



Reviews

Performance of an occupational therapist in a neonatal intensive care unit

Desempeño profesional del terapeuta ocupacional en la Unidad de Cuidado Intensivo Neonatal

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Abstract

Background: The following article constitutes an effort to make explicit an experience in neonatology within the framework of the exercise of occupational therapy, a discipline belonging to the health sciences. The occupational therapist (OT) in the Neonatal Intensive Care Unit in which he participates in an interdisciplinary health group. Exalts the interaction of person-environment-occupation-performance. Encourage self-regulation of the baby. Encourages family participation in co-participation in routine activities.

Objective: To determine the realities and knowledge about the practice of OT in the Neonatal Intensive Care Unit (NICU) by the occupational therapist in the interaction between the baby, the occupation, the caregivers and the environment of the NICU.

Methods: A systematic exploratory review of the performance of the OT in the NICU was made.

Results: The results transcended the thematic variables, the theories, the methods, the approaches, the characteristics of the baby, the occupations, and the contexts of the management of the premature baby.

Conclusion: The education in concepts concerning the occupation of the baby, the interaction with her/his environment and her/his caregivers, the procedures, the guide for the stimulation as the modification of the physical, temporal and social environment facilitate the self-regulation of the baby and we will all be working in pro of your recovery.

Resumen

Antecedentes: El siguiente artículo constituye un esfuerzo por explicitar una experiencia en neonatología en el marco del ejercicio de la terapia ocupacional, disciplina concerniente a las ciencias de la salud. El terapeuta ocupacional (TO) en la Unidad de Cuidado Intensivo Neonatal como parte del grupo interdisciplinario de salud exalta la interacción de persona-ambiente-ocupación-desempeño. Fomenta la autorregulación del bebé. Alienta la participación de la familia en la coparticipación en actividades rutinarias.

Objetivo: Determinar las realidades y conocimientos sobre la práctica del TO en la Unidad de Cuidado Intensivo Neonatal (UCIN) del terapeuta ocupacional en la interacción entre el bebé, la ocupación, los cuidadores y el entorno de la UCIN.

Métodos: Se hizo una revisión exploratoria sistemática del desempeño del terapeuta ocupacional en la UCIN.

Resultados: Los resultados trascendieron las variables temáticas, las teorías, los métodos, los enfoques, las características del bebé, las ocupaciones, los contextos de la gestión del bebé prematuro.

Conclusión: La educación de conceptos concernientes a la ocupación del bebé, la interacción con su ambiente y sus cuidadores, los procedimientos, la guía para la estimulación como la modificación del entorno físico, temporal y social facilitan la autorregulación del bebé y todos estaremos trabajando en pro de su recuperación.

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Remark

The following article constitutes an effort to make explicit an experience in neonatology within the framework of the exercise of occupational therapy, a discipline belonging to the health sciences. An occupational therapist in a Neonatal Intensive Care Unit with an ecological practice approach participates in an interdisciplinary health group. The therapist enhances the person-environment-occupation-performance interaction, encourages the baby's self-regulation and family participation in co-participation in routine activities. The article aims to reflect on the trajectory of the role of the occupational therapist in the interaction between the baby, the occupation, the caregivers, and the neonatal intensive care unit environment. A systematic exploratory review of the performance of occupational therapists in neonatal intensive care units was carried out. The results transcended thematic variables, theories, methods, approaches, characteristics of the baby, occupations, and contexts of the management of premature babies. Finally, it is concluded that in order to facilitate the baby's self-regulation and teamwork aimed at the child's recovery it is necessary to be able to access education related to concepts concerning the occupation of the baby, the interaction with his/her environment and his/her caregivers, the procedures, the guide for the stimulation as the modification of the physical, temporal and social environment.

Introduction

The World Health Organization¹ Guidelines stipulates that the assistance given to premature babies who are at risk due to their health conditions need of follow-up sessions guided by the application of theories, approaches, techniques, and methods. One of the most remarkable is the *Sinactiva* theory², which considers that all human beings have a rich interior life that must be supported in order to develop and prosper otherwise it will be frustrated due to the lack of care, opportunities and the environment surrounding them. The Neonatal Individualized Developmental Care and Assessment Program (NIDCAP)³⁻⁵ is derived from this theory, as well as the development centered care⁶, the family centered care⁷, and it is based on the follow-up and control of premature babies and their families, and the process of acquiring abilities for life. The approaches focused on neurodevelopment⁸ and sensory integration⁹ strengthen and dynamize the effects of interventions in the area of health.

Due to the variety of concepts and approaches in which the practice of health professionals of the neonatal intensive care unit (NICU) is based, in order to determine what the work of the occupational therapist (OT) should be, an exploratory revision was performed which facilitated the knowledge of recent ideas on what has been done, how it has been done, allowing us formulating hypothesis and identifying those aspects that were studied with much detail to identify key concepts, theories, and sources of evidence, such as the type of questions, what strengths and challenges we face in our work and the inclusion of concepts from teams that intervene in the NICU¹⁰.

Materials and Methods

The contents of the bibliographical references found was analyzed, starting with validated and reproducible inferences that could be applied to the performance of the OT in the context of the NICU. The topic was divided into units in order to categorize and

interpret the data as it was. Such data as conceptual references, processes, history, tools and strategies was analyzed and in so doing, we could highlight and describe some particularities in order to reformulate and generate a complex corpus of knowledge with a harmonic sense for the professional community that works in this clinical area of the profession.

The following were the biomedical data bases used: Cochrane Library, LILACS, IBECS, EMBASE, ACCESS MEDICINE, MEDLINE (Medical Literature Analysis and Retrieval System Online), SciELO (Scientific Electronic library Online), Redalyc, PUBMED, Scopus, Dial net, HHS Public Access, Sciencedirect. Original articles were included whose content complied with the objective: to determine the realities and knowledge on the practice of the occupational therapist (OT) in the NICU and the interaction between the baby, the occupation, the caregivers and the environment of the NICU where realities and knowledge on the practice of occupational therapy in the NICU will be formulated.

