Phibbs, et al., 1996). Two studies were carried out in a Level II NICU (Kucuk Alemdar, 2018; Noergaard et al., 2018), five in a Level III NICU (Dabas et al., 2019; John et al., 2018; Ong et al., 2018; Petteys & Adoumie, 2018; Ribeiro et al., 2018) and one in a Level IV NICU (Welch et al., 2016). Six studies did not specify the level of designation (Akbari et al., 2019; Gustafson et al., 2016; Jouybari et al., 2018; Kadivar et al, 2016; Koochaki

et al., 2017; Mansson et al, 2019).

There was some variability in the parameters in the specific studies as it related to infant characteristics and demographics. All the studies included parents of infants born prematurely, or less than 37 weeks GA (Akbari et al., 2019; Kadivar et al., 2017; Koochaki et al., 2017), although some studies were more specific with their parameters. Dabas et al. (2019) and Welch et al. (2016) included infants born at <34-weeks GA. Kucuk Alemdar et al. (2018) and Pettey & Adoumie (2018) included infants born at <30 weeks and <35 weeks GA, respectively. Two of the studies included parents of infants born at > 28 weeks GA (Gustafson et al, 2016; Noergaard et al., 2018). Two studies included infants born at 27 weeks up to 34 (Ong et al., 2018), 37 (Manson et al., 2019) or 38 weeks (Jouybari et al., 2018) GA. One study did not specify a GA, but rather included parents of infants born at very low birth weight or <1500g (John et al., 2018).

**Outcome Measures**

Outcome measures included stress and/or anxiety reduction as the primary outcomes. The chosen studies utilized variable measurement tools to evaluate the impact of the intervention(s) on stress, anxiety, or both. Eight studies evaluated stress only (Akbari et al.,2019; Jouybari et al., 2018; Kadivar et al., 2017; Kucuk Alemdar et al., 2018; Mansson et al., 2019; Noergaard et al., 2018; Ong et al., 2018; Petteys & Adoumie, 2018). Four studies examined anxiety only (John et al., 2016; Koochaki et al., 2017; Ribeiro et al., 2018; Welch et al., 2016). Dabas et al. (2019) evaluated both stress and anxiety levels. Gustafson et al. (2016) evaluated stress as the primary outcome, but also evaluated pre-intervention anxiety and coping processes and their relationship to parental stress.

Other outcome measures evaluated in various studies included: milk output (Dabas et al., 2019); paternal participation in childcare (Noergaard et al., 2018); maternal ability (Ong et al., 2018); bonding, parent satisfaction and infant length of stay (Petteys & Adoumie, 2018); maternal depression and cardiac autonomic modulation (Ribeiro et al., 2018). These outcome measures will not be discussed within the context of this review.

**Quality Appraisal**

Table 2: Risk of Bias Assessment (Cochrane Risk of Bias Tool, Higgins et al., 2019)

| Studies | Random sequence generation | Allocation concealment | Selective reporting | Blinding: Participants, personnel, & outcome assessment | Incomplete outcome data | Other sources of bias | Overall risk of bias |
|---|---|---|---|---|---|---|---|
| Akbari et al. (2019) | - | ? | ? | - | + | ? | moderate |
| Dabas et al. (2018) | + | + | + | ? | + | ? | low |
| Gustafson et al. (2016) | ? | ? | + | ? | + | - | moderate |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| John et al. (2018) | + | - | ? | + | ? | - | moderate |
| Jouybari et al. (2020) | + | + | ? | + | ? | ? | moderate |
| Kadivar et al. (2017) | - | ? | ? | + | ? | + | moderate |
| Koochaki et al. (2017) | + | ? | ? | ? | ? | + | moderate |
| Kucuk Alemdar et al. (2018) | + | - | ? | ? | ? | + | moderate |
| Mansson et al. (2019) | - | - | ? | + | ? | - | high |
| Noergaard et al. (2018) | - | - | ? | + | ? | - | high |
| Ong et al. (2018) | - | - | ? | + | + | - | high |
| Petteys & doumie (2018) | + | + | ? | - | ? | - | moderate |
| Ribeiro et al. (2018) | + | + | ? | ? | - | - | moderate |
| Welch et al. (2016) | ? | ? | ? | ? | ? | - | moderate |

'+' = low risk of bias; '-' = high risk of bias; '?' = unclear risk of bias

Results of the quality appraisal are summarized in Table 2. Of the 14 studies included in this review, one appeared to have an overall low risk of bias (Dabas et al., 2019) , three studies have an overall high risk of bias (Mannson, 2019; Noergaard, 2018; Ong, 2018), while the remainder had a moderate unclear risk of bias. Eight of the studies had sample sizes less than 100 subjects, which may limit the statistical power. Although RCTs are considered to be the highest level of evidence, the parallel arms necessary in this design and study setting creates a risk for interference and spillover effect between the two study groups. It is difficult to completely eliminate this risk related to frequent contact and interaction between families in the NICU environment. The sequential design utilized by most of the quasi-experimental studies addresses this risk by evaluating the control and intervention groups at different points in time.

When evaluating the parental stressor scale: neonatal intensive care unit (PSS: NICU) within the Turkish context, Kucuk Alemdar et al. (2018) excluded items on measurement tool if they were experienced by less than 1/3 of the subjects, which, subsequently, were not used for statistical analysis. A total of five items were removed from the measurement tool which may have introduced a selective reporting bias. Additional weaknesses in the quality of evidence included lack of a priori power analyses, low response rates that may account for selection bias, missing data (incomplete surveys) and high attrition rates (Noergaard et al., 2018; Petteys & Adoumie, 2018; Ribeiro et al., 2018).

**Measurement Tools**

Nine of the studies utilized the PSS:NICU to evaluate the impact of the studied intervention of self-reported levels of parental stress (Dubas et al., 2019; Gustafson et al., 2016, Jouybari et al., 2018; Kadivar et al., 2017; Kucuk Alemdar et al., 2018; Mansson et al., 2019; Noergaard et al., 2018; Ong et al., 2018, Petteys et al., 2018).The PSS: NICU is a 34-item scale with three dimensions – sights and sounds (6 items), infant behaviour and appearance (17 items) and parental role alteration (11 items) This tool is well utilized in the literature as an instrument to evaluate parents' perceptions of stressors in the NICU produced by the physical, social and psychological environments (Akbari et al., 2016).

Three studies used the state-trait anxiety inventory (STAI) to evaluate anxiety levels of study participants in the NICU (Gustafson et al., 2016; John et al., 2018; Welch et al., 2016). This instrument has been successfully utilized in studies involving mothers of both term and preterm infants (Welch et al., 2016). Two studies used the Beck Anxiety Inventory (BAI) (Koochaki et al., 2017; Ribeiro et al., 2018). One study utilized the Perinatal Anxiety Screening Scale (PASS) developed by Somerville et al. (2014) (Dubas et al., 2019). This self-administered scale was developed to evaluate a range of problematic anxiety symptoms in perinatal women, including general worries and specific fears; control, perfectionisms, and trauma; social anxiety; and acute anxiety and adjustment (Somerville et al., 2014; Somerville et al., 2015). Welch et al. (2016) utilized the Behavioral Inhibition System and Behavioral Activation System (BISBAS) tool to assess maternal motivation at enrollment. The personality traits measured by the BISBAS have been shown to correlate with anxiety and are potential predictors of maternal adaptation and capacity to withstand stresses associated with having a premature infant (Welch et al., 2016). Two studies utilized the Ways of Coping (WOC) questionnaire to evaluate how parents cope in stressful situations (Gustafson et al., 2016; Ribeiro et al., 2018). This tool is used to describe coping processes within clinical settings and is based on "Lazarus and Folkman's theory that people use two types of coping strategies in response to stressful situations: problem and emotion focused" (Gustafson et al., 2016, pp. 663).

**Interventions**

***Complimentary or Alternative Medicine Interventions***

Three studies evaluated narrative writing, or journaling (Akbari et al., 2019; Jouybari et al., 2018; Kadivar et al., 2017), one of which also assessed an art therapy intervention (Jouybari et al., 2018). One study evaluated the impact of an individually tailored music therapy intervention (Riberio et al., 2018), and another a tailored spiritual intervention, assessing spiritual needs and providing one-on-one spiritual care (Kucuk Alemdar et al., 2018). Welch et al. (2016) implemented and evaluated the family nurture intervention (FNI). FNI is based on the hypothesis that adverse consequences of maternal-infant separation following preterm birth can be reduced with repeated calming activities, including physical, emotional, and sensory experiences (Welch et al., 2016). One study evaluated the effect of an activity-based group therapy intervention on maternal anxiety levels (John et al., 2018). Participation in creative activities has been shown to provide opportunities for sublimation

and increased emotional resilience, and activity groups create a setting for social interactions, increased support, and bonding (John et al., 2018). Another study evaluated the effectiveness of an audio assisted relaxation technique (Dabas et al., 2019), consisting of deep breathing, controlled breathing techniques, yoga postures and progressive muscle relaxation.

### *Educational Interventions*

Gustafson et al. (2016) evaluated the effect of facilitated parental presence during rounds. Parental presence during rounds can help empower families with information, inclusion in the decision-making process and having a facilitator present early in the NICU journey may help improve communication, and reduce any additional stressors (Gustafson et al., 2016). Ong et al. (2018) studied a structural nursing intervention program (SNI) aimed to provide education about prematurity, address expectations related to infant's hospitalization, assist mothers in navigating the NICU environment, provide interpersonal interaction and psychosocial support. Petteys & Adoumie (2018) evaluated the impact of parent education and participation in mindfulness-based neurodevelopmental care. Educational material, education sessions teaching structured neurodevelopmental care activities and mindfulness techniques and ongoing support were provided to parents.

### *Psychological Interventions*

Mansson et al. (2019) investigated the impact of an individualized neonatal parent support program. Developed in collaboration with child psychologist and modelled on principles of family centred care, research on parent experiences, and person-centred communication, the program focused on four different dialogues – prematurity, interpreting and interacting with infants, future discharge, and summary of experience.

### *Operational Changes*

Noergaard et al. (2018) developed and implemented a NICU model designed to be more father friendly. The authors obtained increased knowledge and understanding of paternal needs and wishes to create a father friendly NICU, with activities tailored to be more inclusion of paternal needs and evaluated the impact on paternal stress.

## *Effects of Interventions on Parental Distress*

The results of the individual studies in this review are summarized in a rapid review matrix table in Table 1. Most of the interventions evaluated demonstrated significant results related to the reduction of stress and/or anxiety levels of the subjects' post intervention. In studies evaluating both parents, mothers were found to have overall higher levels of stress, which was especially evident in the 'infant's behaviour and appearance' and 'parental role alteration' subscales of the PSS: NICU tool (Gustafson et al., 2016; Mansson et al., 2019). All the studies evaluating anxiety as an outcome measure showed significant findings related to reduced anxiety levels in mothers post intervention.

The studies performed by Akbari et al. (2019) (n=70), Kadivar et al. (2017) (n=70),

Kucuk Alemdar et al. (2018) (n=62), Dabas et al. (2018) (n=50), John et al. (2018) (n=34), Ribeiro et al. (2018) (n=21), and Welch et al. (2016) (n=115) showed significant reduction in parental stress and/or anxiety measurements post intervention, suggestive that contemporary and alternative medicine interventions, including narrative writing, spiritual care, audio-assisted relaxation, activity-based group therapy, music therapy and FNI may be effective in decreasing NICU related stress and anxiety levels. In their tailored spiritual care intervention, Kucuk Alemdar et al. (2018) found that this reduction was especially evident within the 'Infant's Appearance and Behaviours' subscale of the PSS: NICU tool Dabas et al. (2019) found that higher PSS: NICU scores (subscales and overall scores) were "directly correlated with higher S-anxiety and T-anxiety scores" (p. 664), emphasizing the relationship between stress and anxiety levels. This group of authors also found a significant reduction in stress scores in the control group within the domain of parent role alteration, which "might be due to adaptation and some kind of coping strategies used by the postpartum mothers in the control group as well" (Dabas et al., 2019, pp. 202-203).

The music therapy intervention applied by Ribeiro et al. (2018) allowed mothers an outlet to express their thoughts and feelings related to the birth of their preterm infant, their NICU experiences, as well as any other issues causing them distress. Jouybari et al (2018) (n=105) failed to produce the same findings in their narrative writing and art therapy intervention. The educational interventions carried out by Ong et al. (2018), Petteys and Adoumie (2018) and Gustafson (2016) showed mixed results with their respective studies. With their SNI (n=216), Ong et al. (2018) only obtained significant results in one of the subscales post intervention ('parental role alteration'), however, the education provided and activities in this intervention facilitated opportunities for mothers to connect emotionally and psychologically with their premature infant and allowed mothers to feel less detached and more connected with their infants within the context of the NICU setting. It also cannot be ruled out that mothers in the control group did not independently seek out information and support contributing to the lack of significant findings overall (Ong et al., 2018). In evaluating the effectiveness of their mindfulness-based neurodevelopmental care intervention, the RCT by Petteys & Adoumie (2018) with 55 parent dyads reported mixed results. There were no significant differences between groups from enrollment to discharge; however, they found that within the intervention group there was a significant reduction in post-test stress scores in all three subscales of the PSS: NICU tool. The educational study by Gustafson et al. (2016) (n=134) facilitating parental presence during multidisciplinary rounds did not show a significant impact of NICU-related parental stress. The RCT (n=81) by Koochaki et al. (2017) found that both routine counselling and behavioural counselling can reduce the anxiety levels of mothers in the NICU. However, the combination of routine and cognitive behavioural based counselling showed a greater reduction and may have a longer lasting impact on maternal anxiety levels (Koochaki et al.). Mansson et al. (2019) (n=241) also showed significant reduction in maternal and parental stress measurements post intervention, suggestive that a neonatal support program may be effective in decreasing NICU related stress levels. Mansson et al. (2019) found that although the total overall stress measurements did not differ significantly between the control and intervention group, that there were significant

differences found within specific items on the PSS: NICU subscales. There was no significant difference between the control and intervention group in fathers included in the study. In their quasi-experimental study with 109 fathers looking at an organizational change, Noergaard et al. (2018) found that although overall stress scores (control and intervention) decreased significantly by the time of discharge, that the creation of a more father friendly NICU was associated with higher level of post-test stress as compared to the control group. This increase in paternal stress paralleled the increased involvement of father in infant care and information sharing. The higher expectations placed on these fathers, on top of their other economic and social obligations likely contributed to the increased stress levels in the intervention group, as compared to the control group. However, the long duration of this study and the complexity of the intervention and difficultly evaluating the extent of paternal involvement, make it difficult to completely interpret the results.

**Table 1:** Rapid Review Matrix Table: Study characteristics and main results. (Modified from Virginia Commonwealth University, 2018)

| Author, year. country | Purpose | Sample size and characteristics | Study design<br><br>Measurement tool(s) | Main variables | Control<br><br>Intervention(s) | Results |
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| Akbari et al. (2019)<br><br>Iran | Does narra-tive writing reduce stress levels of fathers in the NICU? | n=35 (control group)<br><br>n=35 (intervention group)<br><br>Fathers of infants in the NICU; similar baseline demographics | Quasi-experimental 2 group pre-test post-test design<br><br>Parental stressor scale: neonatal intensive care unit (PSS: NICU) | Stress | Routine care<br><br>Routine care PLUS narrative writing with a minimum of three narratives between the 3rd day (pretest) and 10th day (post-test) post NICU admission | No significant difference between the control group (x=74.05 + 17.39) and Interven-tion group (x=80.11 + 15.82) in pretest stress scores (p=0.13, t=1.52). Significantly lower post-test stress scores in the intervention group (x=48,00 + 10.49) vs. the control group (x=85.45 + 16.91) suggesting that narrative |

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| | | | | | | writing may be effective at decreasing paternal stress levels in the NICU (p=0.001; t=-11.01) |
| Dabas et al. (2018)<br><br>India | What is the impact of an audio assisted relaxa-tion techni-que on maternal stress, anxiety, and milk output in the NICU? | N=25 (control group)<br><br>n=25 (Intervention group) | Non-blinded RCT<br><br>PSS: NICU, Perinatal Anxiety Screening Scale (PASS) | Stress & Anxiety | Routine care<br><br>Audio-assisted relaxation technique (30 minutes). Techniques were demonstrated on day one by a yoga therapist and researcher one in small group setting consisting of: deep breathing; controlled breathing techniques (Anulom-Vilom, Brahmari), yoga postures (Suksham-Vyayam) and progressive muscle relaxation. Performed daily x 10 days | Similar pre-test maternal stress (x=3.9 + 0.5 vs. 3.8 + 0.5; p=0.34 and anxiety scores (x=31.12 + 11.4 vs. x=31.08 + 12; p=0.99 between interven-tion and control groups There was a significant reduction in maternal stress (x=2.9 + 0.5 vs. 3.6 + 0.6; p=0.003) and anxiety scores (x=19.8 + 6.7 vs. 28.18 + 11.7; p=0.003) in the interven-tion group vs. the control group suggesting that the use of audio assisted |

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| | | | | | | relaxation techniques may be effective in reducing maternal stress and anxiety |
| Gustafson et al. (2016)<br><br>United States | Does the presence of parents during multi disci-plinary rounds reduce parental stress in the NICU? | n=46 (control group; 20 fathers, 26 mothers)<br><br>n=86 (Intervention group; 34 fathers, 52 mothers)<br><br>Mothers and fathers of 90 infants in the NICU; similar baseline demographics | Quasi-experimental study, 2 group sequential pre- test post-test design<br><br>PSS: NICU (pre & post) State-Trait Anxiety Inventory (STAI) & Ways of Coping WOC Question-naire (pre-test only) | Stress & Anxiety | Routine family communica-tion per unit routine - informal daily updates with more formal multidisci-plinary meetings as required based on infant's condition and/or parental request Facilitated parental presence during daily multidisci-plinary rounds – prior to participation in rounds parents participated in min. one bedside medical update or family meeting and received an orientation to the rounds process by a clinical nurse specialist (CNS) facilitator (description of the rounding process, roles | Similar pretest parental stress scores were found in the control vs. interven-tion groups (x=3.17 + 0.13 vs. 3.11 + 0.08; p=0.25. Facilitating parental presence during multi-disciplin-ary rounds did not show at significant difference on NICU-related parental stress between control and interven-tion groups (x=3.04 + 0.14 vs. 2.86 + 0.10; p=0.11); however, a significant reduction in parental stress scores was found within the interven-tion group (x=3.11 + |

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| | | | | | of the rounding participants, and plan to address questions during or after rounds. CNS facilitator was present to maintain flow of rounds and to answer questions. Parents were encouraged to write down questions to be discussed and probed prior to rounds completion to allow for any additional questions. Parents were debriefed by the bedside nurse and CNS facilitator to ensure all questions were answered and to provide any needed clarification to families. | 0.08 pretest vs. 2.86 + 0.10. p=<0.001. Mothers reported higher levels of stress than fathers (x=3.4 + 0.81 vs. 2.7 + 0.67; p=<0.001). Pretest STAI scores showed similar trait-anxiety scores between mothers and fathers (x= 39.7 + 8.7 vs. 36.7 + 8.7; p=0.06) but significant-ly higher state anxiety scores in mothers vs. fathers (x=54 + 13 vs. 48.8 + 12.3; p=0.01) suggestive of greater levels of anxiety in mothers associated with a stressful event (infant hospital-ized in NICU) |
| John et al. (2018)<br><br>India | Does activity-based group therapy | n=17 (control)<br><br>n=17 (intervention) | Prospective 2 group phase lag cohort study, pre- | Anxiety | Routine care<br><br>Routine care PLUS weekly activity- | The authors found similar pre-test |

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| | reduce maternal anxiety in the NICU? | Mothers in the NICU: similar baseline demographics | test- post-test design<br><br>STAI-S | based group therapy (x 4 weeks) – small group sessions (n= 5-6 mothers) led by an occupational therapy (OT) student and experienced medical social worker. Variable group activities chosen to be interesting and useful and have a material and/or emotional impact (ex. rattle and footprint card). | anxiety scores between the control and interven-tion group (x=49.94 + 11.28 vs. 47.58 + 12.85; p=0.575). There was a significant reduction in post-test anxiety scores compared to pre-test with the first (p=0.005), third (p=0.07) and forth (p=0.009) activity-based session. A significant reduction in anxiety scores was found in the interven-tion group vs. control (36.58 + 11.16 vs. 46.14 + 9.45; p=0.009) suggestive that activity-based group therapy may be effective in reducing state anxiety levels of |

