INPLASY PROTOCOL

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None declared.

Uni-and multimodal sensory-supported interventions for very preterm and extremely preterm infants in the NICU: An overview of systematic reviews and interventional studies

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Review question / Objective: **To understand the current evidence for sensory-supported interventions in the NICU, identify different components included in these interventions and determine their effects on the VEPIs.**
Condition being studied: **Very and extremely preterm infants (VEPI) experience the sensory deprivation. Various sensory-supported interventions used in NICU may positively impact the immediate physiological response, but unclear for long-term developmental progression. Further, these interventions may not appropriate for VEPIs, due to complex treatments and continuous monitor in the NICU.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 10 December 2022 and was last updated on 10 December 2022 (registration number INPLASY2022120043).

INTRODUCTION

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METHODS

Participant or population: The participants included preterm infants born before 32 weeks' gestation.

Intervention: Visual stimulation, auditory stimulation, tactile or cutaneous stimulation, position or movement support, and multi-sensory stimulation.

Comparator: Standardard care, routine care and so on.

Study designs to be included: This review included systematic reviews, and randomized controlled trials, that involved at least one of the five common NICU interventions. Qualifying interventions included visual stimulation, auditory stimulation, tactile or cutaneous stimulation, position or movement support, and multi-sensory stimulation. The participants included preterm infants born before 32 weeks' gestation. Peer-reviewed articles published in English between February 2016 and September 2022 with the full text available were also included.

Eligibility criteria: Three search categories were used, and the search terms included: (1) infant, prematurity, premature, preterm, newborn, baby, babies, neonate, neonatal, very low birth weight, or low birth weight; (2) NICU, intensive care, newborn intensive care, environmental, or environment; and (3) terms regarding the five intervention domains, such as visual, auditory, tactile/ kinesthetic, position or movement, sensory stimulation or training, and instrument or device. These terms were all searched under Titles or Abstracts and then combined using Boolean operators; (Category 1), (Category 2), and (Category 3) with "premature" as a general medical subject headings term (Supplementary File 1). The literature search results are outlined and discussed in the results section.This review included systematic reviews, and randomized controlled trials, that involved at least one of the five common NICU interventions. Qualifying interventions included visual stimulation, auditory stimulation, tactile or cutaneous stimulation, position or movement support, and multi-sensory stimulation. The participants included preterm infants born before 32 weeks' gestation. Peer-reviewed articles published in English between February 2016 and September 2022 with the full text available were also included. Articles regarding disease or treatment impact on preterm outcomes were excluded.

Information sources: The following databases were systematically searched: PubMed, CINAHL COMPLETE (EBSCO), EMBASE, Web of Science, Scopus, Cochrane, Cochrane trial, Institute of Electrical and Electronics Engineers Digital Library (IEEE Xplore DL), and Association for Computing Machinery Digital Library (ACM DL). Moreover, we also conducted a focused gray literature search to identify clinical guidelines and recommendations from experts in NICU settings for device design considerations. The search was carried out in December 2021 and repeated in September 2022.PubMed, CINAHL COMPLETE (EBSCO), EMBASE, Web of Science, Scopus, Cochrane, Cochrane trial, Institute of Electrical and Electronics Engineers Digital Library (IEEE Xplore DL), and Association for Computing Machinery Digital Library (ACMDL).

Main outcome(s): Twenty three systematic reviews and twenty two intervention studies were included. Eligible papers were included and classified as auditory (n=15), tactile/kinesthetic (n=5), position or movement support (n=7),visual (n=1), and multi-sensory supported interventions (n=13). The efficacy of unimodal (visual, position, auditory, tactile/kinesthetic) or multimodal sensory-supported intervention showed partially effect in short-term period, but controversial in long-term outcomes for the infants. The gaps of sensory-supported interventions are identified and challenge to translate the evidence to clinical practice.

Quality assessment / Risk of bias analysis: Quality assessment for included studies was undertaken independently by two reviewers (TS and SB), and discrepancies were resolved by agreement. Meanwhile, TX and ZY confirmed all the information. The methodological quality of the systematic reviews was appraised using AMSTAR 2(Shea et al., 2017) . There are 16 items including PICO components, comprehensive search strategy, appropriateness of meta-analytical methods, e.g. Each review is rated as high, moderate, low, or critically low based on the number of critical flaw and non-critical weaknesses (Supplementary File 2). Only one systematic review was rated as high quality, two systematic reviews and one systematic review with meta analysis were rated as moderate quality, and the majority were rated as low (4 systematic revises & 2 systematic reviews with meta analysis),or critically low quality(11 systematic reviews & 2 systematic reviews). The methodological quality of the intervention studies included in this review were appraised using the Clinical Appraisal Skills Programme instrument (CASP) and are summarised in Supplementary File 3. Each item was scored (1 for 'yes', 0 for 'no' or 'can't tell'), and a total for each study was converted to a percentage. Studies that scored from 0% to 33.9% were considered weak(n=3), 34% to 66.9% were considered moderate (n=19) and 67% to 100% were interpreted as strong (n=3). three studies were assigned a low-quality ranking, and therefore, they were excluded based on methodological quality.

Strategy of data synthesis: An overview of evidence was conducted to provide information with respect to sensory-supported interventions for the VEPIs in the NICU. Search of nine electronic databases (PubMed, EBSCO, EMBASE, Web of Science, Scopus, Cochrane, Cochrane trial, IEEE Xplore DL, and ACM DL) was initially conducted in Dec 2020 and repeated Sep 2022.

Subgroup analysis: TS and ZY independently extracted data from the eligible systematic reviews. The following data were included: author, year of publication, type of review, time range, number of studies, participants and their characteristics, intervention description and results, comments, and limitations (See Table 1). TS and SB also extracted data from interventional studies (not included in above systematic reviews), including first author, year of publication, country, the study's aim, study type, participants' characteristics, intervention description, comparison procedure, and the main findings (See Table 2). TX and ZY confirmed all the information.

Sensitivity analysis: No sensitivity analysis

Country(ies) involved: China.

Keywords: Literature review; Multimodal sensory-supported device; NICU; Preterm infant; Sensory stimulations.

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