The key words: MeSH, infant, premature, diseases, premature birth, extremely premature, and DeCS defined the verification in the descriptors of the health sciences: neonatology, occupational therapy in neonatology, the role of the occupational therapist in the NICU, the development centered care and the occupational therapy, the family centered care and the OT. Also included were magazines focused on the performance of the occupational therapist, such as: The American Association of Occupational Therapy, and those from the associations of Australia, Galicia, Chile, Argentina, Great Britain, Canada, and Japan which publish the majority of articles about the profession. We also included magazines on pediatrics and neonatology that provided basic knowledge on the interaction with occupational therapy.

Health professionals that assist premature infants at the neonatal intensive care unit**Conceptual references**

Developing the bases for the professional knowledge (researching to know what to do in the practice as therapists) is an exhaustive scrutiny of what it is known and how that knowledge about sample for study was acquired, the manner in which we could validate that knowledge through evidence. It is the building of a careful process, well elaborated, in which the parameters on what it is done that have been more or less agreed upon are complied with. It is applying instruments with standardized guidelines and clinical interventions on children, their parents and the professionals who intervene to measure their efficiency and identify what situations need correction¹¹.

In order to know the sample for the study, it was found that there is a group of babies who due to an illness or a situation present disadvantages impeding their complete participation in their context, according to the National Institute for Health and Care Excellence¹². They are premature¹ and born too soon¹³. Currently the newborns of risky pregnancies survive more frequently as a result of advances in obstetric, neonatal and technological care¹⁴. These newborns at risk demonstrate immaturity in different corporal structures and in their functions, in the areas of occupational performance, the development of abilities, in the occupational activity in interaction with the environment-context affecting their personal and social participation and it could become a barrier for performing activities that are purposeful and meaningful for daily life^{15,16}.

Performing careful processes

Due to the infant's fragility, the vulnerability of their families, the complexity of the medical and social factors that affect them, the health professionals dedicated to the care of newborns at risk guided by world organizations, neonatology associations¹³ assist those babies with an interdisciplinary or transdisciplinary focus^{17,18} in which each professional guided by their profession own proper standards provide an assistance with expertise in a specialized, timely, individualized and flexible manner, based on knowledge, advanced capacities and abilities minimizing risks or developmental disorders.

Knowing their interventions and therapies, but most of all, knowing the subjects and the group receiving that intervention, it is more evident the contributions made by the interdisciplinary approach. If therapists maintain only a reduced vision of their own disciplinary approach, they assume that these newborns have a physical or health condition resulting from natural causes and won't conceive the intervention for this population as bio-psychologic-cultural beings. This means that it won't transcend the interpretation of the occupational realities through the critical analysis offering different theoretic possibilities of interpretation for the occupational phenomena⁹.

The occupational therapy professionals have a unique set of abilities to contribute to the flexibility and integrity in the management of the premature infant^{19,20}. Based on the educational standards that improve the international professional profile proposed by the World Federation of Occupational Therapy²¹ (WFOT) and the American Occupational Therapy Association (AOTA)²², and the conceptual practical orientation on the functions of the occupational therapist in neonatology where the development of intervention of OT in the NICU is explained^{19,20}, besides the different occupations involved in the NICU, in addition to the guidelines proposed for the intervention²³ these educational standards promote the education and understanding²⁴, and finally, the requirements of knowledge and the abilities for the practice²⁵.

To be precise about the practices, the proposal made by Kinney²⁶ is revised. Such proposal starts with the concept of the co-participation managed in the interdisciplinary proposal and in the formulation of the Sinactiva²⁷ theory which increases the knowledge on the most vulnerable newborns and their families and makes sure that the opportunities they have would allow them accomplish their potential in order to lead a satisfactory life.

According to commentaries made by Maltese², Dunn *et al.*²⁸, the theory of Synactiva teaches an individualized approach, it describes the newborn as a being having the capacity to organize and control

his/her conduct. It points out that "the child learns about him/herself in his/her environment and finds the way to satisfy his/her needs". The premature infant who is developing in an unusual environment and who has had less time for the neuro-development in a controlled environment is vulnerable to the sensory stimuli of continuous exposure because they are not neurologically ready to receive an overdose of sensory stimuli. Table 1 exposes the elements of the newborn conduct in the NICU.

On the other hand, Als²⁷, pioneer of the assistance during development, expresses that the intrauterine sensorial experience is dangerous for premature infants for the neurological structure of the immature brain. Based on the concepts presented in the Synactiva theory, it was created the approach for the assistance in the NICU on part of the RN and its individualized development called "development care". For this reason, the evaluation program NIDCAP⁴ is focused in improving the comprehension of the caregiver in self-regulated capacities for the infant is based in observing the baby's conduct as communication in itself. This program is centered in the skills and strengths of the individual infants. It is focused in the integration and modulation of the sensory system and supports all the infant's care givers: parents and professionals. This program takes into account the autonomous motor system, the states of awareness, attention and interaction, and the self-regulation as it is described in Table 1 (The definition of each one of them).

Starting from the synthesis and the growing of the Synactiva theory, concepts that have been recognized as approaches in the NICU are consolidated. Such concepts are: NIDCAP, development centered care, family centered care, neurodevelopment and sensory integration. Each one of these contains compatible elements, they have the same bases, methods and tools and they are interrelated. The analogy between the Sinactiva theory and the intervention of OT are described in Table 2.

The NIDCAP³⁻⁵ derived from the Sinactiva theory, starts with observation of the infant's response to the care procedures. Based on this, individualized recommendations and strategies are contributed for his/her care. These recommendations support the physiological stability of the infant as well as his/her self-regulation and the organization of his/her behavior Compatible with the NIDCAP, the OT centers its performance in the interaction of the autonomous, motor systems, the organizational state, the attention interaction and the regulatory subsystems among themselves and with the environment context according with the ecology and the human performance^{28,29}.

Table 1. Newborn conduct in the NICU

Newborn conduct in the NICU	
Motor	Measures muscular tone, movement, activity, and posture
Autonomous	Measures skin color, cardiac frequency, and respiratory pattern
States of consciousness	Categorizes the level of the central nervous system as far as awareness, sleep, awakening, cry, demonstrating the strength and modulation of his/her states and patterns of transition between each of them.
Attention interaction	Capacity to interact with the environment.
Self-regulation	Measures efforts to get balance using other subsystems.