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| | | | | | | mothers in the NICU |
| Jouybari et al. (2020)<br><br>Iran | Does art therapy and/or narra-tive writing reduce maternal stress in the NICU? | N=35 (control group)<br><br>n=35 (narrative writing group)<br><br>n=35 (art therapy group)<br><br>Mothers in the NICU; similar baseline characteristics | RCT with three parallel arms; pre-test post-test design (single blinded study analyst blinded)<br><br>PSS: NICU | Stress | Routine care<br><br>Routine care PLUS narrative writing OR art therapy with minimum of 3 narratives or drawings between 2nd day (pre-test) and 6th day (post-test) post NICU admission | Similar mean baseline stress scores between control, narrative writing, and art therapy groups (n=47.57 + 21.26 vs. 47.08 + 21.05 vs. 54.94 + 26.33; p=0.28). There was no significant difference in post-test stress scores between groups (x=60.20 + 20.62 vs. 58.60 + 25.56 vs. 57.88 + 27.31; p=0.92), suggestive that narrative writing and art therapy may not be effective at reducing maternal stress in the NICU. |
| Kadivar et al. (2017)<br><br>Iran | Does narra-tive writing reduces the stress levels | N=37 (control group)<br>n=33 (Intervention group)<br><br>Mothers in the NICU; similar baseline | Quasi-experiment-al phase lag pretest post-test design<br><br>PSS: NICU | Stress | Routine care<br><br>Routine care PLUS narrative writing with a minimum of 3 | Similar pre-test stress scores were found in all three subscales of the PSS: NICU |

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| | of mothers in the NICU? | characteristics | | narratives between third day (pre-test) and 10th day (post- test) post NICU admission | between the control and interven-tion group: "Infant behaviour and appearance " (x=31.54 + 7.467 vs. 34.182 + 7.108; p=0.922); "Sights and sounds" (x=17.649 + 6.969 vs. 22.061 + 5.35; p=0.153); "parental role and the parents' relationshi p" (x=24.973 + 7.697 vs. 22.667 + 7.896; p=0.999). In evaluating the difference in stress scores in all three subscales utilizing multivar-iate analysis, the authors found that the interven-tion had a significant effect in all three domains (Roys' largest root=2.141, F=47.11, |

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| | | | | | | p<0.001) suggesting that narrative writing may be effective at reducing maternal stress in the NICU |
| Koochaki et al. (2017)<br><br>Iran | What effect does cognitive behavioural counselling have on the anxiety levels of mothers in the NICU? | n=39 (control group)<br><br>n=42 (intervention group)<br><br>Mothers in the NICU; similar baseline characteristics | Parallel RCT<br><br>Beck's Anxiety Inventory (BAI) | Anxiety | Routine care counselling sessions (2 session/week x 4 weeks): providing information re: hospitalized infant, such as disease, diagnostic and therapeutic modalities (Session 1), disease symptoms & consequences (Session 2); obtaining knowledge and skills re: nutrition (Session 3), movement and positioning (Session 4), hygiene and infection control (Session 5), temperature regulation and clothing infant (Session 6), infant's behaviour (Session 7), and interacting with infant (Session 8) | Similar baseline anxiety scores present in mothers in control and intervention groups (x=20.67 + 6.791 vs. 19.45 + 6.345; p=0.408). Both the intervention and control groups showed a significant difference in maternal anxiety scores immediately following (x=9.7 + 3.645 vs. 8.95 + 3.72) and three weeks after intervention (x=11.52 + 4.528 vs. 15.4 +5.062) between groups (p=0.026) and within each group (p=<0.001). Results |

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| | | | | Routine care counselling sessions followed by anxiety counselling with a cognitive behavioural approach (2 sessions/week x 4 weeks): establishing relationships, learning group rules, determining group goals and getting feedback (Session 1); psychological recount of thoughts and feelings related to birth of infant, emotional adjustment and release in supportive group environment (Session 2); review of signs of stress, introduce concept of stress relief (Session 3); evaluating the effect of thoughts and cognition on stress response, recognizing negative self-talk, assessing how individuals cope with stress and importance of coping skills | suggest that both routine counselling & Behaviour-al counselling can reduce maternal anxiety in the NICU with CBT- based counselling showing a greater reduction and may have a longer lasting impact on maternal anxiety. |

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| | | | | | for stress management (Session 4); review previous stress relief exercises, review of stressful self-talk, encouragement how to turn self- talk into effective coping (Session 5); problem-solving training, extracting problem description from each group member (Session 6); providing and discussing alternate solutions and using the best one (Session 7); assessing effectiveness of solution (Session 8) The researcher had previous training on cognitive behavioural therapy counselling; intervention supervised by clinical psychologist. | |
| Kucuk Alemdar et al. (2018)<br><br>Turkey | What effect does spiritual care have on the stress levels of | n=32 (control group)<br><br>n=30 (Intervention group) | RCT, pre-test post-test design<br><br>PSS: NICU | Stress | Routine care<br><br>Routine care PLUS 1:1 spiritual care based on individual spiritual needs. A | Similar pre-test stress scores were found in control vs. intervention groups |

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| | mothers in the NICU? | Mothers in the NICU; similar baseline characteristics | | | questionnaire was utilized to determine spiritual requirements and mothers were given a choice of four spiritual practices that could be performed on their second visit to the NICU: prayer (n=9); reading the Quaran (n=9); placing the cevsen-muska on infant's incubator (n=8); or placing a clipped evil-eye talisman on infant's incubator (n=4). | (x=3.70 + 0.53 vs. 3.97 + 0.65; p=0.08). A significant reduction in post-test stress scores was seen in the Interven-tion vs. control group (x=3.56 + 0.56 vs. 3.89 + 0.70; p=0.04), suggestive that a tailored spiritual care may be effective at reducing stress levels of mothers in the NICU |
| Mansson et al. (2019)<br><br>Sweden | What impact does an individu alized neonatal parent support program have on parental stress levels in the NICU? | n=118 control group (n=60 mothers. n=58 fathers)<br><br>n=98 intervention group (n=49 mothers; n=49 fathers)<br>Mothers and fathers in the NICU; similar baseline characteristics (exception: infant gender) | Prospective longitudinal quasi experimenta l<br>one group pre- test post-test design<br><br>PSS: NICU | Stress | Standard family centred care<br><br>Standard family centered care PLUS participation in neonatal parent support program. The program was provided by primary nurses as an adjunct to standard care. It focused on parent-centred communicatio n involving four different dialogues – preterm delivery, interpreting and | This study evaluated parents' experience of stress before (control) and after (interven-tion) introduct-ion of a neonatal parent support pro-gramme. No significant differences in stress scores were found between control and interventio n groups in |

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| | | | | | interacting with infants, future discharge, and summary of experience in the hospital. | mothers (x=1.98 + 0.68 vs. 1.80 + 0.52; p=0.306) and fathers (x=1.73 + 0.62 vs. 1.75 + 0.63; p=0.509). Mothers had significantly higher levels of baseline stress compared to fathers (x=1.98 + 0.68 vs. 1.73 + 0.62; p=<0.005). |
| Noergaard et al. (2018)<br><br>Denmark | What is the impact of a more father friendly NICU on paternal stress levels? | n=55 control group<br><br>N=54 intervention group<br><br>Fathers in the NICU; similar baseline characteristics (except more employed fathers in intervention vs. control groups | Quasi-experimental 2 group pre-test post-test design<br><br>PSS: NICU | Paternal Stress | Standard care<br><br>"Father-friendly NICU": The intervention was designed & implemented following control Researchers collaborated with fathers and other stakeholders to increase knowledge and understanding or paternal needs and wishes in order to create the father friendly NICU. Activities were tailored to be more inclusion of paternal needs and included: participation in important | Significant differences in stress scores between control and interven-tion groups on admission to NICU (x=1.71 + 0.46 vs. 2.02 + 0.55; p=0.0014) and time of discharge (x=1.43 + 0.44 vs. 1.84 + 0.59; p=0.001); with significant differences in the mean change of stress scores from admission to discharge in control and interven-tion |

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| | | | | | "firsts" (ex. first bath); skin to skin contact; information and guidance from healthcare professionals; inclusion in important conversation re: growth and development; social work support, including info re: paternity leave, social and economic issues or concerns; participation in father support groups | groups (p=0.004). Results suggest that the "father friendly NICU" design failed to show reduction in paternal stress levels with authors reporting higher mean stress levels in the interven-tion group. |
| Ong et al. (2018)<br><br>Malaysia | What is the effect of a structure-ed nursing interven tion program on maternal stress and ability levels in the NICU? | n=108 control group<br><br>n=108 intervention group<br><br>Mothers with infants in NICU. similar baseline characteristics (exceptions: maternal age, birth weight and birth order) | Quasi-experimenta l pre-test post-test design<br><br>PSS: NICU<br><br>Maternal abilities checklist | Stress<br><br>Maternal ability | Standard care: orientation to NICU layout and equipment; routine activities; education re: handwashing breastfeeding support; answering questions and providing support as needed<br>Standard care PLUS structured nursing intervention (SNI) program. The 14-day intervention focussed on education, psychosocial support, | Similar pre-test stress scores were found in the control and interventio n groups (x=3.67 + 0.87 vs. 3.75 + 0.82; p=0.90). Similar baseline scores were also found in relation to maternal ability in control and interven-tion groups (x=3.09 + 0.75 vs. 2.89 + 0.75; p=0.109). |

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| | | | | and interpersonal interaction. SNI consisted of two in person meetings, in addition to SMS and telephone support.<br><br>1st Meeting: an educational booklet provided and reviewed with mothers (information re: premature infants; NICU environment and equipment; growth and development; developmental care; nutrition; how parents can support infant; relaxation tips for parents); orientation to NICU layout and equipment<br><br>2nd Meeting (4th day after NICU admission): education re: equipment used in NICU; update re: infant's condition; teaching and reinforcement of relaxation techniques for parents; addressing mothers | A significant reduction in total stress scores was found both between (p=0.04) and within the control (p=0.007) and intervention groups (p<0.001) (x=3.50 + 0.83 vs. 3.26 + 0.83) A significant improvement in maternal ability scores was found both between and within the control and intervention groups (x=3.67 + 0.64 vs. 4.04 + 0.64; p values <0.001) Results suggest that both standard care and a SNI are effective at reducing maternal stress and improving maternal abilities; with more marked findings with the SNI. |

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| | | | | | psychological concerns and concerns about infant; address any additional maternal questions/concerns<br><br>Additional support and education were provided via telephone calls (6th and 10th day post NICU admission) and online messaging (3rd and 8th day post NICU admission) | |
| Petteys & Adoumie (2018)<br><br>United States | What is the effect of a mindfulness-based neuro developmental care intervention on parental stress levels, bonding, parent satisfaction and infant length of stay in the NICU? | n=27 control group<br><br>n= 28 intervention group<br><br>Parents dyads with infants in NICU; similar baseline demographics (exception: birth weight, mental health history) | Non-blinded RCT pilot study, pre-test-post-test design<br><br>PSS: NICU<br><br>Mother-to-Infant Bonding Scale (MIBS)<br><br>Parent Satisfaction Score | Stress | Standard care (contact with SW, chaplain, OT/PT, unstructured developmental care training)<br><br>Standard care PLUS 1:1 educational training on mindfulness techniques & structured neurodevelopmental care training activities (within 10 days of enrollment), including provision and review of educational package to families Mindfulness techniques education: | No significant differences were found in pre-test (x=2.4 + 1.7 vs. 2.9 + 1.4; p=0.214) and post-test (x=2.0 + 1.6 vs. 1.8 + 1.6; p=0.648) parental stress scores between control and Interven-tion group. The interven-tion group showed significant reduction in post-test stress scores (p=0.012). |

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| | | | | | focused breathing; principles of attunement and types of touch and non-touch interactions; personal awareness and nonjudge-ment; nonjudge-ment and awareness of infant Neurodevel-opmental care training: observation and recognition of infant cues; signs of organized vs. disorganized physiological states; motor and families with verbal support (min. biweekly) throughout the duration of their NICU stay. | This was not seen in the control group (p=0.285) No significant differences were found in bonding scores (x=1.68 + 2.87 vs. 1.81 + 2.46; p=0.462) or parent satisfaction (p=0.287) between control and interventio n groups There was a significant difference in infant LOS between control and interven-tion group (x=67.2 + 37.7 vs. 48.7 + 30.1; p=0.047). |
| Ribeiro et al. (2018)<br><br>Brazil | What is the impact of a music therapy inter-vention on maternal anxiety in the NICU? | n=11 control group<br><br>n=10 intervention group<br><br>Mothers in the NICU; similar baseline characteristics | RCT, pre-test-post-test design<br><br>BAI | Anxiety | Routine care<br><br>Routine care PLUS tailored music therapy intervention – a music therapy questionnaire was utilized to collect data regarding subjects' experiences with music and list their favorite songs to individualize | Pre-test anxiety scores showed no significant differences in intervention and control groups prior to the intervention (x=15.10 + 10.25 vs. 10.70 + 8.54). Significant findings were found in post-test anxiety scores |

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| | | | | the intervention. Individual music sessions (30-45 min.) were conducted weekly by a professional music therapist and consisted of: Reception Type 1 music listening: listening to instrumental piece (2-4 min.) allowing time for mother to reflect on current life circumstances and hospitaliza-tion of infant Therapeutic music listening songs selected by participant Verbal processing: mother shares experience of therapeutic listening Type II music listening instrumental, faster, more densely textured pieces (vs. type I) Conclusion: brief comment re: issues approached during session and plan for subsequent session | between the interven-tion and control groups (x= 5.40 + 4.72 vs. 6.00 + 4.94; p<0.05) and within the interven-tion group interven-tion (p<0.05). Results suggest that music therapy may be effective at reducing maternal anxiety levels in the NICU |

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| | | | | | The number of music therapy was variable based on overall length of stay (x= 7 + 2 sessions) | |
| Welch et al. (2016)<br><br>United States | What is the effect of the Family Nurture Intervention (FNI) on maternal depression and anxiety symptoms of mothers in the NICU? | n=56 control group<br><br>n=59 intervention group<br><br>Mothers of infants in NICU; similar baseline characteristics | RCT, 2 group pre-test-post-test design<br><br>STAI<br><br>Behavioral Inhibition System and Behavioral Activation System (BISBAS) | Anxiety | Standard care<br><br>Family Nurture Intervention (FNI) – researchers facilitated calming sessions to engage mothers and infants in physical emotional and sensory experiences. Activities included: Calming touch sessions: firm sustained touch over torso or cupping of hands around legs/feet and abdomen; communication of thoughts and feelings with infant; seek and maintain eye contact with infant as able Holding sessions (minimum 4 times per week): skin to skin or clothed holds; encouraged to feed or bathe infants as able Daily scent cloth exchange: | Similar baseline trait anxiety and BISBAS scores were found between control and intervention groups: STAI (x=33.2 + 8.81 vs. 32.8 +n7.47; p=0.775); BISBAS: drive (x=12.3 +2.69 vs. 12.0 + 2.28; p=0.577); BISBAS: fun seeking (x=11.0 + 2.14 vs. 10.8 + 1.94; p=0.578); BISBAS: reward responsiveness (x=17.1 + 1.82 vs. 17.5 + 1.75; p=0.311; BISBAS: behavioural inhibition (x=18.7 + 2.68 vs. 18.7 + 3.10; p=0.937). These |

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| | | | | scent cloths kept in close contact to infant and mother and exchanged daily FNI sessions were facilitated by a FNI nurture specialist (previous NICU nurses trained in implementing FNI protocol) and activities were encouraged at any time even when not facilitated by FNI specialist. | results suggest that both groups were similar in baseline psycholog-ical characterist ics Mean state anxiety scores were significant-ly lower in FNI mothers vs. control group at 4-month corrected age (p=0.004) Anxiety symptoms at 4 months were significant-ly correlated with baseline STAI scores in the control group (p<0.001) but the interven-tion group (p=0.19) Based on anxiety scores, FNI may be an effective interven-tion in reducing anxiety symptoms while in the NICU and after discharge |

## DISCUSSION

This literature review evaluated the effectiveness of interventions for parental distress within the NICU setting. Most of the studies showed favorable results in relation to reduction in the outcome measures utilizing a variety of objective measurement tools. There was great heterogeneity across studies regarding the interventions employed. The PSS: NICU and STAI were the most common tools utilized to evaluate parental stress and anxiety levels in the NICU, although, there was more variability with anxiety measurement tools. This was a similar finding within the literature and previous review articles (Sabnis et al., 2019).

Narrative writing, occupational-based art therapy, mindfulness and relaxation techniques are relatively simple interventions and have been found to reduce maternal, paternal, and/or parental distress in the NICU. The findings of this review are consistent with findings in the literature and previous reviews, with these types of contemporary and alternative medicine interventions decreasing parental distress in the NICU setting (Joseph et al., 2013; Sabnis et al., 2019). The NICU experience is stressful and often traumatic for families, and narrative writing is a strategy that has the potential to aid in coping, growth, and improvement in parental mental health (Crawley, 2020). The study by Jouybari et al. (2018) failed to produce significant results in evaluating narrative writing and art therapy on maternal stress; however, the limited duration of the intervention (4 days between pre-test and post-test measurements) may have contributed to the lack of significant findings. Despite best efforts to limit this within a parallel design, spillover is a risk that would be difficult to completely eliminate within this type of design, especially within the context of the NICU where there is close contract frequent interaction between families, whom often are a source of support for one another.

In evaluation of educational interventions, the mixed results of this review are similar to those of Mendelson et al. (2017), suggesting that educational interventions may not be the most effective type of intervention to address parental distress in the NICU. These types of interventions may need to be combined with complementary or alternative modalities or psychological support to enhance effectiveness with families in the NICU. The results of Koochaki et al. (2017) study suggest that psychological interventions, including both routine care counselling and cognitive behavioural based anxiety counselling are useful tools to decrease maternal anxiety in the NICU. Anxiety counselling using a cognitive behavioural approach had a longer-lasting effect at reducing maternal anxiety levels. These findings are similar to those found by Loughnan et al. (2019) and Shaw et al. (2014) when evaluating an antenatal cognitive-behavioural therapy [CBT] intervention and a NICU-based trauma-focused CBT, respectively. Shaw et al. (2013) found a similar reduction in anxiety measurements of both their control group (receiving education and coping strategies) and their intervention group (receiving trauma-focused CBT). However, reassessment at 6-month post- intervention found a sizable and significant reduction in anxiety levels of the intervention group (Shaw et al., 2014). This provides further evidence for the potential long-term benefits of CBT and emphasizes the need for ongoing support for mothers starting in the antenatal period and extending postnatally to help facilitate anxiety reduction within this highly susceptible and vulnerable group.

Familiar songs can help control anxiety, improve concentration, recover memories, provide a sense of security and motivation, and stimulate social interaction, simultaneously giving people the opportunity to recognize and improve their emotions" (Ribeiro et al., 2018, p. 5-6). The benefit of music therapy on maternal anxiety found by Ribeiro et al. (2018) is mirrored by Roa & Ettenberger (2018) in their clinical pilot intervention evaluating a music therapy self-care group in the NICU. This intervention included both mothers and fathers, also finding reduced stress, improved mood, motivation, and restfulness post-intervention.

The study by Tandberg et al. (2013) evaluating nursing support and parental stress levels, highlighted the importance of nursing communication in reducing parental stress levels in the NICU. Consistency in communication and nursing support has been shown to be important in producing significant reduction in parental distress. The individualized neonatal parent support programme assessed by Mansson et al. (2019) was not associated with a significant reduction in overall parental stress levels. The lack of significant findings in this study may be due to the inconsistent application of the individualized nursing intervention, related to organizational changes and failure to have consistency in the role of designated primary nurses.

In a study by Foutiou et al. (2016), the investigators implemented an intervention assessing the effectiveness of relaxation techniques of parental stress and anxiety levels measured by the PSS: NICU and STAI tools. They found that the intervention was associated with a reduction in trait anxiety levels after discharge. Their results, however, also implied that higher levels of initial stress are associated with significantly increased parental stress measurements three months following discharge. These results emphasize the need for early recognition of those at increased risk and provision with appropriate interventions for ongoing stress management to reduce parental stress levels within the NICU and beyond. Consistent with findings from previous reviews, the majority of literature is focused on evaluating maternal distress in the NICU and paternal distress is often neglected (Sabnis et al., 2019). Lee et al. (2012) found that an early intervention focusing on education, nursing support and guidance, led to higher measures of fathering ability which was associated with reduced paternal stress scores. These findings contradict those found by Noergaard et al. (2018) with their father friendly NICU design, in which increased paternal education and involvement was associated with increased paternal stress levels. These discordant results suggest that there may be additional socioeconomic and culture factors influencing the findings.

Many of the studies included in this review were conducted outside of North America, in single centers, which limits the generalizability of their results to non-comparable jurisdictions. Stress, anxiety, and coping have different sociocultural dimensions. Consideration of these dimensions must be taken into account when designing and adapting interventions within different countries, cultural and religious contexts.

**Implications for Nursing Practice**

Within the NICU, nurses take on a dual role of caring for the vulnerable preterm infant population, while also caring for and supporting their families. Nurses play a central role in

helping address family's needs, providing emotional support, guidance, communicating and assisting families with decision-making (Toral-Lopez et al., 2016). As parents are the most consistent caregivers for their infants, it is vital that they be physically and mentally healthy to help them cope with the NICU environment. Parental presence, including recognition of infant cues and provision of neurodevelopmental interventions (ex. parental touch) is crucial to support the premature infant's development and physical and developmental well-being.

Based on the synactive theory by Als, and the Newborn Individualized Developmental Care and Assessment Program (NIDCAP), parents play an important role in helping to regulate the infants five subsystems including: autonomic/physiology, state, motor, attention, interaction and self-regulation, and help to support the infants developmental (VandenBerg, 2007). Increased understanding of ways to better support families, including information regarding the effectiveness of different interventions to alleviate parental stress will help to inform knowledge translation, influence nursing practice, and hopefully aid in the planning of evidence-based practice improvements. NICU nurses are in an optimal position to help advocate for and facilitate interventions that will help in the reduction of parental distress. Simple and cost-effective interventions, including art-based group activities, narrative writing, mindfulness techniques, relaxation techniques, and individualized nursing interventions can readily be integrated into the NICU setting. The results of the review have the potential to inform new unit policy and/or organization policy and guidelines with the integration of interventions to help reduce parental distress within this intensive care setting.

**Limitations and Biases of Review**

A rapid review is less comprehensive than a full systematic review. The search only utilized three databases, excluded grey literature, non-English publications, and was restricted to literature published within the last five years. These restrictions may have excluded evaluation of interventions that had been previously published or not yet published in the literature.

Interventions that evaluated stress or anxiety, but not as primary outcomes, were also excluded based on the scope of this study. This exclusion could limit the available knowledge about targeting stress and anxiety within this population and may have also potentially excluded larger, more broad scale studies (evaluating multiple outcomes). The selected studies were largely single center designs, with imbalances in respect to parent sex, infant gestational age, and geographical location, which may restrict their generalizability in terms of culture, healthcare structures, concepts, and designs.

## CONCLUSION AND FUTURE IMPLICATIONS

Although there is an understanding of the burden of NICU-related distress amongst experts and families, and a recognition of the need for ongoing psychosocial support, standard screening practices and supports of NICU parents are not in place universally (Sabnis et al., 2019). There is a need for increased resources and support to address the physical and mental health needs of these infants' families. Interventions targeting mothers' psychological needs can significantly reduce stress and this has a long-term benefit on maternal physical and

mental health, as well as enhancing infant mental health, bonding, and attachment. Larger scope studies, including multi-centre studies are needed on an international level. This should include studies evaluating mindfulness and other relaxation techniques, narrative writing, neurodevelopmental education, group therapy, as well as those incorporating technology to educate and engage families. These types of interventions have the potential to be important in empowering families with education and mental preparedness to help relieve stress and anxiety for families in the NICU. The WOC questionnaire could be incorporated into the NICU setting as a means to help establish how the individual parents cope with stress and could allow for a more tailored approach to psychosocial support within the NICU setting. Literature focusing on fathers in the NICU is limited and there are inherent differences in how mothers and fathers experience stress. There is a need for further research and investigation to evaluate these differences, including more data evaluating paternal stress and its trajectory, so that interventions can be developed and structured to better support fathers within the NICU and to reduce the long-term impact on fathers' mental health.

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## APPENDIX A: SEARCH SUMMARY

**CINAHL Plus with Full Text**
Date searched: Jan 13, 2020
Results: 311

1. ((MH "Intensive Care, Neonatal") OR (MH "Intensive Care Units, Neonatal")) OR (Neonatal-intensive-care or NICU )
2. ((Parent* or mother* or father*) N6 (worry or worri* or stress* or distress* or anxiety or psychosocial or upset*))
3. (MH "Clinical Trials+") or randomized or placebo or randomly or trial or groups
4. S1 AND S2 AND S3

**Ovid MEDLINE(R) ALL 1946 to January 10, 2020**
Date searched: Jan 13, 2020
Results: 166

1. exp Intensive Care, Neonatal/ or exp Intensive Care Units, Neonatal/
2. (Neonatal intensive care or NICU).mp.
3. 1 or 2
4. ((Parent* or mother* or father*) adj6 (worry or worri* or stress* or distress* or anxiety or psychosocial or upset*)).mp.
5. 3 and 4
6. exp Clinical trial/ or randomized.tw. or placebo.tw. or dt.fs. or randomly.tw. or trial.tw. or groups.tw.
7. 5 and 6

**PsycINFO 1806 to January Week 1 2020**
Date searched: Jan 13, 2020
Results: 85

1. exp Neonatal Intensive Care/
2. (Neonatal intensive care or NICU).mp.
3. 1 or 2
4. ((Parent* or mother* or father*) adj6 (worry or worri* or stress* or distress* or anxiety or psychosocial or upset*)).mp.
5. 3 and 4
6. exp Clinical trials/ or randomized.tw. or placebo.tw. or randomly.tw. or trial.tw. or groups.tw. or exp experimental design/
7. 5 and 6

RefWorks was used to organize and sort references. Identification of duplicate articles was done within RefWorks utilizing the “Exact Match” function. A total of 97 duplicates were found, leaving a total of 465 articles for further review.

# Survey

# *ICU Clinician Perceptions of COVID-19 ICU Readiness: Results of a Thematic Analysis of National U.S. Survey Data*

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**ABSTRACT**

The COVID-19 pandemic has greatly impacted intensive care unit (ICU) clinicians worldwide. Case number surges resulted in high or even above-capacity ICU patient census, limited bed availability, clinical staffing strains, and concerns about maintaining adequate medication, personal protective equipment (PPE), and equipment supplies to ensure optimal patient care. In the United States, a series of rapid cycle COVID-19 surveys were disseminated to ICU clinicians to assess ICU readiness and ongoing challenges posed by the pandemic. This article reports on a qualitative thematic analysis of the descriptive data for general themes provided by over 800 ICU nurses, advanced practice providers, physicians, pharmacists and respiratory therapists, reflecting upon their perceptions from the early to mid-pandemic timeline.

***Keywords:*** Intensive care, COVID-19 pandemic, equipment, communication, survey

## OVERVIEW

The COVID-19 pandemic has become a rapidly-emerging, far-reaching, deadly killer (Horesh & Brown, 2020). Due to the global case numbers, surges in case numbers and the predilection to cause respiratory failure, which inherently necessitates high levels of acute medical care, there has been immense strain on health care providers, especially ICU clinicians. ICU preparedness is essential because of high ICU utilization during the pandemic. Approximately 12%-19% of

patients with COVID-19 have required hospital admission, and 3%-6% became critically ill (Edelson et al., 2020). Ensuring effective ICU preparedness and response will remain paramount as the pandemic continues.

According to the Society of Critical Care Medicine (SCCM) (2020), the burden for COVID-19 patient care in the ICU mandates a better understanding of ICU resource needs to meet the anticipated healthcare requirements of this patient population. Information regarding national ICU readiness for COVID-19 remains limited (SCCM, 2020). A series of rapid cycle surveys were developed by SCCM to assess ICU readiness across the United States (Kaplan et al., 2020; Kleinpell, 2020). Included in these surveys were open-ended questions that allow for free-text, narrative responses from clinicians. This article reports on an analysis of the descriptive data for general themes provided by over 800 ICU nurses, physicians, pharmacists and respiratory therapists.

## DISASTER PREPAREDNESS

Effective pandemic response necessitates a multifaceted approach. As outlined in Figure 1, several complex relationships exist between critical care pandemic preparedness and the supporting concepts of critical care staffing capacity, critical care bed/surge capacity, equipment capacity (such as ventilators), resource capacity (PPE, COVID-19 testing, medication availability, etc.), critical care clinician stress, and triage preparedness.

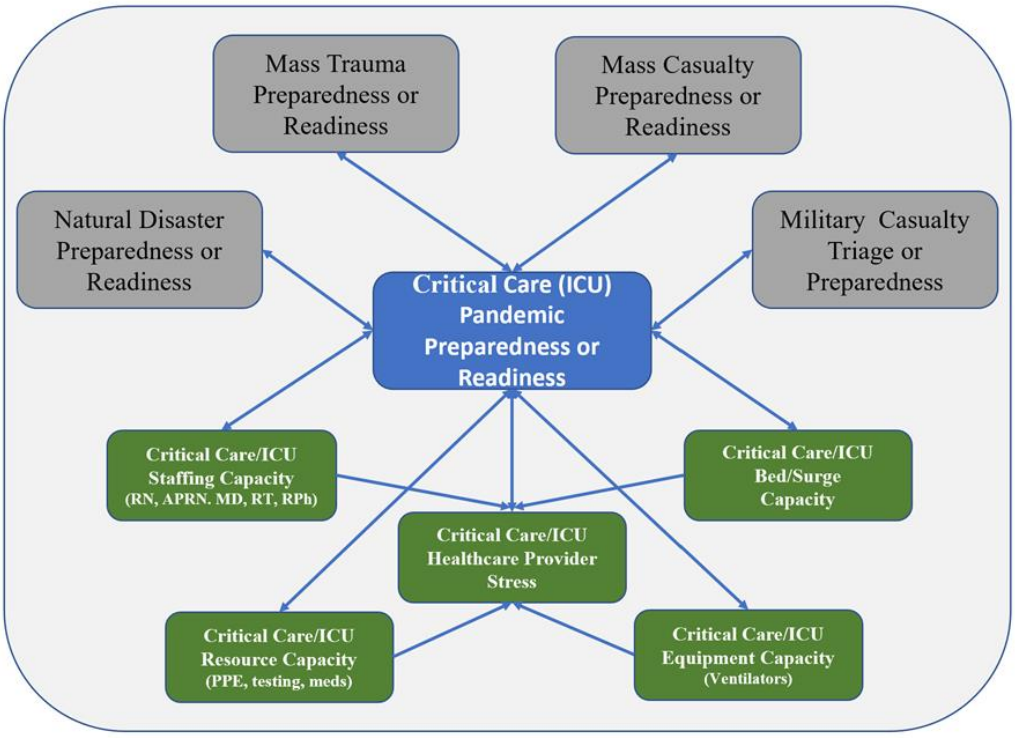


**Figure 1.** Critical Care (ICU) Pandemic Preparedness or Readiness

The COVID-19 pandemic has resulted in a unique circumstance during which care for critically ill patients. Early challenges included a lack of pathophysiologic knowledge of the natural course of the disease and lack of evidence relative to safety and efficacy of novel treatments. Additionally, surges inherently stressed all ICUs because common themes that limited effective care included shortages of space, staff, and supplies. Rubinson et al. (2008) proposed the framework of Emergency Mass Critical Care (EMCC) as a set of changes from everyday ICU patient care to address staffing, equipment, and treatment spaces intended to maximize survival for an overall population of critically ill and simultaneously minimize adverse outcomes that may happen as a result of those changes from usual practice. Lastly, although assurance of adequate space, staff, and stuff in a pandemic is highly important for success of institutional or regional health care preparedness, clinician stress and burnout has been prevalent, and consideration for the well-being of healthcare providers on the frontlines is also necessary (Ripp et al., 2020).

**METHODS**

SCCM, an international organization of over 16,000 ICU clinicians including physicians, nurses, pharmacists, respiratory therapists and others, launched a series of rapid cycle surveys to gather input on the impact of the COVID-19 pandemic. The first survey launched on March 18, 2020 and had over 4,000 respondents; a second survey launched on April 7, 2020, had over 9,000 respondents (Kaplan et al., 2020; Kleinpell et al., 2020). These anonymous, national surveys were provided to potential respondents through a web-based portal. Each of the surveys was available for 1 week and interspaced 2 weeks apart and offered participants with opportunities to answer participants open-ended questions with free-text, descriptive responses.

The first of the two national web-based, anonymous surveys, which focused on pandemic preparedness, was launched March 18-25, 2020. This 12-item questionnaire assessed practicing ICU clinician perceptions the degree to which ICU facilities and teams were prepared to treat COVID-19 patients, concerns related to caring for COVID-19 patients in the ICU, efforts that have been made to care for patients, anticipated personal protective equipment (PPE) supply shortages, and techniques being used to add critical care capacity. In this context, two questions permitted responses of "other" by participants. Those questions were:

- What concerns do you have related to caring for COVID-19 patients in your ICU?
- What efforts has your primary ICU made to prepare for COVID-19?

The second rapid cycle survey focused on concerns related to caring for COVID-19 patients in the ICU and was launched April 8, 2020. This 17-item questionnaire again targeted practicing ICU clinician perceptions of the degree to which ICU facilities and teams were prepared to treat COVID-19 patients, concerns related to caring for COVID-19 patients in the ICU, efforts that have been made to care for patients, anticipated PPE supply shortages, and techniques being used to augment critical care capacity. The qualitative questions that permitted a free-text response in this second survey assessed the most critical needs that ICUs were currently facing to manage the COVID-19 pandemic. Table 1 outlines the open-ended questions used in these surveys.

**Table 1.** Open-ended Questions

| *Open-ended Questions* |
|---|
| What concerns do you have related to caring for COVID-19 patients in your ICU? Other (please specify) |
| What efforts has your primary ICU made to prepare for COVID-19? Other (please specify) |
| What is the most critical need that your ICU is currently facing to manage the COVID-19 pandemic? |
| Other (please specify) |

In order to analyze the open-ended responses, thematic analysis was used to identify themes across all cohorts and by clinician cohorts. Thematic analysis methodology was used to guide the analysis of open-ended question responses received from SCCM's quasi-qualitative designed survey. Thematic analysis is a framework that provides investigators with a process to identify common themes in a qualitative data set. These common themes may be ideas, topics, or patterns of meaning that appear frequently in the data (Caulfield, 2020). Braun and Clarke (2006) maintain that thematic analysis methodology for qualitative research can be broadly employed across a variety of research questions and epistemologies. The thematic analysis methodology proposed for this project followed a six-step process: (a) familiarization; (b) coding; (c) generating themes (d) reviewing themes; (e) defining and naming themes; and (f) writing up results (Caulfield, 2020).

**RESULTS**

A total of 737 clinicians responded to the open-ended question *"What concerns do you have related to caring for COVID-19 patients in your ICU?"* including nurses (n=557, 75.6%), physicians (n=64, 8.68%), advanced practice providers (n=45, 6.11%), respiratory therapists (n=41, 5.6%), and pharmacists (n=6, 1%). There were an additional 136 secondary response themes conveyed in the descriptive responses for a total of 873 response themes. The following themes were identified:

- Lack of supplies, including PPE and masks (n=322, 36.8%)
- Safety of staff, patients and families (n=113, 12.9%)
- Inadequate staff preparedness (n=91, 10.4%)
- Lack of adequate facilities and equipment (n=67, 7.7%).

A total of 234 ICU clinicians responded to the question which listed pre-determined response choices "What is the most critical need that your ICU is currently facing to manage the COVID-19 pandemic? Other (please specify)" Majority (n=208, 88.9%) were nurses, advanced practice providers (n=11, 4.7%), physicians (n=10, 4.3%), and respiratory therapists (n=2, 1%). The primary response themes included the following:

- Lack of PPE, masks, and supplies (n=43, 17.70%)

- Low patient census and shift cancellations (n=24, 9.88%)
- Lack of or inadequate cleaning supplies and housekeeping (n=22, 9.05%)
- Lack of powered air-purifying respirators (PAPR) hoods and equipment (n=20, 8.23%)
- Lack of leadership and poor communication (n=17, 7.00%)
- Lack of institutional support (n=15, 6.17%)
- Lack of adequate facilities and equipment (n=14, 5.76%)
- Lack, delay, or inappropriate testing (n=11, 4.53%)

For the open-ended response option to provide any additional information "Other (please specify)?" a total of 121 professionals responded including nurses (n=109, 89.2%), physicians (n=4, 2.2%) advanced practice providers (n=3, 2.48%), and respiratory therapists (n=1, 0.83%). Main themes included:

- COVID-19 patient care, pronation, and PPE time requirements (n=41, 33.06%)
- Safety of staff, patients, and families (n=10, 8.06%)

The second open-ended question asked ICU clinicians *"What efforts has your primary ICU made to prepare for COVID-19?"* A total of 206 professionals responded including ICU nurses (n=151, 73.3%), advanced practice providers (n=19, 9.2%), physicians (N=16, 7.7%), respiratory therapists (n=11, 5.3%), and pharmacists (n=2, 2.4%)

The 206 respondents provided primary response themes from the drop-down response choices. There were an additional 11 secondary response themes conveyed in the descriptive responses for a total of 217 response themes from the survey. From this data set, and after researcher triangulation to mitigate bias, the following themes emerged:

- Inadequate response and lack of communication 28.11% (61)
- Increased communication and implemented visitor restrictions 19.35% (42)
- Prepared facilities, beds, and equipment 12.44% (27)
- Staff preparedness, training for PPE, and patient care 28.57% (62)

**DISCUSSION**

The results of this thematic analysis of open- ended comments from a series of national rapid cycle surveys assessing the ongoing impact of the COVID-19 pandemic on ICU clinicians identified a number of priority areas for ICU care in the initial phase of the pandemic. These included adequate equipment and supplies, adequate staffing, and staff preparedness. Nurses, physicians, and advanced practice providers all identified a lack of PPE, masks, and supplies as a top area of concern, as well as concerns about leadership and communication. Similar to the findings of the National Academy of Medicine's report on clinician responses to the pandemic (Madera et al 2021). ICU clinicians reported that key elements of the initial response were to develop clinical guidelines, adapt care delivery systems, and focus on education and training.

Nurses identified the safety of staff, patients, and families (13.65 %, n=89), while physicians and advanced practice providers reported inadequate staff preparedness in their top three concerns (15.79%, n=12 and 19.61%, n=10 respectively). For example, "I work in peds but if the adult side gets overwhelmed, they may spill into our unit. I have never worked as a bedside RN with the adult population" (Table 2). The need to enhance staffing by using non-ICU trained clinicians is an identified strategy to ensuring adequate

ICU manpower (Halpern and Tan, 2020). As highlighted in updated US statistics on the availability of critical care resources, the pandemic brought concerns about ICUs potentially being overwhelmed with critically ill patients (Halpern and Tan 2020). Guidance was provided by SCCM to ICUs about the need for contingency and crisis beds for critically ill patients, including augmenting critical care staffing (Halpern and Tan 2020). A Rand report on the critical care surge response strategy during the pandemic highlighted similar findings related to crisis capacity strategies including adapting medical care spaces and changing staffing ratios to increase capacity (Abir et al, 2020).

**Table 2:** Sample Themes and Examples Reported by ICU Clinicians

| Theme | Example | Profession |
|---|---|---|
| Inadequate staff preparation | I work in peds but if the adult side gets overwhelmed they may spill into our unit. I have never worked as a bedside RN with the adult population." | Nurse |
| | The unpredictability of this disease and how deadly it is; we don't know what to do to manage these patients" | Physician |
| Institutional process changes | Mandatory overtime and/or change in work hours and safety overall (what if I get infected despite PPE) | Advanced Practice Provider |
| | Communication with families | |
| | As a provider in an ICU setting, we are not Entering the room as often as we would if They were not on such strict isolation, so I Feel like the patients are not getting the care They normally would. | Advanced Practice Provider |
| | Patients are dying without their families. We are face timing with the family members during the death process but this does not support the families enough. | Nurse |
| | Imagine the patient anxiety when everyone tries to spend the least amount of time in the room and no visitors are allowed . | Nurse |
| Lack of adequate negative pressure rooms, no facilities/equipment | anterooms at all | Inadequate Nurse |

| | | |
|---|---|---|
| | Not enough ventilators | Physician |
| Lack of institutional support | Childcare given school and daycare closure | Advanced Practice Provider |
| Safety of staff, patients Families | Taking every precaution to not bring this home to my family | Nurse |
| | I am pregnant and concerned about safety specifically related to my health | Nurse |
| Hospital preparedness | I am proud of how well ahead of the curve my hospital system seems to be compared to others in the area. Thankfully we had an Ebola plan that has been adapted for COVID. | Nurse |
| Staff preparedness/ Training | Added a full FTE for donning/doffing resource and made an infection prevention specialist hotline for staff to call 24/7 for questions regarding COVID-19 care | Nurse |
| | Trained ancillary staff to assist nursing and cancelled elective surgeries to conserve PPE | Pharmacist |
| | Psychological support to healthcare staff by spiritual coordinator | Physician |
| Lack of PPE, masks and supplies | Need more N95 masks | Nurse |
| | Turnaround time for cleaning our PAPRS | Nurse |
| COVID-19 care | The time it takes to done PPE<br>The general difficulties of caring for someone when in isolation gear | Nurse |
| | The PPE and isolation introduce a barrier to our physician/patient interaction such that it is hard (if not impossible) to develop any relationship with them. Thus, the reward of a therapeutic relationship is lost. | Physician |
| Lack of compensation Or hazard pay | Massive amounts of (over) documentation has not changed even though our jobs are harder, riskier, and scarier. We are now doing the job of ancillary staff (EKG, phlebotomy, etc) with no more pay and same lengthy documentation requirements. | Nurse |

Early in the pandemic, the most common theme across the total cohort of respondents was "no critical needs" (21.81%, n=53). A respiratory therapist shared, "No critical needs at this time" and a nurse wrote, "No critical need identified at this time. My hospital leadership is proactive with planning and strategies setup already for potential surge. PPE is available when needed. Redeployment already setup to address staffing issues". The second most common theme, which was also identified in the first survey, was the Lack lack of PPE, masks, and supplies (17.70%, n=43). Responses were similar to the earlier examples with respect to this theme, such as "All forms of PPE, especially masks, gowns, and face shields." The theme of safety of staff, patients, and families was described in the responses. This is consistent with well-documented needs for safety and wellness of healthcare workers in the literature review. Previous writings note that the predictable surge in mask demand during an influenza pandemic would create a gap that may expose critical care workers to unacceptable risk of infection (Caria et al., 2015). The concerns of staff, patient, and family risk were clearly articulated through the survey responses. Additionally, the capacity of staffing resources is of utmost importance when responding to a pandemic.