Source: Vergara *et al.*²⁹.

Table 2. Analogy relating the Occupational Therapy with the theory of Synactiva

Infant's activities	Activities with sensory visual components: audio, oral, tactile, proprioceptive, vestibular. Daily activities of feeding, sleep, and rest
Infant's factors	Self-regulation Tone, strength, resistance, posture control, oral control State of awareness, modulation, transition of states Visual, auditive, and developmental skills
Contextual factors	Physical context: level of activity, connection, modulation Social context - Cultural (caregiver). sensibility, compromise, willingness, number Temporal context: rhythm, routine, medical needs

Source: Als²⁷

The following are the approaches being taken into consideration: the developmental care^{30,31}, similar with the performance of the OT, it favors the process of neurodevelopment and its main characteristic is the individualization of the RN care starting from observation of their conducts, the propagation of a standardized instruction method, the availability of an environment that supports the participation of the newborn and his/her family in the expected activities which favors the reduction of environmental stress factors as well as improving the micro-environment (light, sound, movement, position, tact, calmness, and physical support) to maintain an optimal tone and a quiet and refreshing sleep in a relaxed, comfortable or vigilant environment³²⁻³⁷.

Another approach is that of family centered care³⁸⁻⁴³. It is also compatible and similar, since with this approach the actions in the macro-environment are shared. The intervention rotates around the parents so they can recognize their children behaviors and get integrated in their care ruled by the principles of closeness to the family and participation of the newborn care and on the other hand, around the professionals in the participation in interdisciplinary work and in the change of attitudes, in the processes and in each profession own dominium⁴⁴.

The next approach is that of neurodevelopment^{8,30,32}. It legitimates the fact that a stable and adequate infant posture favors the correct perception and a variety of stimulus for the future planification and motor coordination. The OT shares this approach with other rehabilitation professionals in order to reach self-regulation and organization in the transition of movement, the posture alignment that provide the entry to sensory stimuli and help the infant mature at the motor, perceptive, and sensorial levels⁴⁵.

As part of the therapeutic tool, the occupational therapist uses the sensory integration approach^{9,46-48}. He/she assumes that the capacity of the infant to process the sensory impulse and integrate it with another sensory information serves him/her to use that capacity for adaptive purposes to improve his/her skills of performance, if and only if the environment would offer him/her the type or the adequate quantity of sensory experiences⁴⁹.

As it is evident in the complex environment of the NICU, the intrinsic importance of the specialized medical assistance is highlighted as well as the hyper-technical and the interaction of inter and multidisciplinary teams. The team's participation is based on the concepts of individualized assistance centered in the family and they take responsibility for coordinating the practice evaluation to comply with the parameters of developmentally oriented assistance, insisting in having the appropriate environment for the infant and his/her family^{17,18}.

The OT as part of the interdisciplinary team establishes identity in the discipline (it does not have to be exclusive or excluding) and it differs from others in that the popular imaginary tends to be materialized with occupational therapy. It bases its interventions on concepts and practices defined by the WFOT⁵⁰ and the AOTA⁵¹ that establish that "the profession is centered in empowering and facilitate the participation of persons or groups in taking roles, habits, and routines at home, at school, at the workplace, and at the community through the occupation. It centers the therapeutic use of activities of the daily life (occupations) with individuals or groups in order to empower or facilitate the participation". This is coherent with the principles of the international classification of functioning and handicap (ICF)⁵² mentioned by the WHO, but also in situations closer to neonatology, based on the model of the person, occupation, and environment (POE)^{53,54} in which attention to the nature of occupational performance is given starting from the dynamic and interactive relation of the person (infant, family) with the components and the areas of yielding (co-occupation, adaptation, communication skills) and the environment as a critical factor in the human performance (physical, social, cultural, and temporary) that influences the behavior and the occupation⁵⁵.

The historical roots found the development of knowledge, attitudes, and practices of the being, doing and feeling of the occupational therapy

The professional performance of the OT in the NICU has led a trail through time and space. This allows having an understanding of the conceptual and practical configuration, consolidating the performance of the OT in neonatology, recognizing the infant's development, his/her occupation in the context in which he/she is developing, the interaction with the family, identifying the contributions made by interdisciplinary groups in the research, and registering the influence in the social and labor contexts.

Taking into account the historical trail, Gorga⁵⁶ taught the developments in the occupational therapy practice for hospitalized children in a NICU. She mentions the representatives of each event or epoch. In her writings, it is summarized the beginning of how the approaches are applied in the treatment for medically stable infants with developmental handicaps and their families in the intensive care unit environment.

During the 1980s, it came to be known specifically the beginning of the application of the Sinactiva theory. It was when practices were beginning to be modified according to the guidelines of development to examine the effects of manipulation on children and the therapy could be integrated to the plan of nursing care.

It was specified if the benefits overcame the risks, if the changes could be measured and if they contributed to the results. Vergara *et al.*^{19,20}, recommended that the therapy were centered on nursing infants and oriented to the parents to whom it was taught the specific skills such as feeding, and an easy transition from the NICU to the home environment was facilitated.

At the end of the 1980s and the beginning of the 1990s, the paring of therapists and parents was established as a movement of collaborative interchange or society. It was specified that as long as the concepts of collaboration, communication, and empowerment were applied, they could guide the way for the near future. Also Schfsky⁵⁷, Cui *et al.*⁵⁸, and Ross *et al.*⁵⁹, define the guidelines that a neonatal therapist requires as part of the personnel of the NICU at an assistance III or IV levels that includes assistance to infants at any gestational age at birth with medical and complex surgical needs. They define the roles of the OT in the NICU and the use of different therapeutic interventions performed on nursing infants at high risk at the NICU. They express that due to the vulnerability of the premature infants, the therapist based in the NICU need advanced skills to optimize the infant's results at the same time that they understand and are adapted to the medical interventions that occur simultaneously with the therapeutic ones.

Tools for the intervention of the occupational therapist facilitate the interpretation of their usage

Up until now it has been presented the revision about the approaches, methods, and theories that the occupational therapist uses in the NICU as tools for intervention. Starting from this intervention it is understood that the movement, organization of the muscular tone, the activity and posture help the infant's self-regulation. The effort the infant makes to get balance in the organization activities as well as the attention-interaction manifests his/her capacity to interact with the environment. The neuro-regulatory capacity of each child guides the interventions geared towards optimizing the results of the neurological development^{20,28}.

The OT in neonatology, a participant of the interdisciplinary group^{17,18}, is guided, as it was already announced, by the standards determined by the WHO¹, AOTA⁶⁰, and those proposed by Adrados⁶¹ and Vergara *et al.*⁶². He/she employs specific approaches treating the infant as a singular being that acts with physical, cognitive, affective, and individual factors manifested in a range of abilities that consciously interact with the temporal, social,

cultural, and physical environment in which the infant develops. Such factors are described in Table 3.

According to what is represented, the OT recognizes the infant as an occupational being who performs activities, is an active co-participant of action patterns that emerges from the interaction of the child with the environment. Kathleen⁶³ considers these occupations as "the tasks and activities that are valued whether in the family culture or in the NICU, and in which it is expected the child to participate". "The occupations are activity patterns that emerge from the interaction of the child with the environment". This way, it could be established that the occupational performance is the occupation of the infant in tasks and activities that are expected whether by the family or by the NICU personnel and in which there is an idea that becomes synchronic between the co-occupational experiences of the infant and those of the caregivers. This thought induces the occupational therapist to couple the newborn nature with adaptations and modifications in the infant, the caregiver in the environment or the objects inside the NICU⁶⁴⁻⁶⁶.

Then, the OT uses a transactional relation between the newborn, his/her activities, his/her valued occupations and his/her context and manages therapeutically the daily life activities because he or she observes the state of organization with which interacts as Hunter *et al.*²³, explains. The OT empowers or facilitates the participation of the caregivers in the creation of habits and routines and the sensory interactions as well as the modulations of sensations, of the space and objects as tools^{67,68}.

It is for the above mentioned that the role of the OT in the neonatology services is geared towards the intervention and research on the acquisition and preservation of abilities of those newborns that have or are at risk of developing a disease, a lesion, a deficiency, a handicap, a limitation of activity or restriction from participation, involving the relatives⁶⁸⁻⁷⁰.

Retaking the systematic revision of the articles aiming towards the actualization of contents and concepts, it was found that the OT interventions in neonatology are not rules nor prescriptions, they are individualized specific actions for each child at every moment. Part of the observation of the infant response to the changes or suggestions is having the responsibility, first and foremost, of preserving the neuro-behavioral and physiological stability actively involving the family to the health care team. This is done with the objective to influence the present and future quality of life of the child and of his/her family as they face situations they most confront⁷¹⁻⁷⁴.

Table 3. Inter-related factors in the occupational performance of the newborn

DCC (development centered care)	Immediate surroundings Moment, sequence, and adaptation during care Support for self-regulation during rest Support for self-regulation during care Appropriate sensory experiences according to development
FCC (family centered care)	Unit environment Communication Participation in care
Neurodevelopment	Provides sensory-motor experiences Promotes the development of normal movements Development of postural patterns

Source: Vergara *et al.*²⁰

Methodological strategies and techniques used by the ot in his/her occupational performance

Here an approximation is made to the fact that strategies and technics of recollection and production of data are working around the nature of the premature infants. From the observations made to describe data from the talks or interviews done to determine an occupational profile, it is aimed at the meaning the professionals give to health, the standardized guidelines to measure the occupational performance of the newborn and his/her family, and the techniques used in their interventions and research^{75,76}.

Since many newborns are examine by professionals knowledgeable about infant development, those who are involved in the diagnosis and interventions should recognize that besides the medications, there are other approaches proposed by other disciplines such as OT. They propose games and ludic activities as ways of stimulating the senses and promoting social skills, movement control, and cognitive development. To that end, it is important to document the intervention and impact this have on the infant and his/her family⁷¹⁻⁷⁶ routine daily life.

In order to develop his/her practice in the NICU, the OT needs to know about the conditions, medical procedures, and vulnerabilities of the newborn. In addition, he/she will recognize an understanding of the individualized developmental skills, the competencies of the neonatal^{19,20} neuro-behavioral organization theories, the family life, the principles of socio-emotional development, and the team work, among others. This is the only way in which the OT could comprehend how these factors interact to influence the newborn performance. According to what is mentioned, the thinking, doing, and being of the OT in neonatology ranges from the secondary prevention through the detection to the diagnosis. Among these components of action there is knowing the believes, the cultural practices, health needs, occupational opportunities, political systems, ideologies and images behind the medical or clinical interventions⁷⁶.

During the evaluation / intervention, the OT keeps in mind the neuro-behavioral organization, the sensorial development and process⁷⁷. On the other hand, he/she considers the refer motor function at a posture level respecting the flexor pattern of arms and legs moving together to the center of the body, giving the characteristic fetal position in a symmetrical manner or corporal mechanics. The OT uses nests and rolls for comfort, contention, extreme stability, favoring the flexor posture and avoiding cranial deformities. Similarly, he/she takes into account the daily activities (feeding, clothing, changing dippers, transferring, transition states, sleeping) as well as the socio-emotional development⁷⁸⁻⁸⁰.

As far as the family is concerned, its systems continue, thinking on the learning styles for adults, expectancy, cultural growth expectancy, parent-children interactions as well as the role of the father during the hospitalization, the family centered informed care and what it is more important, the transition of the infant from the hospital to his/her home⁸¹.

A key aspect is the environment⁸²⁻⁸⁴.

In the sensorial environment five types are considered:

- Tactile; synchronization, intensity, texture, management for procedures, and interaction with parents. The tactile proprioceptive gives a facilitating impulse for self-organization.
- Proprioceptive-vestibular: synchronization, intensity, texture, management for procedures, and interaction with parents. (hammocks, balance of the infant in his/her mother's lap)
- Specific olfactive, taste experiences in the NICU (time, quality, and intensity)
- Auditive: intensity, duration, time, animated Vs. inanimate
- Visual: Temporization, environment and intensity of focal light, content and visual field.