**LIMITATIONS**

Limitations include the low number of responses from respiratory therapists and pharmacists, precluding identification of significant concerns related to those healthcare providers. Overall, thematic analysis has limitations related to the potential for inconsistency when deriving themes. As a type of qualitative analysis, thematic analysis can also be prone to personal inferences by the researcher in interpreting the results.

**CONCLUSIONS**

COVID-19 is an ongoing global pandemic that has significantly impacted critical care clinicians including nurses, physicians, advanced practice providers, and respiratory therapists. Significant gaps in ICU readiness to care for COVID-19 patients, adequate supplies and equipment, staffing concerns, and barriers to providing patient and family centered care were identified in the descriptive, qualitative responses from the early time period of the pandemic. Lessons learned regarding ICU preparedness during the pandemic and strategies used to meet the demands for ICU care can be used to prepare for the next disaster/pandemic. It is crucial that healthcare leaders and administrators ensure adequate resources and support for ICU clinicians during the ongoing pandemic.

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# Review article

# *Effectiveness of Current Interventions to Alleviate Parental Distress in the NICU: A Rapid Review*

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## ABSTRACT

**Background**: The birth of a premature infant and admission to the NICU is often unexpected and traumatic for families, leading to increased distress and can negatively impact parental-infant attachment. Appropriate interventions can help to lessen the negative impact of a NICU admission on families, improving parental mental health, reducing distress, enhancing parent- infant relationships, and improving the long-term physical, cognitive, emotional, and social development of the infant.

**Aims:** The purpose of this study is to examine and evaluate research evidence on the effectiveness of current interventions for improving parental distress in the NICU.

**Methods:** A rapid review was conducted utilizing a protocol based on the Virginia Commonwealth University guidance. Keyword searches were conducted on CINAHL, MEDLINE, and PsychINFO, and studies were selected according to pre-defined eligibility criteria, published between January 2015 and January 2020. The literature search included primary studies of interventions with parental stress and/or anxiety reduction as outcomes.

**Results:** A total of 14 articles were included, evaluating the effectiveness of 13 different interventions, including narrative writing, art therapy, structured nursing interventions, anxiety counselling, spiritual care, organizational change, music therapy, relaxation, and mindfulness techniques. With the Pexception of three, all the studies found significant results in the reduction of stress and/or anxiety levels of the subjects, with mothers having overall higher levels of stress indicated by higher stress scores on standardized measurement tools.

**Conclusion:** There is a need for ongoing assessment of parental distress and integration of appropriate interventions within the NICU settings. In this review, both individualized and group interventions including narrative writing, art therapy, music therapy, spiritual care, activity-based group therapy, music therapy, audio-assisted relaxation techniques, mindfulness based neurodevelopmental care, cognitive behavioral based counselling, family nurture intervention and a structured nursing intervention were shown to be effective in reducing parental stress and/or anxiety in the NICU. The small scale of the studies included in this review impact generalizability to a broader audience and emphasizes the need for larger scope, multi-center studies at an international level to build on and broaden our level of knowledge on how to better support families and reduce parental distress in the NICU.

***Key words:*** Parental stress, neonatal intensive care, interventions, review, premature, mental health

**BACKGROUND**

Premature birth (birth before 37 weeks gestation) is the leading cause of infant mortality and morbidity, and is associated with numerous complications, including brain injury, chronic lung disease, necrotizing enterocolitis, cerebral palsy, neurodevelopmental and academic impairments (Canadian Neonatal Follow-up Network [CNFUN], 2019; Johnston et al., 2014; McBryde et al., 2020; Polin & Yoder, 2020; Toral-Lopez et al., 2016). Advances in reproductive and healthcare knowledge and technologies have resulted in increased rates of prematurity and increased survival of those born at the extreme cusp of human viability, as early as 22 weeks gestation (Canadian Neonatal Network [CNN], 2017; Green et al., 2017; Lemyre & Moore, 2017).

The neonatal intensive care unit (NICU) is a fast paced, highly technical, and medically focused area specializing in the care of premature and critically ill infants. Admission into this foreign, intensive care environment is often an "unexpected and traumatic event for families" (Del Fabbo & Cain, 2016, p. 281). Parents often experience high levels of psychological distress, guilt, anxiety, fatigue, loss of control, sadness, feelings of helplessness, emotional distancing, uncertainty and worries about their infant's future, and these symptoms have been shown to still be present up to one year after the birth of their premature infant (Obeit et al., 2009; Petteys & Adoumie, 2018; Roque et al., 2017; Toral-Lopez et al., 2016; Treherne et al., 2017). The persistence of these symptoms and the physical, emotional, and psychological separation between infants and their parents within the NICU can lead to lack of bonding, parental self-confidence and parent-infant attachment, which has the potential to negatively impact the infants' cognitive, motor and social development during hospitalization and beyond (Del Fabbro & Cain, 2016; Jubinville et al., 2012; Makela et al., 2018; Obeidat et al., 2009; Petteys & Adoumie, 2018). Additional challenges include socioeconomic status, education, age, pregnancy factors (ex. fertility treatments), history of depression or high anxiety, financial concerns, juggling family responsibilities and life demands that carry on outside the NICU (Ayers et al., 2019; Carter et al., 2007). These challenges are further complicated by prognostic uncertainties and barriers of the NICU setting itself, including space, equipment, loud noises, lack of accommodations for family members, visiting restrictions, long hospital stays and lack of privacy, which can obstruct the emotional needs of parents to be close to their infants (Makela et al., 2018; Petteys & Adoumie, 2018; Treherne et al., 2017). Elevated stress levels in parents in the NICU are associated with higher levels of stress at three-months post discharge, which can adversely affect their ability to cope and care for their infant once at home (Fotiou et al., 2016). Appropriate interventions can help to lessen the negative impact of a NICU admission on families (Fotiou et al., 2016; Loewenstein et al., 2019). Although interventions have been studied, there is little literature comparing the effectiveness of different interventions.

The few published reviews on interventions focused almost exclusively on developmental care and family-centered care interventions and/or did not focus on parental stress, or anxiety as primary outcomes (Benzies et al., 2013; Ding et al., 2019; Lavalle et al., 2019; Vetcho et al., 2020). Other reviews were restrictive in the types of interventions evaluated. Dol et al. (2017) and Ebstein et al. (2016) performed reviews of eHealth

interventions and communication technology, respectively, finding mixed results on their effectiveness to reduce parental stress and/or anxiety within the NICU setting. Family centered care interventions and developmental care interventions have been extensively studied within the literature and have been shown to be effective at reducing parental stress and anxiety; however, despite the known benefits, implementation and utilization within the clinical setting has been lacking (Vetcho et al., 2020). There is a need to increase our awareness of the clinical utility of the different types of interventions to reduce parental stress and/or anxiety, including evaluating the current literature to inform healthcare professionals, guide practice and improve both parent and infant health and well-being.

## PURPOSE OF RAPID REVIEW

The purpose review was to critically review and evaluate evidence on the effectiveness of different interventions for improving parental distress in the NICU, identifying any methodological limitations or biases, as well as potential gaps in the current literature regarding interventions for parental distress, to inform practice and guide future research. This review builds on and adds to a previous review and meta-analysis conducted by Sabnis et al. (2019) who evaluated interventions studied prior to 2016, and their impact on parental distress levels. This review found that with the exception of family centered care interventions, which are the most extensively studied and a target for ongoing implementation, that further study and evaluation of parental interventions is needed going forward.

For this review, distress was defined as a negative emotional state or negative stress response that overwhelms one's ability to cope leading to physical and/or psychological maladaptation (American Psychological Association [APA], 2020). Stress was defined as a psychological or physiological response(s) to external or internal stressors (APA, 2020). Anxiety was defined as an emotion or emotional response manifesting as feelings of dread, marked apprehension, and somatic symptoms of tension in which the body mobilizes to meet the perceived threat (APA, 2020). The definition of stress and/or anxiety is based on standardized tools used in most of the included studies, each of which has different characteristics and definitions of what is normal versus abnormal. Although distress can encompass several physical and psychological constructs, within the scope of this review, the focus will be on evaluating the effectiveness of interventions on parental stress and/or anxiety within the NICU setting.

## METHODS

### Rapid Review Protocol

A rapid review was conducted utilizing a protocol outlined by Virginia Commonwealth University (2018). A rapid review follows the basic structure of a systematic review; however, it makes concessions in relation to methodology in order to be conducted in a more accelerated fashion and by a single reviewer. This review is less comprehensive than a full systematic review in that the literature search was restricted to the following three databases: CINAHL, MEDLINE, and PsychINFO. Grey literature was excluded from

the review. The literature search was completed in January 2020 and RefWorks Citation Manager ® was utilized to manage citations. A health sciences librarian was consulted to review the search strategy and to provide assistance and expertise with the literature search (see Appendix A for search summary). A PRISMA flow diagram (Figure 1) was utilized to increase transparency in the literature search and study selection (Higgins et al., 2019; Moher et al., 2009).

**Inclusion Criteria**

Primary published experimental and quasi-experimental studies taking place within the NICU setting were included in the review. Intervention studies focusing on parents of infants born prematurely (<35 weeks gestational age [GA]), with parental (maternal and/or paternal) stress and/or anxiety reduction as the primary outcome were included. No selection criteria with regards to the country of origin or level of NICU was used. As this review focuses on current trends in managing parental distress in the NICU, study inclusion was limited to English literature published between January 2015 and January 2020.

**Exclusion Criteria**

Review articles, dissertations, studies published in languages other than English and prior to 2015 were excluded from this review. Studies focusing on healthcare workers, grandparents and those that did not evaluate stress or anxiety reduction as the primary outcomes were also excluded. Articles which focused exclusively on parents of late preterm infants (35-37 weeks GA) were also excluded, as these infants often have short NICU admissions (Braun et al., 2020).

**Screening and Study Selection**

Search results were combined in RefWorks Citation Manager ® and duplicates were removed. Title and abstracts were screened by the investigator (DSS), and full text studies examined and evaluated based on the aforementioned criteria. Data were extracted from the studies, including: study design; subject characteristics and demographics; NICU and infant characteristics and demographics; outcome measures defined within the studies; study size; types and description of interventions; measurement tools; results of selected studies based on anxiety and/or stress scores of chosen measurement tools. This data is summarized in a rapid review matrix table, see Appendix C (Virginia Commonwealth University, 2018)

**Risk of Bias**

Critical appraisal of selected articles was carried out utilizing the Cochrane handbook for systematic reviews of interventions (Higgins et al., 2019). This tool was used to assess bias as a judgement of low, high, or unclear risk. This judgement was applied to individual elements within six domains (random sequence generation, allocation concealment, selective reporting, blinding, incomplete outcome data and other), appraising an overall risk of bias to the individual studies. When assessing risk of bias, an unclear risk was considered moderate

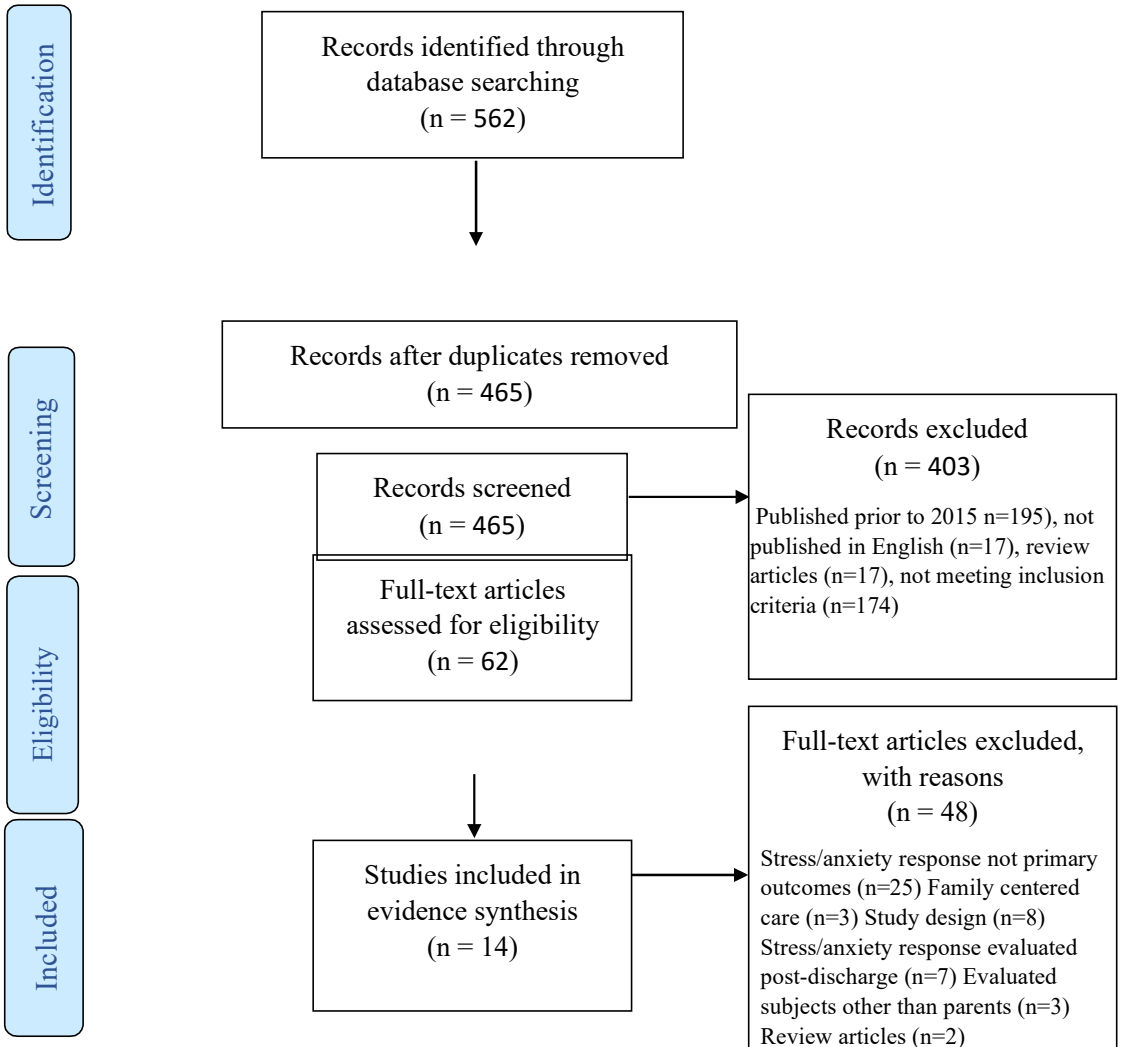
with an average of risk used to determine the overall risk of bias. Evaluation of publication bias, time-lag bias, language bias and location bias were not addressed in this review.

## RESULTS

### Study Selection

Of the 562 articles retrieved in the database searches, a total of 62 full articles were screened for eligibility and based on the selection criteria, 14 studies were included in this review (Figure 1).

**Figure 1: PRISMA Flow Diagram (Modified from Moher et al., 2009)**




### Study design

Selected studies included seven randomized controlled trials (RCTs) (Dabas et al., 2019; Jouybari et al., 2018; Koochaki et al., 2017; Kucuk Alemdar et al., 2018; Petteys & Adoumie., 2018; Ribeiro et al., 2018; Welch et al., 2016) and seven quasi-experimental designs (Akbari et al., 2019; Gustafson et al., 2016; John et al., 2018; Kadivar et al., 2016; Mansson et al., 2019; Noergaard et al., 2018; Ong et al., 2018). One of the RCT studies was blinded (Jouybari et al., 2018). The majority of studies were single centered, with the exception of Jouybari et al. (2020) and Kadivar et al. (2017). Six of the quasi-experimental studies utilized sequential pretest post-test designs (Akbari et al., 2019; Gustafson et al., 2016; John et al., 2018; Kadivar et al., 2017; Ong et al., 2018) and one a prospective longitudinal study design (Mansson et al., 2019). Five of the RCT studies utilized a pretest post-test design, with control and intervention arms occurring concurrently (Dabas et al., 2019; Jouybari et al., 2020; Koochaki et al., 2017; Kucuk Alemdar et al. 2018; Petteys & Adoumie, 2018). One of these studies had three arms occurring concurrently (Jouybari et al., 2020)

**Subject Characteristics**

The chosen studies evaluated the effectiveness of the various interventions on stress and/or anxiety levels on mothers and/or fathers. In total, 1,335 parent participants were involved in the identified studies. The majority of studies looked exclusively at mothers (Dabas et al., 2019; John et al., 2018; Jouybari et al., 2018; Kadivar et al., 2016; Koochaki et al., 2017; Kucuk Alemdar et al., 2018; Ong et al., 2018; Ribeiro et al., 2018; Welch et al., 2016). Two of the studies evaluated the effects on fathers only (Akbari et al., 2016; Noergaard et al., 2018), and five recruited both mothers and fathers as subjects (Gustafson et al., 2016; Mansson et al., 2019; Petteys & Adoumie, 2018). Gustafson et al. (2016) evaluated the effects on mothers and fathers as a parental group, as well as differences between mothers and fathers within both control and experimental groups. The total number of subjects (control and intervention) in the studies varied between 34 and 231, with control groups between 17 and 130 subjects and intervention groups between 17 and 101 subjects.

**NICU and Infant Characteristics**

Study locations included NICUs in hospitals in India (Dabas et al., 2019; John et al., 2018), Iran (Akbari et al., 2019; Jouybari et al., 2018; Kadivar et al., 2016; Koochaki et al, 2017), United States (Gustafson et al., 2016; Petteys & Adoumie, 2018; Welch et al. 2015), Turkey (Kucuk Alemdar et al., 2018), Sweden (Mansson et al., 2019), Denmark (Noergaard et al., 2018), Malaysia (Ong et al., 2018) and Brazil (Ribeiro et al., 2018)

This review includes studies carried out in Level II, III and IV NICUs. This classification is based on the gestational ages of the infants and the level of intensive care that can be provided, including surgical care (Phibbs, et al., 1996). Two studies were carried out in a Level II NICU (Kucuk Alemdar, 2018; Noergaard et al., 2018), five in a Level III NICU (Dabas et al., 2019; John et al., 2018; Ong et al., 2018; Petteys & Adoumie, 2018; Ribeiro et al., 2018) and one in a Level IV NICU (Welch et al., 2016). Six studies did not specify the level of designation (Akbari et al., 2019; Gustafson et al., 2016; Jouybari et al., 2018; Kadivar et al, 2016; Koochaki

et al., 2017; Mansson et al, 2019).

There was some variability in the parameters in the specific studies as it related to infant characteristics and demographics. All the studies included parents of infants born prematurely, or less than 37 weeks GA (Akbari et al., 2019; Kadivar et al., 2017; Koochaki et al., 2017), although some studies were more specific with their parameters. Dabas et al. (2019) and Welch et al. (2016) included infants born at <34-weeks GA. Kucuk Alemdar et al. (2018) and Pettey & Adoumie (2018) included infants born at <30 weeks and <35 weeks GA, respectively. Two of the studies included parents of infants born at > 28 weeks GA (Gustafson et al, 2016; Noergaard et al., 2018). Two studies included infants born at 27 weeks up to 34 (Ong et al., 2018), 37 (Manson et al., 2019) or 38 weeks (Jouybari et al., 2018) GA. One study did not specify a GA, but rather included parents of infants born at very low birth weight or <1500g (John et al., 2018).

**Outcome Measures**

Outcome measures included stress and/or anxiety reduction as the primary outcomes. The chosen studies utilized variable measurement tools to evaluate the impact of the intervention(s) on stress, anxiety, or both. Eight studies evaluated stress only (Akbari et al.,2019; Jouybari et al., 2018; Kadivar et al., 2017; Kucuk Alemdar et al., 2018; Mansson et al., 2019; Noergaard et al., 2018; Ong et al., 2018; Petteys & Adoumie, 2018). Four studies examined anxiety only (John et al., 2016; Koochaki et al., 2017; Ribeiro et al., 2018; Welch et al., 2016). Dabas et al. (2019) evaluated both stress and anxiety levels. Gustafson et al. (2016) evaluated stress as the primary outcome, but also evaluated pre-intervention anxiety and coping processes and their relationship to parental stress.

Other outcome measures evaluated in various studies included: milk output (Dabas et al., 2019); paternal participation in childcare (Noergaard et al., 2018); maternal ability (Ong et al., 2018); bonding, parent satisfaction and infant length of stay (Petteys & Adoumie, 2018); maternal depression and cardiac autonomic modulation (Ribeiro et al., 2018). These outcome measures will not be discussed within the context of this review.