Social environment in which parents and infants, extended family members and babies, personnel and babies; parents and personnel; occupational therapist, parents, personnel and infants are identified.

The physical environment is formed by the teams and medical procedures; the frequency, time, duration, quality and intensity of sensory information of doctors, team and procedures; the sensory information of the teams, procedures and personnel activities that are harmful for the neuro-behavioral organization.

The cultural environment refers to the philosophy of specific care in the NICU, including its particular orientation towards the acute and chronic care of the infants; the roles, functions, attitudes, and the position of the team members in the structural organization of the individual NICU; the influence of stressful factors of the NICU, the communication and structure patterns, both formal and informal among the personnel members and between the family and the personnel; rules of conduct explicit and non-explicit; the effect of the physical and social environment in the personnel performance and moral and the humanization of the NICU (incubator with personal elements and family souvenirs).

Table 4. The techniques: reduction of environmental stimulation. Sensory unimodal stimulation

	Reactions to assistance/interaction
Facing signs of stress, suspend intervention. One sensory stimulation at a time. Soft lights	Keeping intervention when facing signs of stress. Interaction under inadequate conditions. More than 1 sensory stimuli at a time.
Keep the infant covered or dressed. Visual stimuli at 30-40 cm from sight. Eliminate unnecessary stimuli. Facilitate hand-mouth or pacifier activity. Posture in flexion. Give support and stability. Intervention RN in awareness.	

Source: Sardá⁸⁵

So being, one integral part of the process of occupational therapy is the therapeutic use of oneself and this makes possible to develop and manage his/her therapeutic relation through the use of the narrative and the clinical reasoning (empathy and a collaborative approach). Through the use of interpersonal communication techniques, the power of the relation is displaced so that the families would have a greater control in the decision making and problem solving. These are essential aspects for an efficient intervention^{83,84}.

Summarizing, in order to identify the treatment interventions used inside the NICU by the OT, an example of Sardá was taken. He presented some forms of making interventions with newborns at high risk that could be a guide for the approach. Table 4 announces the techniques for the discussion of environmental and unimodal sensory stimulation⁸⁵.

Conclusions

The previously exposed represents the general vision of the requirements for the OT approach in neonatology.

Regarding the development of premature infants, it is considered that if the individual needs are not stimulated in a long run, the damages will be evident. Such damages could be: the capacity for praxis, imitation, sequencing, and construction; the motor skills, the cognitive capacities, such as perception; processing abilities (capacity of organizing actions in an opportune and safe manner) and the capacities of emotional regulation that could affect the ability to efficiently respond to the demands of occupation with a range of emotions.

Consequently, beyond the reference model centered in the conventional problem of handicap, the OT make a valuable contribution to the newborn care because they center in the power of commitment with the occupation and to the support of the parents in the infant's care in order to accomplish positive results for the family and the caregivers.

It is a change of attitude from **“we are the experts and we know what is best for the patient”** to **“we will do it with you”** Zarubi *et al*⁸⁶.

If we understand the interdisciplinary concept as a dialogue and interchange of techniques, concepts and researching methods among different disciplines, the OT, without losing his/her identity, does not have a problem in grasping the heuristic tools from other disciplinary fields for the research work. The intervention of the OT in the NICU is a collaborative practice in which it is demonstrated at the same time respect and support to the functions of other people and the disciplines in the lives of the newborns.

Knowing the nature of the social, cultural structure, believes, cultural practices, health needs of relatives and health professionals provides occupational opportunities relevant to the interactions of the OT that are behind the medical or clinical interventions.

Sharing our experiences, successes and errors, difficulties and wrongs, generating and validating instruments, standardized guidelines and clinical interventions, measuring its efficacy and identifying situations to be corrected presents us as “active researchers” that teach not only what has been done, but also what

is being doing and what can change. Counseling and orientations based on real research experiences could contribute to the “how” to face to the process of research starting from the documented observation, the interventions, its impact in propagating and publicly communicating. This way, we are building history and practices of the OT in neonatology is a symbol for formulating the practical and transforming character of the occupational praxis.

Conflict of interest: Ninguno

References

1. OMS. Nacimientos prematuros. Nota descriptiva: 19 de febrero de 2018-World Health. Accessed: 20 February 2018. Available from: www.who.int/mediacentre/factsheets/fs363/es/
2. Maltese A, Gallai B, Marotta R, Lavano F, Lavano SM, Tripi G, *et al*. The Synactive theory of development: the keyword for neurodevelopmental disorders. *Acta Medica Mediterranea*, 2017, 33: 1257-63. Doi: 10.19193/0393-6384_2017_2s_194.
3. Ohlsson A, Jacob SE. NIDCAP: A systematic review and meta-analysis and randomized controlled trials. *Pediatrics*. 2013;131(3): e881-93. Doi:10.1542/peds.2012-2121.
4. Wallin L, Eriksson M. Newborn Individual Development Care and Assessment Program (NIDCAP): A systematic review of the literature. *Worldviews on Evidence-Based Nursing*. 2009;2(6):54-69. Doi: 10.1111/j.1741-6787.2009.00150.
5. Pallás CR, López MM. NIDCAP, práctica clínica y metanálisis. *Evidencias en Pediatría*. 2013;9(3):40.
6. Perapoch J, Pallás CR, Linde MA, Moral MT, Benito F, López M, *et al*. Cuidados Centrados en el Desarrollo. Situación de las Unidades de Neonatología en España. *An Pediatr*. 2006;64(2):132-9.
7. McGrath J, Samra H, Kenner C. Family-centered developmental care practices and research: what will the next century bring? *J Perinat Neonatal Nurs* 2011;25(2): 165-170. Doi: 10.1097/JPN.0b013e31821a6706.
8. Egan F, Quiroga A, Chattás G. Cuidado para el neurodesarrollo. *Rev Enferm Neonatal*. 2012; 4(14):4-14.
9. Anderson J. Sensory intervention with the preterm infant in the neonatal intensive care unit. *Am J Occup Ther*. 1986;40(1):19-26.
10. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Intern J Social Res Methodol*. 2005;8(1):19-32 doi: 10.1080/1364557032000119616.
11. Solsona D. Enseñar metodologías de investigación en la formación profesional: un diálogo interdisciplinario entre la sociología y la terapia ocupacional. *Rev Latinoam Metodol Investig Social*. 2018;15:58-78.
12. National Institute for Health and Care Excellence (NICE). Specialist Neonatal Care Quality Standard; 2010. NICE quality standard 4. Guidance.nice.org.uk/qs4
13. OMS. Nacidos demasiado pronto. Informe de acción global

sobre nacimientos prematuros. Resumen ejecutivo OMS; 2016. Accessed: 30 March 2016. Available from: <http://http://www.who.int/mediacentre/factsheets/fs363/es/>.