**Quality Appraisal**

Table 2: Risk of Bias Assessment (Cochrane Risk of Bias Tool, Higgins et al., 2019)

| Studies | Random sequence generation | Allocation concealment | Selective reporting | Blinding: Participants, personnel, & outcome assessment | Incomplete outcome data | Other sources of bias | Overall risk of bias |
|---|---|---|---|---|---|---|---|
| Akbari et al. (2019) | - | ? | ? | - | + | ? | moderate |
| Dabas et al. (2018) | + | + | + | ? | + | ? | low |
| Gustafson et al. (2016) | ? | ? | + | ? | + | - | moderate |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| John et al. (2018) | + | - | ? | + | ? | - | moderate |
| Jouybari et al. (2020) | + | + | ? | + | ? | ? | moderate |
| Kadivar et al. (2017) | - | ? | ? | + | ? | + | moderate |
| Koochaki et al. (2017) | + | ? | ? | ? | ? | + | moderate |
| Kucuk Alemdar et al. (2018) | + | - | ? | ? | ? | + | moderate |
| Mansson et al. (2019) | - | - | ? | + | ? | - | high |
| Noergaard et al. (2018) | - | - | ? | + | ? | - | high |
| Ong et al. (2018) | - | - | ? | + | + | - | high |
| Petteys & doumie (2018) | + | + | ? | - | ? | - | moderate |
| Ribeiro et al. (2018) | + | + | ? | ? | - | - | moderate |
| Welch et al. (2016) | ? | ? | ? | ? | ? | - | moderate |

'+' = low risk of bias; '-' = high risk of bias; '?' = unclear risk of bias

Results of the quality appraisal are summarized in Table 2. Of the 14 studies included in this review, one appeared to have an overall low risk of bias (Dabas et al., 2019) , three studies have an overall high risk of bias (Mannson, 2019; Noergaard, 2018; Ong, 2018), while the remainder had a moderate unclear risk of bias. Eight of the studies had sample sizes less than 100 subjects, which may limit the statistical power. Although RCTs are considered to be the highest level of evidence, the parallel arms necessary in this design and study setting creates a risk for interference and spillover effect between the two study groups. It is difficult to completely eliminate this risk related to frequent contact and interaction between families in the NICU environment. The sequential design utilized by most of the quasi-experimental studies addresses this risk by evaluating the control and intervention groups at different points in time.

When evaluating the parental stressor scale: neonatal intensive care unit (PSS: NICU) within the Turkish context, Kucuk Alemdar et al. (2018) excluded items on measurement tool if they were experienced by less than 1/3 of the subjects, which, subsequently, were not used for statistical analysis. A total of five items were removed from the measurement tool which may have introduced a selective reporting bias. Additional weaknesses in the quality of evidence included lack of a priori power analyses, low response rates that may account for selection bias, missing data (incomplete surveys) and high attrition rates (Noergaard et al., 2018; Petteys & Adoumie, 2018; Ribeiro et al., 2018).

**Measurement Tools**

Nine of the studies utilized the PSS:NICU to evaluate the impact of the studied intervention of self-reported levels of parental stress (Dubas et al., 2019; Gustafson et al., 2016, Jouybari et al., 2018; Kadivar et al., 2017; Kucuk Alemdar et al., 2018; Mansson et al., 2019; Noergaard et al., 2018; Ong et al., 2018, Petteys et al., 2018).The PSS: NICU is a 34-item scale with three dimensions – sights and sounds (6 items), infant behaviour and appearance (17 items) and parental role alteration (11 items) This tool is well utilized in the literature as an instrument to evaluate parents' perceptions of stressors in the NICU produced by the physical, social and psychological environments (Akbari et al., 2016).

Three studies used the state-trait anxiety inventory (STAI) to evaluate anxiety levels of study participants in the NICU (Gustafson et al., 2016; John et al., 2018; Welch et al., 2016). This instrument has been successfully utilized in studies involving mothers of both term and preterm infants (Welch et al., 2016). Two studies used the Beck Anxiety Inventory (BAI) (Koochaki et al., 2017; Ribeiro et al., 2018). One study utilized the Perinatal Anxiety Screening Scale (PASS) developed by Somerville et al. (2014) (Dubas et al., 2019). This self-administered scale was developed to evaluate a range of problematic anxiety symptoms in perinatal women, including general worries and specific fears; control, perfectionisms, and trauma; social anxiety; and acute anxiety and adjustment (Somerville et al., 2014; Somerville et al., 2015). Welch et al. (2016) utilized the Behavioral Inhibition System and Behavioral Activation System (BISBAS) tool to assess maternal motivation at enrollment. The personality traits measured by the BISBAS have been shown to correlate with anxiety and are potential predictors of maternal adaptation and capacity to withstand stresses associated with having a premature infant (Welch et al., 2016). Two studies utilized the Ways of Coping (WOC) questionnaire to evaluate how parents cope in stressful situations (Gustafson et al., 2016; Ribeiro et al., 2018). This tool is used to describe coping processes within clinical settings and is based on "Lazarus and Folkman's theory that people use two types of coping strategies in response to stressful situations: problem and emotion focused" (Gustafson et al., 2016, pp. 663).

**Interventions**

***Complimentary or Alternative Medicine Interventions***

Three studies evaluated narrative writing, or journaling (Akbari et al., 2019; Jouybari et al., 2018; Kadivar et al., 2017), one of which also assessed an art therapy intervention (Jouybari et al., 2018). One study evaluated the impact of an individually tailored music therapy intervention (Riberio et al., 2018), and another a tailored spiritual intervention, assessing spiritual needs and providing one-on-one spiritual care (Kucuk Alemdar et al., 2018). Welch et al. (2016) implemented and evaluated the family nurture intervention (FNI). FNI is based on the hypothesis that adverse consequences of maternal-infant separation following preterm birth can be reduced with repeated calming activities, including physical, emotional, and sensory experiences (Welch et al., 2016). One study evaluated the effect of an activity-based group therapy intervention on maternal anxiety levels (John et al., 2018). Participation in creative activities has been shown to provide opportunities for sublimation

and increased emotional resilience, and activity groups create a setting for social interactions, increased support, and bonding (John et al., 2018). Another study evaluated the effectiveness of an audio assisted relaxation technique (Dabas et al., 2019), consisting of deep breathing, controlled breathing techniques, yoga postures and progressive muscle relaxation.

### *Educational Interventions*

Gustafson et al. (2016) evaluated the effect of facilitated parental presence during rounds. Parental presence during rounds can help empower families with information, inclusion in the decision-making process and having a facilitator present early in the NICU journey may help improve communication, and reduce any additional stressors (Gustafson et al., 2016). Ong et al. (2018) studied a structural nursing intervention program (SNI) aimed to provide education about prematurity, address expectations related to infant's hospitalization, assist mothers in navigating the NICU environment, provide interpersonal interaction and psychosocial support. Petteys & Adoumie (2018) evaluated the impact of parent education and participation in mindfulness-based neurodevelopmental care. Educational material, education sessions teaching structured neurodevelopmental care activities and mindfulness techniques and ongoing support were provided to parents.

### *Psychological Interventions*

Mansson et al. (2019) investigated the impact of an individualized neonatal parent support program. Developed in collaboration with child psychologist and modelled on principles of family centred care, research on parent experiences, and person-centred communication, the program focused on four different dialogues – prematurity, interpreting and interacting with infants, future discharge, and summary of experience.

### *Operational Changes*

Noergaard et al. (2018) developed and implemented a NICU model designed to be more father friendly. The authors obtained increased knowledge and understanding of paternal needs and wishes to create a father friendly NICU, with activities tailored to be more inclusion of paternal needs and evaluated the impact on paternal stress.

## *Effects of Interventions on Parental Distress*

The results of the individual studies in this review are summarized in a rapid review matrix table in Table 1. Most of the interventions evaluated demonstrated significant results related to the reduction of stress and/or anxiety levels of the subjects' post intervention. In studies evaluating both parents, mothers were found to have overall higher levels of stress, which was especially evident in the 'infant's behaviour and appearance' and 'parental role alteration' subscales of the PSS: NICU tool (Gustafson et al., 2016; Mansson et al., 2019). All the studies evaluating anxiety as an outcome measure showed significant findings related to reduced anxiety levels in mothers post intervention.

The studies performed by Akbari et al. (2019) (n=70), Kadivar et al. (2017) (n=70),

Kucuk Alemdar et al. (2018) (n=62), Dabas et al. (2018) (n=50), John et al. (2018) (n=34), Ribeiro et al. (2018) (n=21), and Welch et al. (2016) (n=115) showed significant reduction in parental stress and/or anxiety measurements post intervention, suggestive that contemporary and alternative medicine interventions, including narrative writing, spiritual care, audio-assisted relaxation, activity-based group therapy, music therapy and FNI may be effective in decreasing NICU related stress and anxiety levels. In their tailored spiritual care intervention, Kucuk Alemdar et al. (2018) found that this reduction was especially evident within the 'Infant's Appearance and Behaviours' subscale of the PSS: NICU tool Dabas et al. (2019) found that higher PSS: NICU scores (subscales and overall scores) were "directly correlated with higher S-anxiety and T-anxiety scores" (p. 664), emphasizing the relationship between stress and anxiety levels. This group of authors also found a significant reduction in stress scores in the control group within the domain of parent role alteration, which "might be due to adaptation and some kind of coping strategies used by the postpartum mothers in the control group as well" (Dabas et al., 2019, pp. 202-203).

The music therapy intervention applied by Ribeiro et al. (2018) allowed mothers an outlet to express their thoughts and feelings related to the birth of their preterm infant, their NICU experiences, as well as any other issues causing them distress. Jouybari et al (2018) (n=105) failed to produce the same findings in their narrative writing and art therapy intervention. The educational interventions carried out by Ong et al. (2018), Petteys and Adoumie (2018) and Gustafson (2016) showed mixed results with their respective studies. With their SNI (n=216), Ong et al. (2018) only obtained significant results in one of the subscales post intervention ('parental role alteration'), however, the education provided and activities in this intervention facilitated opportunities for mothers to connect emotionally and psychologically with their premature infant and allowed mothers to feel less detached and more connected with their infants within the context of the NICU setting. It also cannot be ruled out that mothers in the control group did not independently seek out information and support contributing to the lack of significant findings overall (Ong et al., 2018). In evaluating the effectiveness of their mindfulness-based neurodevelopmental care intervention, the RCT by Petteys & Adoumie (2018) with 55 parent dyads reported mixed results. There were no significant differences between groups from enrollment to discharge; however, they found that within the intervention group there was a significant reduction in post-test stress scores in all three subscales of the PSS: NICU tool. The educational study by Gustafson et al. (2016) (n=134) facilitating parental presence during multidisciplinary rounds did not show a significant impact of NICU-related parental stress. The RCT (n=81) by Koochaki et al. (2017) found that both routine counselling and behavioural counselling can reduce the anxiety levels of mothers in the NICU. However, the combination of routine and cognitive behavioural based counselling showed a greater reduction and may have a longer lasting impact on maternal anxiety levels (Koochaki et al.). Mansson et al. (2019) (n=241) also showed significant reduction in maternal and parental stress measurements post intervention, suggestive that a neonatal support program may be effective in decreasing NICU related stress levels. Mansson et al. (2019) found that although the total overall stress measurements did not differ significantly between the control and intervention group, that there were significant

differences found within specific items on the PSS: NICU subscales. There was no significant difference between the control and intervention group in fathers included in the study. In their quasi-experimental study with 109 fathers looking at an organizational change, Noergaard et al. (2018) found that although overall stress scores (control and intervention) decreased significantly by the time of discharge, that the creation of a more father friendly NICU was associated with higher level of post-test stress as compared to the control group. This increase in paternal stress paralleled the increased involvement of father in infant care and information sharing. The higher expectations placed on these fathers, on top of their other economic and social obligations likely contributed to the increased stress levels in the intervention group, as compared to the control group. However, the long duration of this study and the complexity of the intervention and difficultly evaluating the extent of paternal involvement, make it difficult to completely interpret the results.

**Table 1:** Rapid Review Matrix Table: Study characteristics and main results. (Modified from Virginia Commonwealth University, 2018)

| Author, year. country | Purpose | Sample size and characteristics | Study design<br><br>Measurement tool(s) | Main variables | Control<br><br>Intervention(s) | Results |
|---|---|---|---|---|---|---|
| Akbari et al. (2019)<br><br>Iran | Does narra-tive writing reduce stress levels of fathers in the NICU? | n=35 (control group)<br><br>n=35 (intervention group)<br><br>Fathers of infants in the NICU; similar baseline demographics | Quasi-experimental 2 group pre-test post-test design<br><br>Parental stressor scale: neonatal intensive care unit (PSS: NICU) | Stress | Routine care<br><br>Routine care PLUS narrative writing with a minimum of three narratives between the 3rd day (pretest) and 10th day (post-test) post NICU admission | No significant difference between the control group (x=74.05 + 17.39) and Interven-tion group (x=80.11 + 15.82) in pretest stress scores (p=0.13, t=1.52). Significantly lower post-test stress scores in the intervention group (x=48,00 + 10.49) vs. the control group (x=85.45 + 16.91) suggesting that narrative |

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| | | | | | | writing may be effective at decreasing paternal stress levels in the NICU (p=0.001; t=-11.01) |
| Dabas et al. (2018)<br><br>India | What is the impact of an audio assisted relaxa-tion techni-que on maternal stress, anxiety, and milk output in the NICU? | N=25 (control group)<br><br>n=25 (Intervention group) | Non-blinded RCT<br><br>PSS: NICU, Perinatal Anxiety Screening Scale (PASS) | Stress & Anxiety | Routine care<br><br>Audio-assisted relaxation technique (30 minutes). Techniques were demonstrated on day one by a yoga therapist and researcher one in small group setting consisting of: deep breathing; controlled breathing techniques (Anulom-Vilom, Brahmari), yoga postures (Suksham-Vyayam) and progressive muscle relaxation. Performed daily x 10 days | Similar pre-test maternal stress (x=3.9 + 0.5 vs. 3.8 + 0.5; p=0.34 and anxiety scores (x=31.12 + 11.4 vs. x=31.08 + 12; p=0.99 between interven-tion and control groups There was a significant reduction in maternal stress (x=2.9 + 0.5 vs. 3.6 + 0.6; p=0.003) and anxiety scores (x=19.8 + 6.7 vs. 28.18 + 11.7; p=0.003) in the interven-tion group vs. the control group suggesting that the use of audio assisted |

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| | | | | | | relaxation techniques may be effective in reducing maternal stress and anxiety |
| Gustafson et al. (2016)<br><br>United States | Does the presence of parents during multi disci-plinary rounds reduce parental stress in the NICU? | n=46 (control group; 20 fathers, 26 mothers)<br><br>n=86 (Intervention group; 34 fathers, 52 mothers)<br><br>Mothers and fathers of 90 infants in the NICU; similar baseline demographics | Quasi-experimental study, 2 group sequential pre- test post-test design<br><br>PSS: NICU (pre & post) State-Trait Anxiety Inventory (STAI) & Ways of Coping WOC Question-naire (pre-test only) | Stress & Anxiety | Routine family communica-tion per unit routine - informal daily updates with more formal multidisci-plinary meetings as required based on infant's condition and/or parental request Facilitated parental presence during daily multidisci-plinary rounds – prior to participation in rounds parents participated in min. one bedside medical update or family meeting and received an orientation to the rounds process by a clinical nurse specialist (CNS) facilitator (description of the rounding process, roles | Similar pretest parental stress scores were found in the control vs. interven-tion groups (x=3.17 + 0.13 vs. 3.11 + 0.08; p=0.25. Facilitating parental presence during multi-disciplin-ary rounds did not show at significant difference on NICU-related parental stress between control and interven-tion groups (x=3.04 + 0.14 vs. 2.86 + 0.10; p=0.11); however, a significant reduction in parental stress scores was found within the interven-tion group (x=3.11 + |

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| | | | | | of the rounding participants, and plan to address questions during or after rounds. CNS facilitator was present to maintain flow of rounds and to answer questions. Parents were encouraged to write down questions to be discussed and probed prior to rounds completion to allow for any additional questions. Parents were debriefed by the bedside nurse and CNS facilitator to ensure all questions were answered and to provide any needed clarification to families. | 0.08 pretest vs. 2.86 + 0.10. p=<0.001. Mothers reported higher levels of stress than fathers (x=3.4 + 0.81 vs. 2.7 + 0.67; p=<0.001). Pretest STAI scores showed similar trait-anxiety scores between mothers and fathers (x= 39.7 + 8.7 vs. 36.7 + 8.7; p=0.06) but significant-ly higher state anxiety scores in mothers vs. fathers (x=54 + 13 vs. 48.8 + 12.3; p=0.01) suggestive of greater levels of anxiety in mothers associated with a stressful event (infant hospital-ized in NICU) |
| John et al. (2018)<br><br>India | Does activity-based group therapy | n=17 (control)<br><br>n=17 (intervention) | Prospective 2 group phase lag cohort study, pre- | Anxiety | Routine care<br><br>Routine care PLUS weekly activity- | The authors found similar pre-test |

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| | reduce maternal anxiety in the NICU? | Mothers in the NICU: similar baseline demographics | test- post-test design<br><br>STAI-S | based group therapy (x 4 weeks) – small group sessions (n= 5-6 mothers) led by an occupational therapy (OT) student and experienced medical social worker. Variable group activities chosen to be interesting and useful and have a material and/or emotional impact (ex. rattle and footprint card). | anxiety scores between the control and interven-tion group (x=49.94 + 11.28 vs. 47.58 + 12.85; p=0.575). There was a significant reduction in post-test anxiety scores compared to pre-test with the first (p=0.005), third (p=0.07) and forth (p=0.009) activity-based session. A significant reduction in anxiety scores was found in the interven-tion group vs. control (36.58 + 11.16 vs. 46.14 + 9.45; p=0.009) suggestive that activity-based group therapy may be effective in reducing state anxiety levels of |

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| | | | | | | mothers in the NICU |
| Jouybari et al. (2020)<br><br>Iran | Does art therapy and/or narra-tive writing reduce maternal stress in the NICU? | N=35 (control group)<br><br>n=35 (narrative writing group)<br><br>n=35 (art therapy group)<br><br>Mothers in the NICU; similar baseline characteristics | RCT with three parallel arms; pre-test post-test design (single blinded study analyst blinded)<br><br>PSS: NICU | Stress | Routine care<br><br>Routine care PLUS narrative writing OR art therapy with minimum of 3 narratives or drawings between 2nd day (pre-test) and 6th day (post-test) post NICU admission | Similar mean baseline stress scores between control, narrative writing, and art therapy groups (n=47.57 + 21.26 vs. 47.08 + 21.05 vs. 54.94 + 26.33; p=0.28). There was no significant difference in post-test stress scores between groups (x=60.20 + 20.62 vs. 58.60 + 25.56 vs. 57.88 + 27.31; p=0.92), suggestive that narrative writing and art therapy may not be effective at reducing maternal stress in the NICU. |
| Kadivar et al. (2017)<br><br>Iran | Does narra-tive writing reduces the stress levels | N=37 (control group)<br>n=33 (Intervention group)<br><br>Mothers in the NICU; similar baseline | Quasi-experiment-al phase lag pretest post-test design<br><br>PSS: NICU | Stress | Routine care<br><br>Routine care PLUS narrative writing with a minimum of 3 | Similar pre-test stress scores were found in all three subscales of the PSS: NICU |

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| | of mothers in the NICU? | characteristics | | narratives between third day (pre-test) and 10th day (post- test) post NICU admission | between the control and interven-tion group: "Infant behaviour and appearance" (x=31.54 + 7.467 vs. 34.182 + 7.108; p=0.922); "Sights and sounds" (x=17.649 + 6.969 vs. 22.061 + 5.35; p=0.153); "parental role and the parents' relationshi p" (x=24.973 + 7.697 vs. 22.667 + 7.896; p=0.999). In evaluating the difference in stress scores in all three subscales utilizing multivar-iate analysis, the authors found that the interven-tion had a significant effect in all three domains (Roys' largest root=2.141, F=47.11, |

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| | | | | | | p<0.001) suggesting that narrative writing may be effective at reducing maternal stress in the NICU |
| Koochaki et al. (2017)<br><br>Iran | What effect does cognitive behavioural counselling have on the anxiety levels of mothers in the NICU? | n=39 (control group)<br><br>n=42 (intervention group)<br><br>Mothers in the NICU; similar baseline characteristics | Parallel RCT<br><br>Beck's Anxiety Inventory (BAI) | Anxiety | Routine care counselling sessions (2 session/week x 4 weeks): providing information re: hospitalized infant, such as disease, diagnostic and therapeutic modalities (Session 1), disease symptoms & consequences (Session 2); obtaining knowledge and skills re: nutrition (Session 3), movement and positioning (Session 4), hygiene and infection control (Session 5), temperature regulation and clothing infant (Session 6), infant's behaviour (Session 7), and interacting with infant (Session 8) | Similar baseline anxiety scores present in mothers in control and intervention groups (x=20.67 + 6.791 vs. 19.45 + 6.345; p=0.408). Both the intervention and control groups showed a significant difference in maternal anxiety scores immediately following (x=9.7 + 3.645 vs. 8.95 + 3.72) and three weeks after intervention (x=11.52 + 4.528 vs. 15.4 +5.062) between groups (p=0.026) and within each group (p=<0.001). Results |