14. Rite S, Fernández JR, Echániz UI, Botet MF, Herranz CG, Moreno J. *et al.* Niveles asistenciales y recomendaciones de mínimos para la atención neonatal. *An Pediatr (Barc)*. 2013;79(1):51.e1-e1.

15. Ludwig S. Poll question: do you know why infants in the neonatal intensive care unit need neonatal therapy services? *Newborn Infant Nurs Rev*. 2013; 13(1): 2-4.

16. Milgrom J, Newnham C, Anderson P, Doyle P, Gemmill A, Lee K *et al.* Early sensitivity training for parents of preterm infants: impact on the developing brain. *Pediatr Res*. 2010;67(3):330-5. Doi: 10.1203/PDR.0b013e3181cb8e2f.

17. Meyer EC, Brodsky D, Hansen AR, Lamiani G, Sellers DE, Browning DM. An interdisciplinary, family-focused approach to relational learning in neonatal intensive care. *Semin Perinatol*. 2015;39(5):326-37. Doi: 10.1053/j.semperi.2015.06.004.

18. Thomas EJ, Sherwood GD, Mulhollem JL, Sexton JB, Helmreich RL. Working together in the neonatal intensive care unit (provider perspectives). *J Perinatol*. 2004;24:552-9.

19. Vergara E, Anzalone M, Bigsby R, Gorga D, Holloway E, Hunter J, *et al.* Specialized knowledge and skills for occupational therapy practice in the neonatal intensive care unit. *Am J Occup Ther*. 2006;60(6):659-68.

20. Vergara ER. Enhancing occupational performance in infants in the NICU. *OT Practice*. 2002;7(12):8-13

21. World Federation Occupational Therapy (WFOT). Position Statement, Competency and maintaining Competency. CM 2012. Accessed: 20 November 2018. Available from: <https://www.otnz.co.nz/wp-content/uploads/Competency-and-Maintaining-Competency-CM2012.pdf>.

22. Christiansen CH, Townsend EA. Introduction to occupation: The art and science of living. 2nd ed. Cranbury, NJ: Pearson Education; 2010.

23. Hunter J, Mullen J, Vergara D. Medical and practice guidelines for the neonatal occupational therapist. *Am J Occup Ther*. 1994;48(6):546-60.

24. Dewire A, White D, Kanny E, Glass R. Education and training of occupational therapists for neonatal intensive care units. *Am J Occup Ther*. 1996;50(7):486-94.

25. The Neonatal Intensive Care Unit. Knowledge and skills for occupational therapy practice in the neonatal intensive care unit. *Am J Occup Ther*. 1993;47:1100-5.

26. Kinney MV, Cocoman O, Dickson KE, Daelmans B, Zaka N, Rhoda NR, *et al.* Implementation of the Every Newborn Action Plan: Progress and lessons learned. *Semin Perinatol*. 2015;39(5):326-37. Doi: 10.1053/j.semperi.2015.06.004.

27. Als H. Synactive models of neonatal behavioral organization: Framework for de assessment of neurobehavioral development in the premature infant and support of infants and parent in the neonatal intensive care environment. In: Seweney JK (Ed). *The high-risk neonate: developmental therapy perspectives*. New York: Haworth Press; 1986. 3-55.

28. Dunn W, Brown C, McGuigan A. The ecology of human performance: a framework for considering the effect of context. *Am J Occupat Ther*. 1994; 48(7): 595-607. doi:10.5014/ajot.48.7.595

29. Vergara ER, Bigsby R. *Developmental and therapeutic interventions in the NICU*. Baltimore : Paul H Brookes; 2004

30. Gibbins S, Hoath S, Coughlin M, Gibbins A, Franck L. The universe of developmental care: a new conceptual model for application in the neonatal intensive care unit. *Adv Neonatal Care*. 2008;8:141-7. Doi: 10.1097/01.ANC.0000324337.01970.76.

31. VandenBerg KA. Individualized developmental care for high-risk newborns in the NICU: A practice guideline. *Early Hum Dev*. 2007;3(7):433-42.

32. Legendre V, Burtner PA, Martinez KL, Crowe TK. The evolving practice of developmental care in the neonatal unit: a systematic review. *Phys Occup Ther Pediatr*. 2011;31(3):315-38. Doi: 10.3109/01942638.2011.5566.

33. Berg AL, Chavez CT, Serpanos YC. Monitoring Noise levels in a Tertiary Neonatal Intensive care unit. *Contemporary Issues in Communication Science and Disorders*. 2010;37(9):69-72.

34. Fajardo D, Gallego S, Argote L. Niveles de ruido en la Unidad de Cuidado Intensivo Neonatal "CIRENA" del Hospital Universitario del Valle, Cali, Colombia. *Colomb Med*. 2007;38 (Supl 2):64-71.

35. Orejón LMV, Rodríguez DC, Pérez GC. Técnicas de Posicionamiento en prematuros. *Revista Enfermería Integral*. 2009;87:42-44.

36. Karem C, Crapnell T, Tiltges L, Madlinger L, Reynolds L, Lukas K, *et al.* Neonatal nurses' and therapists' perceptions of positioning for preterm infants in the neonatal intensive care unit. *Neonatal Netw*. 2013;32(2):110-6. doi:10.1891/0730-0832.32.2.110

37. Grenier IR, Bigsby R, Vergara ER, Lester BM. Comparison of motor self-regulatory and stress behaviors of preterm infants across body positions. *Am J Occup Ther*. 2003;57(3):289-97.