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| | | | | Routine care counselling sessions followed by anxiety counselling with a cognitive behavioural approach (2 sessions/week x 4 weeks): establishing relationships, learning group rules, determining group goals and getting feedback (Session 1); psychological recount of thoughts and feelings related to birth of infant, emotional adjustment and release in supportive group environment (Session 2); review of signs of stress, introduce concept of stress relief (Session 3); evaluating the effect of thoughts and cognition on stress response, recognizing negative self-talk, assessing how individuals cope with stress and importance of coping skills | suggest that both routine counselling & Behaviour-al counselling can reduce maternal anxiety in the NICU with CBT- based counselling showing a greater reduction and may have a longer lasting impact on maternal anxiety. |

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| | | | | | for stress management (Session 4); review previous stress relief exercises, review of stressful self-talk, encouragement how to turn self- talk into effective coping (Session 5); problem-solving training, extracting problem description from each group member (Session 6); providing and discussing alternate solutions and using the best one (Session 7); assessing effectiveness of solution (Session 8) The researcher had previous training on cognitive behavioural therapy counselling; intervention supervised by clinical psychologist. | |
| Kucuk Alemdar et al. (2018)<br><br>Turkey | What effect does spiritual care have on the stress levels of | n=32 (control group)<br><br>n=30 (Intervention group) | RCT, pre-test post-test design<br><br>PSS: NICU | Stress | Routine care<br><br>Routine care PLUS 1:1 spiritual care based on individual spiritual needs. A | Similar pre-test stress scores were found in control vs. intervention groups |

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| | mothers in the NICU? | Mothers in the NICU; similar baseline characteristics | | | questionnaire was utilized to determine spiritual requirements and mothers were given a choice of four spiritual practices that could be performed on their second visit to the NICU: prayer (n=9); reading the Quaran (n=9); placing the cevsen-muska on infant's incubator (n=8); or placing a clipped evil-eye talisman on infant's incubator (n=4). | (x=3.70 + 0.53 vs. 3.97 + 0.65; p=0.08). A significant reduction in post-test stress scores was seen in the Interven-tion vs. control group (x=3.56 + 0.56 vs. 3.89 + 0.70; p=0.04), suggestive that a tailored spiritual care may be effective at reducing stress levels of mothers in the NICU |
| Mansson et al. (2019)<br><br>Sweden | What impact does an individu alized neonatal parent support program have on parental stress levels in the NICU? | n=118 control group (n=60 mothers. n=58 fathers)<br><br>n=98 intervention group (n=49 mothers; n=49 fathers)<br>Mothers and fathers in the NICU; similar baseline characteristics (exception: infant gender) | Prospective longitudinal quasi experimenta l<br>one group pre- test post-test design<br><br>PSS: NICU | Stress | Standard family centred care<br><br>Standard family centered care PLUS participation in neonatal parent support program. The program was provided by primary nurses as an adjunct to standard care. It focused on parent-centred communicatio n involving four different dialogues – preterm delivery, interpreting and | This study evaluated parents' experience of stress before (control) and after (interven-tion) introduct-ion of a neonatal parent support pro-gramme. No significant differences in stress scores were found between control and interventio n groups in |

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| | | | | | interacting with infants, future discharge, and summary of experience in the hospital. | mothers (x=1.98 + 0.68 vs. 1.80 + 0.52; p=0.306) and fathers (x=1.73 + 0.62 vs. 1.75 + 0.63; p=0.509). Mothers had significantly higher levels of baseline stress compared to fathers (x=1.98 + 0.68 vs. 1.73 + 0.62; p=<0.005). |
| Noergaard et al. (2018)<br><br>Denmark | What is the impact of a more father friendly NICU on paternal stress levels? | n=55 control group<br><br>N=54 intervention group<br><br>Fathers in the NICU; similar baseline characteristics (except more employed fathers in intervention vs. control groups | Quasi-experimental 2 group pre-test post-test design<br><br>PSS: NICU | Paternal Stress | Standard care<br><br>"Father-friendly NICU": The intervention was designed & implemented following control Researchers collaborated with fathers and other stakeholders to increase knowledge and understanding or paternal needs and wishes in order to create the father friendly NICU. Activities were tailored to be more inclusion of paternal needs and included: participation in important | Significant differences in stress scores between control and interven-tion groups on admission to NICU (x=1.71 + 0.46 vs. 2.02 + 0.55; p=0.0014) and time of discharge (x=1.43 + 0.44 vs. 1.84 + 0.59; p=0.001); with significant differences in the mean change of stress scores from admission to discharge in control and interven-tion |

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| | | | | | "firsts" (ex. first bath); skin to skin contact; information and guidance from healthcare professionals; inclusion in important conversation re: growth and development; social work support, including info re: paternity leave, social and economic issues or concerns; participation in father support groups | groups (p=0.004). Results suggest that the "father friendly NICU" design failed to show reduction in paternal stress levels with authors reporting higher mean stress levels in the interven-tion group. |
| Ong et al. (2018)<br><br>Malaysia | What is the effect of a structure-ed nursing interven tion program on maternal stress and ability levels in the NICU? | n=108 control group<br><br>n=108 intervention group<br><br>Mothers with infants in NICU. similar baseline characteristics (exceptions: maternal age, birth weight and birth order) | Quasi-experimenta l pre-test post-test design<br><br>PSS: NICU<br><br>Maternal abilities checklist | Stress<br><br>Maternal ability | Standard care: orientation to NICU layout and equipment; routine activities; education re: handwashing breastfeeding support; answering questions and providing support as needed<br>Standard care PLUS structured nursing intervention (SNI) program. The 14-day intervention focussed on education, psychosocial support, | Similar pre-test stress scores were found in the control and interventio n groups (x=3.67 + 0.87 vs. 3.75 + 0.82; p=0.90). Similar baseline scores were also found in relation to maternal ability in control and interven-tion groups (x=3.09 + 0.75 vs. 2.89 + 0.75; p=0.109). |

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| | | | | and interpersonal interaction. SNI consisted of two in person meetings, in addition to SMS and telephone support.<br><br>1st Meeting: an educational booklet provided and reviewed with mothers (information re: premature infants; NICU environment and equipment; growth and development; developmental care; nutrition; how parents can support infant; relaxation tips for parents); orientation to NICU layout and equipment<br><br>2nd Meeting (4th day after NICU admission): education re: equipment used in NICU; update re: infant's condition; teaching and reinforcement of relaxation techniques for parents; addressing mothers | A significant reduction in total stress scores was found both between (p=0.04) and within the control (p=0.007) and intervention groups (p<0.001) (x=3.50 + 0.83 vs. 3.26 + 0.83) A significant improvement in maternal ability scores was found both between and within the control and intervention groups (x=3.67 + 0.64 vs. 4.04 + 0.64; p values <0.001) Results suggest that both standard care and a SNI are effective at reducing maternal stress and improving maternal abilities; with more marked findings with the SNI. |

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| | | | | | psychological concerns and concerns about infant; address any additional maternal questions/concerns<br><br>Additional support and education were provided via telephone calls (6th and 10th day post NICU admission) and online messaging (3rd and 8th day post NICU admission) | |
| Petteys & Adoumie (2018)<br><br>United States | What is the effect of a mindfulness-based neuro developmental care intervention on parental stress levels, bonding, parent satisfaction and infant length of stay in the NICU? | n=27 control group<br><br>n= 28 intervention group<br><br>Parents dyads with infants in NICU; similar baseline demographics (exception: birth weight, mental health history) | Non-blinded RCT pilot study, pre-test-post-test design<br><br>PSS: NICU<br><br>Mother-to-Infant Bonding Scale (MIBS)<br><br>Parent Satisfaction Score | Stress | Standard care (contact with SW, chaplain, OT/PT, unstructured developmental care training)<br><br>Standard care PLUS 1:1 educational training on mindfulness techniques & structured neurodevelopmental care training activities (within 10 days of enrollment), including provision and review of educational package to families Mindfulness techniques education: | No significant differences were found in pre-test (x=2.4 + 1.7 vs. 2.9 + 1.4; p=0.214) and post-test (x=2.0 + 1.6 vs. 1.8 + 1.6; p=0.648) parental stress scores between control and Interven-tion group. The interven-tion group showed significant reduction in post-test stress scores (p=0.012). |

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| | | | | | focused breathing; principles of attunement and types of touch and non-touch interactions; personal awareness and nonjudge-ment; nonjudge-ment and awareness of infant Neurodevel-opmental care training: observation and recognition of infant cues; signs of organized vs. disorganized physiological states; motor and families with verbal support (min. biweekly) throughout the duration of their NICU stay. | This was not seen in the control group (p=0.285) No significant differences were found in bonding scores (x=1.68 + 2.87 vs. 1.81 + 2.46; p=0.462) or parent satisfaction (p=0.287) between control and interventio n groups There was a significant difference in infant LOS between control and interven-tion group (x=67.2 + 37.7 vs. 48.7 + 30.1; p=0.047). |
| Ribeiro et al. (2018)<br><br>Brazil | What is the impact of a music therapy inter-vention on maternal anxiety in the NICU? | n=11 control group<br><br>n=10 intervention group<br><br>Mothers in the NICU; similar baseline characteristics | RCT, pre-test-post-test design<br><br>BAI | Anxiety | Routine care<br><br>Routine care PLUS tailored music therapy intervention – a music therapy questionnaire was utilized to collect data regarding subjects' experiences with music and list their favorite songs to individualize | Pre-test anxiety scores showed no significant differences in intervention and control groups prior to the intervention (x=15.10 + 10.25 vs. 10.70 + 8.54). Significant findings were found in post-test anxiety scores |

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| | | | | the intervention. Individual music sessions (30-45 min.) were conducted weekly by a professional music therapist and consisted of: Reception Type 1 music listening: listening to instrumental piece (2-4 min.) allowing time for mother to reflect on current life circumstances and hospitalization of infant Therapeutic music listening songs selected by participant Verbal processing: mother shares experience of therapeutic listening Type II music listening instrumental, faster, more densely textured pieces (vs. type I) Conclusion: brief comment re: issues approached during session and plan for subsequent session | between the intervention and control groups (x= 5.40 + 4.72 vs. 6.00 + 4.94; $p<0.05$) and within the intervention group intervention ($p<0.05$). Results suggest that music therapy may be effective at reducing maternal anxiety levels in the NICU |

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| | | | | | The number of music therapy was variable based on overall length of stay (x= 7 + 2 sessions) | |
| Welch et al. (2016)<br><br>United States | What is the effect of the Family Nurture Intervention (FNI) on maternal depression and anxiety symptoms of mothers in the NICU? | n=56 control group<br><br>n=59 intervention group<br><br>Mothers of infants in NICU; similar baseline characteristics | RCT, 2 group pre-test-post-test design<br><br>STAI<br><br>Behavioral Inhibition System and Behavioral Activation System (BISBAS) | Anxiety | Standard care<br><br>Family Nurture Intervention (FNI) – researchers facilitated calming sessions to engage mothers and infants in physical emotional and sensory experiences. Activities included: Calming touch sessions: firm sustained touch over torso or cupping of hands around legs/feet and abdomen; communication of thoughts and feelings with infant; seek and maintain eye contact with infant as able Holding sessions (minimum 4 times per week): skin to skin or clothed holds; encouraged to feed or bathe infants as able Daily scent cloth exchange: | Similar baseline trait anxiety and BISBAS scores were found between control and intervention groups: STAI (x=33.2 + 8.81 vs. 32.8 +n7.47; p=0.775); BISBAS: drive (x=12.3 +2.69 vs. 12.0 + 2.28; p=0.577); BISBAS: fun seeking (x=11.0 + 2.14 vs. 10.8 + 1.94; p=0.578); BISBAS: reward responsiveness (x=17.1 + 1.82 vs. 17.5 + 1.75; p=0.311; BISBAS: behavioural inhibition (x=18.7 + 2.68 vs. 18.7 + 3.10; p=0.937). These |

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| | | | | scent cloths kept in close contact to infant and mother and exchanged daily FNI sessions were facilitated by a FNI nurture specialist (previous NICU nurses trained in implementing FNI protocol) and activities were encouraged at any time even when not facilitated by FNI specialist. | results suggest that both groups were similar in baseline psycholog-ical characterist ics Mean state anxiety scores were significant-ly lower in FNI mothers vs. control group at 4-month corrected age (p=0.004) Anxiety symptoms at 4 months were significant-ly correlated with baseline STAI scores in the control group (p<0.001) but the interven-tion group (p=0.19) Based on anxiety scores, FNI may be an effective interven-tion in reducing anxiety symptoms while in the NICU and after discharge |

## DISCUSSION

This literature review evaluated the effectiveness of interventions for parental distress within the NICU setting. Most of the studies showed favorable results in relation to reduction in the outcome measures utilizing a variety of objective measurement tools. There was great heterogeneity across studies regarding the interventions employed. The PSS: NICU and STAI were the most common tools utilized to evaluate parental stress and anxiety levels in the NICU, although, there was more variability with anxiety measurement tools. This was a similar finding within the literature and previous review articles (Sabnis et al., 2019).

Narrative writing, occupational-based art therapy, mindfulness and relaxation techniques are relatively simple interventions and have been found to reduce maternal, paternal, and/or parental distress in the NICU. The findings of this review are consistent with findings in the literature and previous reviews, with these types of contemporary and alternative medicine interventions decreasing parental distress in the NICU setting (Joseph et al., 2013; Sabnis et al., 2019). The NICU experience is stressful and often traumatic for families, and narrative writing is a strategy that has the potential to aid in coping, growth, and improvement in parental mental health (Crawley, 2020). The study by Jouybari et al. (2018) failed to produce significant results in evaluating narrative writing and art therapy on maternal stress; however, the limited duration of the intervention (4 days between pre-test and post-test measurements) may have contributed to the lack of significant findings. Despite best efforts to limit this within a parallel design, spillover is a risk that would be difficult to completely eliminate within this type of design, especially within the context of the NICU where there is close contract frequent interaction between families, whom often are a source of support for one another.

In evaluation of educational interventions, the mixed results of this review are similar to those of Mendelson et al. (2017), suggesting that educational interventions may not be the most effective type of intervention to address parental distress in the NICU. These types of interventions may need to be combined with complementary or alternative modalities or psychological support to enhance effectiveness with families in the NICU. The results of Koochaki et al. (2017) study suggest that psychological interventions, including both routine care counselling and cognitive behavioural based anxiety counselling are useful tools to decrease maternal anxiety in the NICU. Anxiety counselling using a cognitive behavioural approach had a longer-lasting effect at reducing maternal anxiety levels. These findings are similar to those found by Loughnan et al. (2019) and Shaw et al. (2014) when evaluating an antenatal cognitive-behavioural therapy [CBT] intervention and a NICU-based trauma-focused CBT, respectively. Shaw et al. (2013) found a similar reduction in anxiety measurements of both their control group (receiving education and coping strategies) and their intervention group (receiving trauma-focused CBT). However, reassessment at 6-month post- intervention found a sizable and significant reduction in anxiety levels of the intervention group (Shaw et al., 2014). This provides further evidence for the potential long-term benefits of CBT and emphasizes the need for ongoing support for mothers starting in the antenatal period and extending postnatally to help facilitate anxiety reduction within this highly susceptible and vulnerable group.

Familiar songs can help control anxiety, improve concentration, recover memories, provide a sense of security and motivation, and stimulate social interaction, simultaneously giving people the opportunity to recognize and improve their emotions" (Ribeiro et al., 2018, p. 5-6). The benefit of music therapy on maternal anxiety found by Ribeiro et al. (2018) is mirrored by Roa & Ettenberger (2018) in their clinical pilot intervention evaluating a music therapy self-care group in the NICU. This intervention included both mothers and fathers, also finding reduced stress, improved mood, motivation, and restfulness post-intervention.

The study by Tandberg et al. (2013) evaluating nursing support and parental stress levels, highlighted the importance of nursing communication in reducing parental stress levels in the NICU. Consistency in communication and nursing support has been shown to be important in producing significant reduction in parental distress. The individualized neonatal parent support programme assessed by Mansson et al. (2019) was not associated with a significant reduction in overall parental stress levels. The lack of significant findings in this study may be due to the inconsistent application of the individualized nursing intervention, related to organizational changes and failure to have consistency in the role of designated primary nurses.

In a study by Foutiou et al. (2016), the investigators implemented an intervention assessing the effectiveness of relaxation techniques of parental stress and anxiety levels measured by the PSS: NICU and STAI tools. They found that the intervention was associated with a reduction in trait anxiety levels after discharge. Their results, however, also implied that higher levels of initial stress are associated with significantly increased parental stress measurements three months following discharge. These results emphasize the need for early recognition of those at increased risk and provision with appropriate interventions for ongoing stress management to reduce parental stress levels within the NICU and beyond. Consistent with findings from previous reviews, the majority of literature is focused on evaluating maternal distress in the NICU and paternal distress is often neglected (Sabnis et al., 2019). Lee et al. (2012) found that an early intervention focusing on education, nursing support and guidance, led to higher measures of fathering ability which was associated with reduced paternal stress scores. These findings contradict those found by Noergaard et al. (2018) with their father friendly NICU design, in which increased paternal education and involvement was associated with increased paternal stress levels. These discordant results suggest that there may be additional socioeconomic and culture factors influencing the findings.

Many of the studies included in this review were conducted outside of North America, in single centers, which limits the generalizability of their results to non-comparable jurisdictions. Stress, anxiety, and coping have different sociocultural dimensions. Consideration of these dimensions must be taken into account when designing and adapting interventions within different countries, cultural and religious contexts.

**Implications for Nursing Practice**

Within the NICU, nurses take on a dual role of caring for the vulnerable preterm infant population, while also caring for and supporting their families. Nurses play a central role in

helping address family's needs, providing emotional support, guidance, communicating and assisting families with decision-making (Toral-Lopez et al., 2016). As parents are the most consistent caregivers for their infants, it is vital that they be physically and mentally healthy to help them cope with the NICU environment. Parental presence, including recognition of infant cues and provision of neurodevelopmental interventions (ex. parental touch) is crucial to support the premature infant's development and physical and developmental well-being.

Based on the synactive theory by Als, and the Newborn Individualized Developmental Care and Assessment Program (NIDCAP), parents play an important role in helping to regulate the infants five subsystems including: autonomic/physiology, state, motor, attention, interaction and self-regulation, and help to support the infants developmental (VandenBerg, 2007). Increased understanding of ways to better support families, including information regarding the effectiveness of different interventions to alleviate parental stress will help to inform knowledge translation, influence nursing practice, and hopefully aid in the planning of evidence-based practice improvements. NICU nurses are in an optimal position to help advocate for and facilitate interventions that will help in the reduction of parental distress. Simple and cost-effective interventions, including art-based group activities, narrative writing, mindfulness techniques, relaxation techniques, and individualized nursing interventions can readily be integrated into the NICU setting. The results of the review have the potential to inform new unit policy and/or organization policy and guidelines with the integration of interventions to help reduce parental distress within this intensive care setting.

**Limitations and Biases of Review**

A rapid review is less comprehensive than a full systematic review. The search only utilized three databases, excluded grey literature, non-English publications, and was restricted to literature published within the last five years. These restrictions may have excluded evaluation of interventions that had been previously published or not yet published in the literature.

Interventions that evaluated stress or anxiety, but not as primary outcomes, were also excluded based on the scope of this study. This exclusion could limit the available knowledge about targeting stress and anxiety within this population and may have also potentially excluded larger, more broad scale studies (evaluating multiple outcomes). The selected studies were largely single center designs, with imbalances in respect to parent sex, infant gestational age, and geographical location, which may restrict their generalizability in terms of culture, healthcare structures, concepts, and designs.

## CONCLUSION AND FUTURE IMPLICATIONS

Although there is an understanding of the burden of NICU-related distress amongst experts and families, and a recognition of the need for ongoing psychosocial support, standard screening practices and supports of NICU parents are not in place universally (Sabnis et al., 2019). There is a need for increased resources and support to address the physical and mental health needs of these infants' families. Interventions targeting mothers' psychological needs can significantly reduce stress and this has a long-term benefit on maternal physical and

mental health, as well as enhancing infant mental health, bonding, and attachment. Larger scope studies, including multi-centre studies are needed on an international level. This should include studies evaluating mindfulness and other relaxation techniques, narrative writing, neurodevelopmental education, group therapy, as well as those incorporating technology to educate and engage families. These types of interventions have the potential to be important in empowering families with education and mental preparedness to help relieve stress and anxiety for families in the NICU. The WOC questionnaire could be incorporated into the NICU setting as a means to help establish how the individual parents cope with stress and could allow for a more tailored approach to psychosocial support within the NICU setting. Literature focusing on fathers in the NICU is limited and there are inherent differences in how mothers and fathers experience stress. There is a need for further research and investigation to evaluate these differences, including more data evaluating paternal stress and its trajectory, so that interventions can be developed and structured to better support fathers within the NICU and to reduce the long-term impact on fathers' mental health.