38. American Academy of Pediatrics Committee on Hospital Care Institute for Patient- and Family-Centered Care. Patient- and family-centered care and the pediatrician's role. *Pediatrics* 2012;129(2):394-404. Doi: 10.1542/peds.2011-3084.

39. Harris GM. Family-centered rounds in the neonatal intensive care unit. *Nurs Womens Health*. 2014;18(1):18-27. Doi: 10.1111/1751-486X.12090.

40. Altimier L, Phillips RM. The neonatal integrative developmental care model: Seven neuroprotective core measures for family-centered developmental care. *Newborn Infant Nurs Rev*. 2013;13:9-22. Doi: 10.1053/j.nainr.2012.12.002

41. Goldstein LA. Family support and education. *Phys Occupat Ther Pediatrics*. 2013;33:13-161. Doi: 10.3109/01942638.2012.754393
42. Montes BMT, Quiroga A, Rodríguez S, Sola A. Acceso de las familias a las unidades de internación de Neonatología en Iberoamérica: una realidad a mejorar. *An Pediatr (Barc)*. 2015; 85(2): 95-101 Doi: 10.1016/j.anpedi.2015.07.030.
43. Guimarães H. The importance of parents in the neonatal intensive care units. *Journal of Pediatric and Neonatal Individualized Medicine*. 2015;4(2):e040244 Doi: 10.7363/040244.
44. Hernández NL, Rubio-Grillo MH, Lovera A. Strategies for neonatal developmental care and family - centered neonatal care. *Invest Educ Enferm*. 2016;34(1):104-112. Doi: 10.17533/udea.iee.v34n1a12.
45. Gomes daCRP, Mota PA, Pacciullo-Pinto MP, Lara PL. Estimulación temprana en enfermería pediátrica: el papel del terapeuta ocupacional *Revista TOG (A Coruña)*. 2015; 9(16): 11
46. Crozier SC, Goodson JZ, Mackay ML, Synnes AR, Grunau RE, Miller SP, *et al*. Sensory Processing Patterns in Children Born Very Preterm. *Am J Occup Ther*. 2016;70(1):70012200501p1-7. doi: 10.5014/ajot.2016.018747.
47. Ryckman J, Hilton Cl, Rogers C, Pineda R. Sensory processing disorder in preterm infants during early childhood and relationships to early neurobehavior. *Early Human Development*. 2017;113:18-22. Doi: 10.1016/j.earlhumdev.2017.07.012.
48. Cabral L, Pereirada G, Silva CM, Simões MET. Analysis of sensory processing in preterm infants. *Early Human Development*. 2016. 103. 77-81 Doi: 10.1016/j.earlhumdev.2016.06.010
49. Fernández DMP. Intervención sensorio-motriz en recién nacidos prematuros. *Rev Pediatría Electron*. 2004; 1(1):13-20.
50. World Federation of Occupational Therapists. Definición de terapia ocupacional, WFOT, 2012 Defining occupational therapy, WFOT, 2012. *World Federat Occupat Therapist Bull*. 2015; 71(1): 18. Doi: 10.1179/1447382815Z.00000000011.
51. American Occupational Therapy Association. Definition of occupational therapy practice for the AOTA Model Practice Act. AOTA group; 2011. Available from: <https://www.aota.org/~media/Corporate/Files/Advocacy/State/Resources/PracticeAct/MODEL%20PRACTICE%20ACT%20FINAL%202007.pdf>
52. Herrera-Castanedo S, Vázquez-Barquero JL, Gaite Pindado L. La Clasificación Internacional del Funcionamiento, de la Discapacidad y de la Salud (CIF) Rehabilitación. 2008;42:269-75 Doi: 10.1016/S0048-7120(08)75662-7.
53. Bass JD, Baum CM, Christiansen CH. Interventions and outcomes of OT: PEOP Occupational Therapy Process. En: Christiansen CH, Baum CM, Bass JD (Eds.). *Occupational therapy: Performance, participation, and well-being* (4th ed). Thorofare, NJ, USA: Slack Incorporated; 2015. 57-79.
54. Law M, Cooper B, Strong S, Stewart D, Rigby P, Letts L. The Person-Environment-Occupation Model: A transactive approach to occupational performance. *Canad J Occupat Ther*. 1996;63(1): 9-23. Doi: 10.1177/000841749606300103
55. De Rose ML. Promoviendo el desarrollo del ser ocupacional desde el periodo neonatal. *TOG (A Coruña)*. 2013;10(18):13.
56. Gorga D. The evolution of occupational therapy practice for infants in the neonatal intensive care unit. *Am J Occup Ther*. 1994;48(6):487-89. Doi:10.5014/ajot.48.6.487.
57. Schifsky H. Surviving the NICU: The Role of Occupation in the NICU and beyond. American Occupational Therapy Association; 2017. Available from: <https://www.motafunctionfirst.org/assets/2017-Conference-Presentation/1D%20-%20Surviving%20the%20NICU.pdf>
58. Cui LR, LaPorte M, Civitello m, Stanger M, Orringer M, Casey F, Kuch B S, Beers S, Sue R. *et al* . Physical and Occupational Therapy Utilization in a Pediatric Intensive Care Unit *J Crit Care*. 2017;40:15-20. Doi: 10.1016/j.jcrc.2017.03.003
59. Ross K, Heiny E, Conner S, Spencer P, Pineda R. Occupational therapy, physical therapy and speech-language pathology in the neonatal intensive care unit: Patterns of therapy usage in a level IV NICU. *Res Developmen Disabilit* . 2017;64:108-117 doi:10.1016/j.ridd.2017.03.009.
60. American Occupational Therapy Association. Knowledge & Skills Paper American Occupational Therapy Association specialized knowledge and skills for occupational therapy practice in the neonatal intensive care unit; 2010.
61. Adrados DRP. Unidades de neonatología. En: Viana MI, Castellanos OMC, Polonio LB, coordinadores. *Terapia Ocupacional en la Infancia: Teoría y Práctica*. Madrid: Editorial Médica Panamericana; 2008:253-66.
62. Vergara E, Bigsby R. *Developmental and Therapeutic Interventions in the NICU*. Illionis: Paul H. Brookes Publishing Co.; 2004.
63. Kathleen N. *Developmentally Supportive Care in the Neonatal Intensive Care Unit: An Occupational Therapist's Role*. Springer Publishing Company 243. 2011;30(4): 243-8. Doi: 10.1891/0730-0832.30.4.243.
64. Pierce D. Co-occupation: The changes of defining concepts original to occupational Science. *J Occup Sci*. 2009;16(3):203-7. Doi: 10.1080/14427591.2009.9686663.
65. Price P, Miner S. Extraordinarily Ordinary Moments of Co-Occupation in a Neonatal Intensive Care Unit. *OTJR*. 2009;29(2):72-8. Doi: 10.3928/15394492-20090301-04
66. Olson JA. Mothering occupations in caring for infants and young children. En: Esdaile SA, Olson JA (Eds.). *Mothering occupations: Challenge, agency and participation*. Philadelphia, PA: FA Davis; 2004.
67. Maziero-Barbosa V. Teamwork in the Intensive Neonatal Care Unit. *Phys Occup Ther Pediat*, 2013;33(1):5-26. Doi: 10.3109/01942638.2012.7295.

68. Moreno-Chaparro J, Cubillos-Mesa C, Duarte-Torres SC. Terapia ocupacional en la unidad de cuidados intensivos. *Rev Fac Med.* 2017; 65(2): 291-296. Doi:10.15446/revfacmed.v65n2.59342.
69. Domínguez I, Calvo JI. Terapia ocupacional y su papel en atención temprana: revisión sistemática. *TOG (A Coruña).* 2015;12(21):1-22.
70. Fisher AG, Griswold LA. Performance skills: Implementing performance analyses to evaluate quality of occupational performance. En: Boyt SBA, Gillen G, Gillen MG, Scaffa M. (Eds.), Willard and Spackman's occupational therapy. 12th ed. Philadelphia: Lippincott Williams & Wilkins; 2014:249-64.
71. Raffray M, Semenic S, Osorio Galeano S, Ochoa Marín SC. Barriers and facilitators to preparing families with premature infants for discharge home from the neonatal unit. Perceptions of health care providers. *Invest Educ Enferm.* 2014;32(3):379-92. Doi: 10.17533/udea.iee.v32n3a03.
72. Thon KN. Supporting Parents of Premature Infants in the Neonatal Intensive Care Unit: A Manual for Practitioners. Professional Psychology Doctoral Projects; Department of Psychology, University of St Thomas; 2013. Disponible en: http://ir.stthomas.edu/caps_gradpsych_docproj/28
73. Gibbs D, Boshoff K, Lane A. Understanding parenting occupations in neonatal intensive care: Application of the person-environment-occupation model. *Br J Occup Ther.* 2010;73(2):55-63. Doi:10.4276/030802210X12658062793762.
74. Cardin AD. Parent and Infant Occupational Performance in the Neonatal Intensive Care Unit. Doctoral Project. Department Occupational Science, St Catherine University. 2015. Available from: http://sophia.stkate.edu/otd_projects/2.
75. García dRM, Sánchez LM, Doménech ME, Izquierdo MI, López HMC, Losada MA, et al. Revisión de los estándares y recomendaciones para el diseño de una unidad de neonatología. *An Pediatr (Barc).* 2007; 67(6): 527-999.dRM
76. Hildenbrand WC, Lamb AJ. Health Policy Perspectives-Occupational therapy in prevention and wellness: Retaining relevance in a new health care world. *Am J Occup Ther.* 2013;67:266-271. Doi: 10.5014/ajot.2013.673001
77. Philpott-Robinson K, Lane SJ, Korostenski L, Lane AE. The impact of the Neonatal Intensive Care Unit on sensory and developmental outcomes in infants born preterm: A scoping review. *British J Occupat Ther.* 2017; 80(8): 459-69. Doi: 10.1177/0308022617709761
78. Maitre1 N. Neurorehabilitation after neonatal intensive care: evidence and challenges. *Arch Dis Child Fetal Neonatal Ed.* 2016; 100(6): F534-F540. Doi: 10.1136/archdischild-2013-305920.
79. Hostli L, Granau R. Extremity movement's help occupational therapists identify stress responses in preterm infants in the neonatal intensive care unit. *Canad J Occupat Ther.* 2007;74(3):183-94.
80. Pitcher JB , Schneider LA, Drysdale JL, Ridding MC, Owens JA. Motor System Development of the Preterm and Low Birthweight Infant *Clin Perinatol.* 2011;38(4):605-25. doi: 10.1016/j.clp.2011.08.010.
81. Craig JW, Glick C, Phillips R, Hall SL, Smith J, Browne J. Recommendations for involving the family in developmental care of the NICU baby. *J Perinatol.* 2015;35(Suppl 1): S5-S8 doi:10.1038/jp.2015.142.
82. ShepleyMMC, Song Y, Marshall-Baker A. Creating an environmentally sustainable neonatal intensive care unit. *Newborn Infant Nursing Rev.* 2016;16(4): 213-217. doi: 10.1053/j.nainr.2016.09.027.
83. Taylor RR, Van Puymbroeck L. Therapeutic use of self: Applying the intentional relationship model in group therapy. En: O'Brien JC, Solomon JW (Eds.). *Occupational analysis and group process.* St. Louis, MO: Elsevier; 2013:36-52.
84. Taylor RR, Wook LS, Kielhofner G. Practitioners' use of interpersonal modes within the therapeutic relationship: results from a nationwide study OTJR. *Occup Participation Health.* 2010; 31(1): 6-14. Doi: 10.3928/15394492-20100521-02
85. Sardá R. Primeros pasos de la maternidad. *Rev1 Hosp Materno Infantil.* 2005; 24(3):136-138.
86. Zaruby KL, Reiley P, McCarter B. Putting patients and Families at the Center of Care. *Nurs Administration.* 2008;38:275-81. Doi: 10.1097/01.NNA.0000312789.95717.81.