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## APPENDIX A: SEARCH SUMMARY

**CINAHL Plus with Full Text**
Date searched: Jan 13, 2020
Results: 311

1. ((MH "Intensive Care, Neonatal") OR (MH "Intensive Care Units, Neonatal")) OR (Neonatal-intensive-care or NICU )
2. ((Parent* or mother* or father*) N6 (worry or worri* or stress* or distress* or anxiety or psychosocial or upset*))
3. (MH "Clinical Trials+") or randomized or placebo or randomly or trial or groups
4. S1 AND S2 AND S3

**Ovid MEDLINE(R) ALL 1946 to January 10, 2020**
Date searched: Jan 13, 2020
Results: 166

1. exp Intensive Care, Neonatal/ or exp Intensive Care Units, Neonatal/
2. (Neonatal intensive care or NICU).mp.
3. 1 or 2
4. ((Parent* or mother* or father*) adj6 (worry or worri* or stress* or distress* or anxiety or psychosocial or upset*)).mp.
5. 3 and 4
6. exp Clinical trial/ or randomized.tw. or placebo.tw. or dt.fs. or randomly.tw. or trial.tw. or groups.tw.
7. 5 and 6

**PsycINFO 1806 to January Week 1 2020**
Date searched: Jan 13, 2020
Results: 85

1. exp Neonatal Intensive Care/
2. (Neonatal intensive care or NICU).mp.
3. 1 or 2
4. ((Parent* or mother* or father*) adj6 (worry or worri* or stress* or distress* or anxiety or psychosocial or upset*)).mp.
5. 3 and 4
6. exp Clinical trials/ or randomized.tw. or placebo.tw. or randomly.tw. or trial.tw. or groups.tw. or exp experimental design/
7. 5 and 6

RefWorks was used to organize and sort references. Identification of duplicate articles was done within RefWorks utilizing the “Exact Match” function. A total of 97 duplicates were found, leaving a total of 465 articles for further review.

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# Practice development

## *Nursing initiatives in the emergency department during the COVID-19 pandemic: The COVID-19 Update Team*

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**ABSTRACT**

The COVID-19_pandemic is a challenge facing healthcare systems worldwide. Emergency Departments are frontline units that need to be properly prepared to protect clinicians from SARS-CoV-2. During the first wave of the pandemic, four emergency nurses of the Nicosia General Hospital in the Republic of Cyprus formed the COVID-19_Update Team. The team aimed to update guidelines about infection prevention and management of COVID-19 disease and inform health care professionals of the emergency department. This report describes the initiatives developed by this team and its future plans.

***Keywords:*** COVID-19 pandemic, SARS-CoV-2, emergency department, nursing initiatives, protective measures

### THE PANDEMIC OF COVID-19 IN THE REPUBLIC OF CYPRUS

On the 11$^{th}$ of March 2020, World Health Organization (WHO) announced the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) pandemic; two days earlier, the first 2 cases of the coronavirus disease 2019 (COVID-19) were diagnosed in the Republic of Cyprus (Koios: Covid-19 spread in Cyprus, 2020). Cyprus is a small country in the East Mediterranean basin with a population of 875.900 (Statistical Service of Cyprus, 2018). The global spread of COVID-19 has been putting enormous pressure on healthcare systems around the world, including Cyprus; this is true especially for Intensive Care Units (ICUs), expected to effectively support those most severely affected by SARS-CoV-2 (Li et al, 2020). Emergency Departments (EDs) are also deemed as crucial frontline units towards management of the pandemic (Hou et al., 2020). Triage nurses and physicians are those obtaining a thorough history from all walk-in patients, even when COVID-19 symptoms are absent. Therefore, EDs are a key line of defense through early recognition and timely isolation of SARS-CoV-2 positive cases, thus reducing the risk of contamination for other patients and healthcare providers. In response to COVID-19 pandemic, administrators of EDs faced several challenges, such as additional precautions for infection control (Kim et al., 2020), safety issues

amongst staff (Chua et al., 2020; Möckel et al., 2020), educational needs and clinical leadership (Whitwell et al., 2020).

## EMERGENCY DEPARTMENT OF THE NICOSIA GENERAL HOSPITAL

The Nicosia General Hospital (NGH) is the largest public tertiary hospital in the Republic of Cyprus, based in Nicosia, the capital city of Cyprus. Subsequently, the Emergency Department (ED) of the NGH is the reference center for serious cases; 12 physicians and 72 nurses are employed there to provide services to over 140 patients per day who visit it. During the first wave of the pandemic, this ED continued to offer emergency services to all patients in need, while at the same time it also served those reporting COVID-19 symptoms. According to the severity of their symptoms, patients with COVID-19 were either admitted to ICU or COVID-19 unit in the NGH, transferred to the COVID-19 referral hospital, or discharged. Thus, the clinical nurse manager of the ED on each shift was responsible for maintaining a safe work environment for staff, as well as a therapeutic environment for service users. That included at the same time protecting clinicians and COVID-free patients from contracting SARS-CoV-2, and safely managing COVID-19 patients.

### The COVID-19 Update Team

On the 30th of March 2020, four ED staff nurses (one Advanced Nurse Practitioner [ANP]-PhD candidate, and three master's students in Advanced Emergency and Critical Nursing Care), each with more than ten years of clinical experience in the specific department, proposed to the clinical nurse manager of the ED the formation of the "COVID-19 Update Team". The following factors were pivotal towards the conception of such a team:

- Worldwide recognition of the severity of the COVID-19 outbreak
- Alarming reports of the spread of the virus to healthcare professionals(International Council of Nurses, 2020)
- Responsibility of the department to prevent clinical staff, medical and nursing students, and non-COVID patients from contracting the SARS-CoV-2
- Accumulating evidence on the protection measures against SARS-CoV-2 and on emerging therapies.

The team would be responsible (a) to gather information on preventive measures and novel therapeutic strategies, (b) prioritize the needs of healthcare professionals for information, (c) present data, in the form of brochures, on the bulletin board of the ED, (d) to provide relevant educational sessions to the healthcare workers of the NGH and (e) to implement guidelines to address safety issues between staff.

One week later, the proposal was accepted by the clinical nurse manager of the ED and the duties of team were established. It was not unusual for the ED to be the first department to pursue such educational goals; emergency nurse-led educational programs in the management of sepsis and ischemic stroke had already been running in the NGH.

Although the case rates in the Republic of Cyprus were low (Koios: Covid-19 spread in Cyprus, 2020), the pandemic was in full blow throughout China and Europe. So, on the 10th of April 2020, the team decided to start its meetings, in order to determine initial actions. The meetings were scheduled to take place twice a week (Tuesday and Friday), in a place available to the staff of ED but out of working hours.

**FIRST TASKS OF THE COVID-19 UPDATE TEAM: INFECTION PREVENTION AND MANAGEMENT OF DISEASE AMONG HEALTHCARE PROFESSIONALS**

Howard Catton, the International Council Nurses' Chief Executive Officer, stated that, since March 2020, the 1500 nurses who died in hospitals around the world from SARS-CoV-2, are more than those who died during the First World War (International Council of Nurses, 2020). In the beginning of the pandemic, it was reports from China that first demonstrated COVID-19 cases among healthcare professionals (Zhan et al., 2020). Based on that early experience, the team decided that, during the first wave of the COVID-19 outbreak, priority should be given to inform healthcare professionals in taking the necessary protective measures.

First, the members of the team focused on collecting data on the effective protective measures from WHO, the US Centers for Disease Control and Prevention (CDC), the Cyprus Ministry of Health and PubMed (part of the United States National Library of Medicine), given that the pandemic was ongoing, and information was accumulating rapidly. Both WHO and CDC provided guidelines on COVID-19, which were adapted by the Ministry of Health of the Republic of Cyprus. The latter has the responsibility of updating information for Cyprus related to the pandemic and ensuring that their website contains useful announcements, decrees, guidelines for workplaces, press releases etc. in Greek, English and several other languages (Ministry of Health. Republic of Cyprus. New Coronavirus disease [COVID-19], 2020).

Second, the team performed a thorough investigation on the adequacy of personal protective equipment (PPE) available to the ED personnel, such as N95 and surgical masks, full face shields or goggles for eye protection, disposable gloves and gowns. The administration of the NGH had earlier organized training courses for the clinicians of the ED on the use of PPE and other protective strategies during patient care. The team also focused on prevention and offered continuous reminders of diligent hand washing, proper PPE use and the significance of equipment and surface disinfection. Moreover, the psychological PPE (P-PPE) was included in the topics discussed. P-PPE regards a group of evidence-based interventions towards protecting psychological well-being of healthcare employees and support them to activate their own resilience coping strategies (Maben & Bridges, 2020). Specifically, the aim of P-PPE is to reduce mental and psychological distress and promote peer support and solidarity among employees, psychological safety, while relevant interventions are incorporated into everyday routine without increasing workload in healthcare workers (IHI, 2020).

Lastly, the team developed guidelines for the protection not only of the ED staff but also of patients visiting ED. In particular, the team developed instructions on the secure transport of staff in and out of the ED. In addition, the team presented guidelines on the steps to be taken in case of a staff member getting infected with the virus.

To fight the pandemic, our ED had to adjust to the new reality. The team implemented a collaborative strategy, addressed challenges in determining the education needs of the staff and the infection control management and each member did its utmost for responding to these challenges. Barriers to this practice development were overcome very soon as managers and ED personnel accepted the need for defining behaviors and procedures related to the pandemic and they embraced the COVID-19 Update Team. Nevertheless, it would be valuable to study the effectiveness of its actions after the end of the pandemic.

## CONCLUSIONS

At the time of writing this article (the 30th of November 2020), the Republic of Cyprus is experiencing the 2nd wave of the pandemic, as is the rest of Europe. From the 1st of October 2020 until the 30th of November 2020, there were 8793 new cases and 27 deaths (Koios: Covid-19 spread in Cyprus, 2020). EDs are again the first hospital departments to manage suspected SARS-CoV-2 patients, thus exposing their clinicians to a considerable risk of contracting the virus. Several improvements have been made to the Nicosia Emergency Department and it is now better prepared to face the pandemic. The actions of the COVID-19 Update Team have helped in this direction. The team plans to keep up to date through weekly presentations, not only the ED personnel but also healthcare workers of all departments of the NGH; to keep developing and adapting to novel knowledge and clinical protocols related to SARS-CoV-2. The COVID-19_pandemic has forced healthcare systems to change and adapt. Nurses have the knowledge and skills to play a pivotal part towards that goal.

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**Dr. Meropi Mpouzika** is an assistant professor in critical care nursing at the Department of Nursing of the Cyprus University of Technology. Her main research interest revolves around nursing management of critically ill patients in the intensive care units and emergency departments.

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# ABSTRACTS

## Oral Presentations

### *Improving Working Environments for Critical Care Nurses: A Blended Training Solution - An Erasmus + Project*

***Evanthia Georgiou***

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**Background**: Healthy work Environment (HWE) is a key factor for enhanced patient outcomes and nurses' work satisfaction.

**Aim:** To support Critical Care Nurses and their trainers to develop the relevant soft and hard skills required for creating HWEs in the Critical care Unit (CCU), fostering increased motivation and wellbeing, staff retention and better patient care.

**Methods:** A cross-sectoral partnership involving Critical Care Nurses (CCN), field of soft-skills development was formulated to design a blended training course on HWEs. The six dimensions of HWE (i.e. communication, collaboration, leadership, decision-making, recognition and staffing) as proposed by the American Association of Critical Care Nurses provided the conceptual framework of the project. The main project proposal activities, involve content development, testing, improvement, translation and dissemination.

**Results/Findings:** The blended training course consists of 4 modules. The training content was customised to best answer training needs and can be delivered both face to face and online as a free Open Educational Resource (OER) in six languages. The first module familiarizes trainers involved in the continuous professional development (CPD) of CCU nurses with the notion of HWE and the relevant knowledge, skills and competences required for HWEs. The second module is a toolbox with a comprehensive set of methods and tools to assist trainers to design HWE training curricula. The third module provides the trainers with complete, ready-to-use lesson plans and the fourth module includes assessment and recognition tools to assess learning for trainers becoming professionals in HWE and CCN taking part in HWE training.

**Conclusions:** The blended training course proposed, will enable CCN and their trainers to develop the relevant knowledge, skills and competences required for HWE and by that mean fostering employability, improved quality of care and socio-educational and professional development in the Critical Care Nursing field, which is strategic for smart economic and social development.

## *Infusion Alarm Fatigue: The Size of The Problem and Mitigation Strategies*

***James Waterson***

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**Background:** Smart pump medication libraries, and their reporting software, record medication and dose selections made by users, as well as cancellations of selections.

**Aim:** To establish, in a reproducible and reliable study, baseline data on the set-up and initial programming phase of intravenous medication administration from review of medication library reports from infusion pumps used across three facilities in the Middle East. Analysis of user-initiated corrections of common 'death-by-decimal point' errors of incorrect dose/concentration selection, and of wrong medication selection related to medication-name 'lookalike-soundalike' issues. The study also focused on the time taken for clinicians to self-remedy the error.

**Methods:** A twelve-month review of medication library reports from 4341 infusion pumps used in 15 disciplines across the Middle East obtained metrics on the set-up phase of intravenous medication administration. The reporter software used in this study records cancelled infusions and resolutions of infusion alerts by the user. Decision times of clinicians were calculated from the time-date stamps of the pumps' logs.

**Results:** Incorrect medication selections were 12.1% of all medication library alerts and 70.2% of the cancelled infusions. Of these cancelled medications c. 30% would require two-nurse checking dependant on local policy. Wrong dose selection was responsible for 6.1% of all alarms and 29.8% of infusion cancellations. Average error recognition to cancellation and correction time was 27 seconds [+/-22.3] for medication error correction, and 26.5 seconds [+/- 24.7] for dose corrections.

**Conclusions:** The study identified a great number of lookalike-soundalike near miss errors. The value of an infusion pump having the capability to show the entire medication name, complete with TALLman lettering on the interface matching that of medication labelling is supported by these findings. The study indicates that even with standardised doses being available to clinicians the risk of programming error still exists.

## *Combination Of Chest Compressions and Interposed Abdominal Compressions in A Swine Model of Ventricular Fibrillation.*

***Marios Georgiou***

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**Background:** The compression-related cardiac output is one of most critical determinants of cardiopulmonary resuscitation (CPR) efficacy and survival after cardiac arrest.

**Aim:** To investigate the effects of the combination of chest compressions and interposed abdominal compressions (IAC-CPR) in a swine model of ventricular fibrillation (VF).

**Methods:** Twenty Landrace-Large White pigs with average weight of 20±1 kg (aged 19±21 weeks) were the study subjects. At the end of the eighth minute of VF, animals in the control group (Group A) received chest compressions at a rate of 100/min, while animals in the second group received chest compressions and simultaneous interposed abdominal compressions (CC-IAC –

Group B), both at a rate of 100/min. Both groups received intravenous adrenaline 0.02 mg/kg at the onset of CPR. Successful resuscitation was defined as ROSC with a mean aortic pressure (MAP) of at least 60 mm Hg for a minimum of 5 minutes. After ROSC, the animals were monitored closely and mechanically ventilated for 6 h. The primary end point of the experiment was ROSC. Secondary outcomes were 48-hour survival rate and 48-hour neurologic outcome. **Results:** No significant difference was observed in ROSC between the two groups, as 6 animals (60%) from Group A and 9 animals (90%) from Group B achieved ROSC (p=0.121). No significant differences were observed in baseline and 8-minute untreated VF haemodynamic parameters between the 2 groups. There was a statistically significant difference in systolic aortic pressure, MAP, right atrial pressures, and ETCO2 between the two groups during the first cycle of CPR, while during the second cycle, diastolic aortic pressure was significantly higher in Group B. Coronary perfusion pressure (CPP) values in group B were significantly higher compared with those in Group A during the first and second cycle of CPR. Neurologic examination was significantly better in the animals of Group B (75.00 ± 10.00 vs. 90.00 ± 10.00, P=0.037). **Conclusion:** We found a statistically significant difference in haemodynamics between the two groups during the first cycle of CPR, while CPP in IAC-CPR-treated animals was significantly higher compared to animals treated with standard CPR.

## *Family-Centered Care in The Paediatric Intensive Care Unit: From Giving Parents A Voice and Engagement to Reducing Sound Pollution*

***Muna Zahir Al Shaqsi***

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The family experience high anxiety and complicated grief in PICU. Effective partnership between family and staff will help in redesigning health care safety and quality. It will lead to better outcome, enhance efficiency and cost-effectiveness. In order to implement FCC, PICU started with phase one analysis, with one-on-one interview in order to explore family's needs and challenges. After exploring parents' needs, PICU established FCC program with dramatic change in nursing practice and strict adherence in Arabic communication with integrated learning sessions provided to the staffs. The challenge of allowing parents to cuddle their intubated child and being involved with care was extremely difficult as the child my get self extubated and may have potential complications. However, after a year of transformation, it resulted to a high satisfaction rating from the parents and was fully-embraced by the nurses as well. After sustaining phase one project, phase two project was started for continuous improvement. Parent's Satisfaction Survey has been established consisting open and close-ended questions. Family gave major concern on high noise in PICU. An audit tool was started to measure the noise level in PICU using a Sound detector with 80db of noise level detected. The World Health Organization (WHO) recommends that noise levels in the hospital environment should not exceed 35 decibels (dB) during the night and 40 (dB) during the day. Subsequently, Quiet Time was implemented in PICU. The goal of the Quiet Time is to promote adequate rest and healing to our vulnerable critical patient, to lower the noise level, to avoid disturbance during the sleep cycle of the patient and increase parent's satisfaction. Sound level monitoring has been conducted before, during and after quiet time periods. After implementing FCC phase one project, parent's satisfaction achievement rate was 96%. Quiet time project in phase two shows that, an average sound level dropped to 45-46 (dB) sound level. A secondary

outcome was less deterioration of patient and medication errors.

## *Validation & Development Of "Battle" Approach to Combat Alarm Fatigue*

***Pooja Nair***

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**Introduction:** "Alarm Fatigue" is a major health care concern, ranking fourth on the Emergency Care Research Institute (ECRI). It is described as sensory overload that occurs when clinicians are exposed to an excessive number of alarms, which can result in desensitization to alarms and missed alarms as stated in AACN. Desensitization to alarms is a serious patient safety concern and must be dealt promptly. Hence the present study aimed at development and Validation of Alarm Management guideline - BATTLE approach to combat Alarm Fatigue among Critical Care Nurses.

**Method:** To ascertain need for Alarm Management Guidelines, Alarm fatigue Risk Assessment questionnaire was administered to 60 critical care nurses (CCNs) with minimum one year of ICU experience from 5 multispecialty hospitals after obtaining permission from authority and informed consent from individual respondent. Followed by this, Delphi technique was implemented with an aim to bring expert`s consensus about incorporation of strategies in BATTLE approach. Total 4 Delphi rounds undertaken with 9 experts from Intensive Care, Medicine & Nursing.

**Results**: Survey findings revealed that majority (56%) CCNs had an experience between 1-5 years. Majority (51.7%) CCNs were at severe risk of alarm fatigue while 48% of CCNs were found be at moderate risk of alarm fatigue. 44% & 24.47% CCNs reported that poor placement of electrodes and probe and inadequate staff training about monitor handling contribute to Alarm fatigue respectively. Validated Alarm Fatigue Management Guidelines were named as BATTLE APPROACH after achieving expert`s consensus which is enumerated as follows; BASELINE DATA Assessment, ANALYZE data, TROUBLE SHOOT false Alarms, TAKE SMART ROUNDS, LOCATE default setting, ENCOURAGE: Positive Deviant.

**Conclusion**: BATTLE APPROACH has potential for global implementation as feasible, comprehensive & full proof strategy to combat Alarm Fatigue.

## *Health and Well-Being: Self-Care Tips for The Bedside Nurse*

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**Background:** In addition to personal problems and challenges, nurses are generally considered at high risk of work-related stress due to long working hours, a wide range of tasks, and complicated relationships with patients and their families, doctors, and other colleagues. The high rate of exhaustion of nurses affects patients and patient care delivery. Nurses who suffer from burnout, or who are perceived as unhappy or unhealthy by patients may not be able to meet the demands of patient care delivery or those presenting to healthcare services. It is therefore imperative that nurses develop or adopt self-care techniques to ensure their health and well-being.

**Aim:** To provide some self-help care tips to fellow nurses and other healthcare professionals based on the strategies employed during difficult and stressful times in my nursing career and personal life.

**Methods:** This paper employs a phenomenological approach to provide a narrative of my personal experiences that impacted my life, relationships, and career, and to describe some strategies employed on how I overcome those challenges.

**Results/Findings**: From my own experiences, having endured many challenges, problems, and

stresses in life, I found that resilience, strong determination and hard work, open-mindedness and positive outlook to life are qualities paramount to an individual's capacity to cope. I found that these qualities can be learnt and would help a great deal if a person opens his/her mind to possibilities and opportunities for change. Through the years, I have engaged myself in mind-body-spirit enriching activities such as mindfulness meditation, yoga and reiki, which are helpful to minimise the negative effects of stress such as anxiety, depression, sleeplessness, and/or anorexia/bulimia. Eating a balanced diet and regular exercises are also important to maintain good health and well-being.

**Conclusions:** An individual's intrinsic qualities such as resilience, patience, strong determination, and hard work are important coping mechanisms when faced with problems and challenges. Also, mind-body-spirit enhancing activities such as mindfulness meditation, yoga, reiki, balanced diet and exercise are essential in overcoming the negative effects of stress.

## *Needs of Family Members of Critically Ill Patients Admitted to Intensive Care Unit and Emergency Wards at Mbarara Regional Referral Hospital*

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**Introduction:** Admission of a critically ill patient to an intensive care unit or emergency ward places considerable stress to family members. Most often, critical illness occurs without warning and the stress associated is not anticipated. Since critically ill patients are part of the family unit, it is essential to attend to their needs within a framework of the concept of holistic patient care.

**Objective:** To identify information, proximity, assurance, comfort, and support needs of family members of critically ill patients at Mbarara Regional Referral Hospital.

**Methods:** A descriptive cross-sectional study design was used to collect data from (n=80) respondents. Convenience sampling strategy was employed in the study. The Critical Care Family Needs Inventory tool was used to collect data which was analyzed using descriptive statistical analysis and ANOVA.

**Results:** Family members identified needs from the assurance sub scale / dimension as the very important and support needs as the least important. Thirteen needs showed statistically significant difference with demographic characteristics of family members. All analytical analyses were considered significant at the level of 0.05. Two additional needs specific to this sample group were identified related to resource constraints.

**Conclusion:** Most of the very important needs of family members consisted of needs from the assurance dimension while the least important ones are related to the support dimension. The findings will help nurses to plan for meetings with family members to identify needs that might reduce psychological burden during hospitalization of their patients in the intensive care unit and emergency wards.

## *Pressure Injury Challenges Related to Prone Position for Covid Patients in Critical Care Units*

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**Background:** A novel beta-coronavirus, named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV-2), Covid 19 was identified in China in 2019 and rapidly spread to pandemic in

2020 resulting disease was called Coronavirus Disease 2019 (COVID-19). COVID-19 has a broad spectrum of clinical presentations, ranging from asymptomatic to extremely severe forms. And patient develops the acute respiratory distress syndrome (ARDS) therefore patient required critical care for mechanical ventilation and prone position to manage ARDS complication However, turning patients to prone induced important complications such as pressure injury. A study revealed that prone positioning is associated with higher incidence of HAPI compared with supine positioning Pressure injuries are localized damage to the skin and underlying soft tissue usually over a bony prominence or in relation to a medical device. COVID-19 ARDS management requires prone positioning for extended periods of time, and therefore, using appropriate support surfaces and pillows and patient repositioning as soon as feasible are key preventive strategies recommended by the guidelines to prevent pressure injuries.

**Aim:** The aim of this abstract is to describe the prevalence and characteristics of prone positioning pressure injuries, and to highlight the importance using appropriate support surfaces and pillows as pressure injury preventive measures.

**Method:** Patient with covid 19 and placed on mechanical ventilator and required to position them on prone position and minimal handling as part of ARDS management. Braden score used to assess patient at risk of pressure injury development and skin assessment done on admission, regular basis and before placing the patient on prone position by critical care nurses these patients developed Hospital Acquired Pressure Injury (HAPI) on March and reported through Datix system as incident report for (HAPI) and patients examined and assessed by wound management team and in addition result displayed of confirmed cases of HAPI due to prone position.

**Result:** Patient characteristics resulted age (51.6 mean), Braden score (mean 11) and length of hospital stay (mean 34.1). Confirmed (HAPI) cases n= (18) from critical care due to prone position and minimal handling, Male n=(14), Female (4). The most affected pressure injury location was nose (9), penis (7), cheek (6) and lip (6). Patient discharge status for those with HAPI at the time of the study: discharged from hospital (7), present in hospital (6), and expired (5).

# Poster Presentations

## Cypriot Intensive Care Nurses' Knowledge and Attitudes Regarding Fever and Antipyresis

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**Background**: Fever is common in critically ill patients during their hospitalization in the Intensive Care Unit (ICU). Fever may represent either an indicator of illness severity or a marker of a protective host mechanism to the severe illness but usually causes fear and the urgent need to suppress it. Nursing personnel care for patients with fever and thus fever has a significant role on decision making about patient management.
**Aim:** To explore a) self-evaluated and actual (number of correct answers) level of knowledge and b) attitudes regarding fever and antipyresis among Greek-speaking ICU nurses in Cyprus.
**Method:** Descriptive cross-sectional correlation study. From October 2019 to February 2020 a convenience sample of ICU nurses employed in 4 public and 2 private ICUs in Cyprus were invited to complete anonymously a previously validated, self-administered questionnaire that assessed knowledge and attitudes towards fever and antipyresis.
**Results/ Findings:** 113 nurses participated in the study [Response Rate: 66%]. Regarding their knowledge, 66% of the participants self-evaluated it as adequate although their actual knowledge score was only moderate on average (Mean: 5.1+1.7; Scale Range: 0-10) with those working at private ICUs recording higher levels of knowledge (p=0.003). Nursing personnel expressed moderately negative attitudes towards fever and moderately positive attitudes towards antipyresis [Mean: 30.8+3.3, Scale Range: 10-50 and Mean: 26.4+3.6, Scale Range: 20-50 respectively (higher values reflect more negative attitudes)]. Nurses employed in private ICUs expressed more positive attitudes regarding antipyresis (p=0.014). No correlation was found between knowledge and attitudes.
**Conclusion:** Further research is needed to investigate more factors associated with ICU nurses' knowledge and attitudes regarding fever and antipyresis such as organizational culture of the hospital.

## End-Of-Life Care in The Intensive Care Unit: A Concept Analysis

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**Background:** Death is a fact of life. Since nursing deals with people's health at all developmental stages and at any point in the health-illness continuum, end-of-life care is part of it.
**Aim:** The aim of this concept analysis was to identify the definition of end-of-life care in the ICU.
**Methods:** The method of Walker & Avant was adopted because it identifies the structure and definition of end-of-life care in the ICU, to further evaluate research related to end-of-life in critical care nursing. A manual literature search was conducted followed by a search of PubMed and Scopus of the scientific literature.
**Results/Findings:** These searches extracted six attributes of the concept of end-of-life care in the ICU including communication with patient & family, support of decision making, symptom management, multidisciplinary approach, dignity, and respect for cultural background. Four antecedents included strong dependency on medical equipment, short term, less or no ability of decision making by patients themselves and focusing on family surrogate decision-making. Four consequences included family satisfaction, improved interaction between medical staff and patient/family, normal grief process, and sense of the family being "supported". The definition of

end-of-life care in the ICU was "the holistic care of critically ill patients and families with dignity and respect for their culture without distress over the short-term. Despite the short time, the care should be provided intensely, and support decision making by families. End-of-life care in the ICU should result in family satisfaction, and finally aim at the patient living their own life well and support the normal grieving process of the family".

**Conclusions:** The result of this concept analysis is useful, may support critical care nurses to provide optimal care for dying patients and their families in the ICU and contribute to conducting further research related to end-of-life in critical care nursing.

## *Early Provision of Buccal Mucosa Swabbing with Colostrum in Preterm Infants - Leads to Sustained Breast Milk & Better Developmental Outcomes*

***Mini Thomas***

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**Background:** Extremely premature infants/ for very low birth weight (VLWB) infants do not receive oral milk feeds until 32weeks post-conception age, they lack the potential benefit provided by milk (bio factor) and this deficiency could contribute to late-onset sepsis and necrotizing enterocolitis. To close this gap, the practice of early application of oropharyngeal colostrum (OC) was proposed and initiated as a protective strategy by placing a small volume of colostrum directly onto the inside cheeks of preterm infants that may provide immunological and growth factors that stimulate the immune system and enhance growth of the intestine. These benefits could potentially reduce infections, including necrotizing enterocolitis (NEC), thereby improving survival and long-term outcomes.

**Aim:**

- Achieve 98% Colostrum swabbing for all preterm babies <34 weeks
- Educate mothers on significance of breast milk especially colostrum
- to achieve mothers' satisfaction, prevent prematurity related complications

**Methods:** A separate retrospective control cohort of VLBW was completed prior to initiation of colostrum protocol. The oral colostrum protocol was segmented by birthweight, therefore infants weighing <1500 grams received colostrum via swab to each buccal mucosa every 4-hours within 4-6hrs of birth. Mothers were given education on proposed benefits oral colostrum Staff education and training continued.

**Results:** The median time for Colostrum initiation was within 2-4 hours with a cotton-tipped sterile applicator. 0.2 mL of mother's colostrum is applied to the infant's oropharyngeal mucosa every 6hours for 5 days from birth within 4-6hrs of birth to day 7 of life (intervention). There were no adverse changes in vital signs and no desaturation associated with the application of Colostrum. After the initiation of the project our post discharge breast feeding improved to 90%.

**Conclusion**: We continue to encourage to provide breastmilk within first 4hrs of delivery. Increasing the exposure of breastmilk in NICU must become standard of practice.

## *The Development of Decision Aids of Advance Care Planning for Critical Care Patients: Checking Its Acceptability and Usability*

***Kanako Yamamoto***

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**Background:** The timing and goals of advance care planning (ACP) for patients treated in the intensive care unit (ICU) are difficult and have many problems. Decision aid (DA) is a tool that helps people make decisions about matters that are complex and difficult to predict and judge. A DA on ACP for patients undergoing critical care after surgery was developed using systematic development process and international patient decision aid standards.

**Aim:** This study aimed to evaluate the content of the developed DA and to refine it.

**Methods:** This was a qualitative study with semi structured interviews. A total of 10 subjects, including intensivists, surgeons, palliative care physicians, ICU nurses, cancer nurses, and home care nurses, were enrolled. All the nurses were advanced practice registered nurses. Two DAs were evaluated: 1) a DA where patients choose to share the treatment preferences with their families and health care providers and 2) a DA where patients choose the treatment preferences when transitioning to end-of-life care. The study period was from October to November 2020. The study covered the comprehensibility, length, and improvements of DAs.

**Results:** The respondents pointed out that the two DAs had too much information and needed to be corrected, whereas the DAs were considered useful if they were used in preoperative patients. There were also concerns that reading the guide before surgery would increase patient and family anxiety. This was especially the opinion of those working outside the ICU.

**Conclusions:** The DAs of ACP for patients undergoing critical care after surgery were determined to require text reduction and improved reading time. On the other hand, regarding comprehensibility, health care providers evaluated the appropriateness of the content of the DAs. It was indicated that there was a possibility of adapting the DAs in clinical practice after improvement.

# *Journey of Chronic Wound: "It Was a Long Way There"*

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**Background**: Wound care is not straight forward and predictable as patients present with complex co-morbidities. There are several questions that clinician must answer to establish management goals:

1. Is there a way to control, treat or eliminate co-morbidities?
2. Can local dressing regimen address issues like bioburden, infection or microclimate?
3. Does the patient or care providers have adequate drive, understanding and resources to adhere to treatment plans?

**Aim:** Two case reports of how interdisciplinary approach along with Holistic wound care made a positive impact on a nearly impossible Wound situation.

**Methods and Results:** CASE 1 – 87-year-old male, on mechanical ventilator with co-morbidities presented with:

1. Right Foot Gangrene aggravated by arterial disease.
2. Sacral Pressure injury stage 4 with poorly approximated and Integrated skin flap. Remained open and left for secondary closure.

Initial goal -wound hygiene and appropriate dressing with co-ordinated effort:

a) Right foot lesion reduced in size, slough eradicated, wound edges well contracted
b) Sacral wound achieved 90% epithelization and wound closure is eminent.

Case 2 - 87-year-old female patient tracheostomized on ventilator with co-morbidities Developed large bowel perforation status post laparotomy, total abdominal colectomy, and terminal ileostomy presented with:

1. Poorly approximated abdominal wound with suture tension and tissue necrosis.
2. Two weeks later, wound dehisced further with moderate to large amount of purulence.

Initial goal was symptom management and pain relief along with systemic antibiotics, topical antiseptics and antimicrobial dressings.

Wound bed grew 100% granulation tissue and an 80% epithelialization, edges contracted resulting in predominantly closed wound. **Conclusion**: Chronic wound care is extensively challenging. Full thickness wounds have significant tissue growth or loss from 6 months to time of 100% Epithelialization which can take more than 12 months. Within this timeframe, a myriad of treatment strategies was instituted to keep up with the dynamic changes.

## *Poster for Best Practice on Control and Prevention of Blood Sampling Error*

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In Rashid hospital 2018, had lot of blood sample error incidents which created a delay in differentiate diagnosis, delay in treatment and increase nurse's workload. In 2019, taken as a quality improvement project. In Critical care units, nurses worked together as a team to control the sample error.

## *Knowledge of Greek-Speaking Emergency Health Care Professionals in Cyprus Regarding Ischemic Stroke*

***Christos Rossis, Evangelia Giannelou, Maria Karanikola, Christos Andreou, Nicos Middleton***

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**Background:** Data show that ischemic stroke is one of the leading causes of death and disability worldwide. Knowledge of ischemic stroke-related guidelines is vital for health care professionals working in the Emergency Departments (EDs) because it affects the early diagnosis and timely treatment to combating stroke.

**Aim:** To explore knowledge regarding the recognition and treatment of the ischemic stroke among Cypriot emergency health care personnel.

**Method:** This was a descriptive cross-sectional correlation study. From November 2019 to April 2020 Greek-speaking nurses and physicians employed in 3 private and 7 public EDs in Cyprus were invited to complete anonymously a self-administered questionnaire developed by a multidisciplinary group of experts in stroke based on the latest guidelines (2018) of American Stroke Association.

**Results:** 243 nurses [Response Rate (RR): 74.34%] and 26 physicians (RR; 46.42%) completed the questionnaire. 94% of the participants responded that EDs play an important role in the rapid recognition and treatment of ischemic stroke. Regarding overall knowledge, nurses and physicians reported poor to moderate (Mean: 12.6+4.1; Scale Range: 1-28) and moderate (Mean: 15.7+4) level, respectively. Awareness of IS was higher among physicians ($p<0.001$) and participants with previous education at IS ($p=0.048$) and more years of clinical experience ($p<0.05$).

**Conclusion:** Cypriot health care professionals in EDs reported poor to moderate knowledge about ischemic stroke and further study of factors related with this may be of interest. Also, development and implementation of evidenced-based protocols and enhanced education regarding ischemic stroke should be consider essential interventions for emergency health care professionals.

# Impact of Time of Day and Admission Diagnosis on Pain CPOT Scores in Uncommunicative Critically Ill Patients

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**Background:** Uncommunicative critically ill patients experience pain during their hospitalization in the Intensive Care Unit (ICU) due to the nature of their disease or painful procedures that take place mainly in the morning.
**Aim:** In mechanically ventilated patients, we investigated pain measured on the Critical Care Pain Observation Tool (CPOT): a) before, during and after the turning procedure both in the morning and afternoon and b) differences in pain scores among groups with different types of admission diagnoses.
**Methods:** Prospective, observational study with repeated measures. A total of 1164 observations were carried out. 46 surgical, 37 medical, 30 trauma and 8 burn adult critically-ill patients were followed up for up to 5 days. Pain was assessed by CPOT (Scale range: 0-8, cut-off point>2) just before, during and 20 minutes after turning, twice daily, morning and afternoon.
**Results/ Findings:** During turning: In the morning, CPOT score (Mean+SD) was 1.84+0.84 on the 1st day, 1.91+0.89, 1.83+0.83, 1.68+0.85 and 1.54+1.02 for the next 4 days respectively (p=0.001). In the afternoon, CPOT was 1.82+0.86, 1.82+0.86, 1.61+0.89, 1.46+0.91, 1.43+0.97 on each day respectively (p<0.001). Regarding admission diagnosis, in the morning of the 1st and 2nd day, burn patients had the highest CPOT score (3.00+0.58 and 2.63+0.92) when compared to surgical (1.60+0.74 and 1.57+0.77), medical (1.86+0.85 and 2.06+0.86) and trauma patients (1.89+0.80 and 2.00+0.95), (p=0.001). In the afternoon at the 1st and 5th day, burn patients also had the highest CPOT score (3.14+0.59 and 2.00+0.58) when compared to surgical (1.49+0.64 and 1.11+1.08), medical (1.94+0.87 and 1.43+0.95) and trauma patients (1.83+0.85 and 1.69+0.79), (p<0.001). Before and after turning, both in morning and afternoon, CPOT score was <2.
**Conclusion:** Turning was not associated with severe pain suggesting that the preventing analgesic treatment was sufficient enough. Burn ICU patients may be at higher risk for pain, especially in the afternoon.

# Perceived Barriers to Compliance of Critical Care Nurses with Six Hour Sepsis Resuscitation Bundle

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**Background:** Sepsis and septic shock kills one in four of the millions of people it affects worldwide annually. Eighty percent of admissions to intensive care units (ICUs) are related to severe sepsis and septic shock. Progression from sepsis to severe sepsis in ICU is related to use of invasive catheters and invasive diagnostic procedures. Compliance to the six-hour sepsis resuscitation bundle is related to six times improved survival. However, studies have revealed low compliance to the six-hour sepsis resuscitation bundle in resource limited settings.
**Aim:** Aim of this study was to identify barriers that hinder compliance of critical care nurses to the six-hour sepsis resuscitation bundle.
**Method:** A cross sectional descriptive research design was utilized to carry out the study. Data was collected from a convenience sample of 40 critical care nurses using a self-administered questionnaire.
**Results:** Insufficient knowledge and lack of awareness of the six-hour sepsis resuscitation

bundle, delayed recognition of sepsis and burden of caring for several patients were identified nurse related barriers. Organizational related barriers identified included shortage of critical care nurses, lack of trainings, variations in expertise, prolonged laboratory turnaround times, lack of work place library and delay in diagnosis. Heavy task load for septic patients and multiple comorbid conditions were identified patient related barriers. Overall organizational barriers were highly associated with low bundle compliance.

**Conclusions:** Addressing organizational barriers will lead to improved bundle compliance therefore improved survival to discharge for sepsis and septic shock patients.

## *Knowledge of Greek-Speaking Cypriot Emergency Care Nurses on Early Recognition and Management of Sepsis*

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**Background:** Sepsis is associated with increased morbidity and mortality. According to Sepsis 3 International Guidelines, sepsis treatment should start in the Emergency Departments (EDs) but sepsis first needs to be recognized early. Emergency care nurses are among the first health care workers responsible for the recognition and management of early signs of sepsis in patients presenting to EDs.

**Aim:** To evaluate knowledge regarding the recognition and treatment of sepsis among Greek-speaking Cypriot emergency care nurses.

**Methods:** A descriptive cross-sectional study was conducted between July and August 2018 in 5 public and 2 private hospitals in Cyprus. A convenience sample of emergency care nursing personnel were invited to complete anonymously a self-administered two section questionnaire. Section one included 10 socio-demographics questions and section two included 24 questions regarding recognition and management of sepsis. The questionnaire was developed by a team of experts in sepsis using the Delphi method and based on the Sepsis-3 International Guidelines (a=0.89).

**Results/Findings**: 225 nurses participated in the study (Response rate: 88%). 50.7% of the participants described their level of knowledge as moderate as their actual knowledge score was (Mean: 12.6+4.5; Scale Range: 1-24). The question with the highest percentage of correct answers was about sepsis definition (93.8%), and the one with the fewest correct answers was about the levels of lactate acting as an indicator of sepsis (21%). None of the participants had answered all the questions answered correctly. The overall knowledge was higher among nurses with previous education at sepsis ($p=0.005$).

**Conclusions:** Findings demonstrated that emergency care nurses appeared to have a moderate level of sepsis awareness. Educational programs are needed to address the gaps in this area.

# *International Journal of Critical Care*

**The Official Journal of the World Federation of Critical Care Nurses**

## Call for Papers

*The International Journal of Critical Care* is seeking manuscripts on topics of interest to critical and emergency care nurses and allied health practitioners around the world. We accept a variety of papers. We are particularly keen to receive evidence-based articles that inform policy and practice, integrating health and nursing research into clinical practice. Such articles include but are not limited to clinical and basic research studies; articles that address noteworthy advances in critical and emergency care; scholarly reviews; case reports; education related to critical care practice; letters to the editors; reflections of practitioners and individuals with a critical illness experience; and information about developments of member organizations of the World Federation of Critical Care Nurses (WFCCN).

Topical areas for articles include but are not limited to:

- Clinical care
- Research
- Pharmacology
- Transitions of care
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- Emerging infectious disease and inflammatory conditions
- Healthy work environment
- Technology use in patient care
- Innovative and new approaches to the care of critical and acute care patients
- Systems- or role-related topics of interest to advanced practice nurses or experienced clinicians
- Promoting EBP in critical care and acute care nursing and nursing–system structures, including review articles
- Use of genomics data to care for acute and critically ill patients
- Care of acute and critical care patients on the ends of the age spectrum
- Cultural aspects of critical care
- Patient and family perspectives

Please see the website for author guidelines.

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# Photo Contest

Capture pictures of your colleagues, patients, and families to submit to the International Journal of Critical Care (IJCC), the Official Journal of the World Federation of Critical Care Nurses (WFCCN). Outstanding photos may be shared on the WFCCN website and in the IJCC. We are specifically looking for our cover photo for 2023.

Submission Requirements

- The photo should convey the spirit of critical care or emergency nursing.
- Submissions should be in electronic (JPEG, TIF, GIF) format.
- A short description of no more than 50 words (including all photo subjects' names and genders) must accompany each photo submission.
- A signed permission form from each person (patient, family, or nurse) must accompany the submission of each photo.
- All submissions become the property of WFCCN and IJCC and may be shared widely throughout WFNN/IJCC media.
- Send all submissions to papathan@ualberta.ca by November 31, 2022.