NBrain

CARING FOR KIDS' NEUROLOGICAL DEVELOPMENT

The NBrain Project: A Clinical Mediation Service for Children at Risk of Neurodevelopmental Disorders and their Families

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A mis queridos hermanos,
Anna y Rafa.

Por vuestras sonrisas salidas del corazón,
fuerza de voluntad
y resiliencia.

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Abstract

Six out of ten children born prematurely can develop neurological difficulties affecting their behaviour and cognitive abilities. The public health system in Spain only cares for 40% of the cases, which are usually the ones with severe disability. The remaining 60% of cases are overlooked due either to having mild symptoms or pressure on the service. Here NBrain, a clinical R+D-based institution specialized in child neurodevelopment and advanced therapies is presented with the aim of filling this attentional gap for these children and their families. NBrain considers the family to be the key structure in promoting children's neurodevelopment and wellbeing and for this reason it will be the first specialized clinical institution to include a mediation department integrated in the clinic. The mediation service will aid families to channel conflicts, fostering foster healthy parent-child attachments and co-parenting dynamics that will promote emotional and family stability. This in turn will increase the efficacy of the neurological therapeutical treatments offered to the children and, in the long-term, promoting healthier interactions between family members. This thesis describes the creation and the main premises underlying the functioning of this proposed mediation service.

Key words: children clinics, neurodevelopment, neuroscience, mediation, family conflicts, healthy family dynamics.

BSM Lines of work: Social Transformation & Innovation
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Proyecto NBrain: Un Servicio de Mediación Clínica para Niños en Riesgo de Trastornos del Neurodesarrollado y sus Familias

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Resumen

Seis de cada diez niños nacidos prematuramente pueden desarrollar dificultades neurológicas que afectan su comportamiento y habilidades cognitivas. El sistema de salud pública en España solo puede abarcar al 40% de los casos, que generalmente son aquellos con discapacidad grave. El 60% restante de los casos se pasan por alto debido a síntomas leves, en curso, o por sobrecarga del sistema de sanidad pública. NBrain, pretende ser una nueva institución clínica basada en I+D especializada en neurodesarrollo infantil y terapias avanzadas, con el objetivo de llenar esta brecha de atención para estos niños y sus familias. NBrain considera que la familia es la estructura clave para promover el neurodesarrollo y el bienestar de los niños, por lo que será la primera institución clínica especializada en incluir un departamento de mediación integrado en la institución clínica. El servicio de mediación ayudará a las familias a canalizar conflictos, fomentando la formación de vínculos saludables entre padres e hijos y dinámicas de crianza que promoverán la estabilidad emocional y familiar. Esto, a su vez, aumentará la eficacia de los tratamientos terapéuticos neurológicos ofrecidos a los niños y, a corto y largo plazo, promoverá interacciones más saludables entre los miembros de la familia. Esta tesis describe la creación y los principales fundamentos que subyacen al funcionamiento del servicio de mediación.

Palabras Clave: centros clínicos infantiles, neurodesarrollo, neurociencia, mediación, conflictos familiares, dinámicas familiares saludables.

Líneas BSM: Transformación Social e Innovación
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Part I. Vision & Framework

1. Background

1.1. Epidemiology

The World Health Organization (WHO) estimates that approximately 15 million infants are born prematurely each year worldwide of whom 60% manifest neurodevelopmental disorders related to language, attention, learning impairment, behavioural problems and, in more severe cases, autism (Eklof, et al., 2019).

1.2. Premature Children in Spain: Clinical Network and Needs

In Spain, public early care for all children with developmental difficulties (premature and full-term) is provided between 0-6 years of age and is carried out at Early Development and Care Centres (CDIAT) (Puerto Martinez, 2020). The precise details of this provision in terms of the extent and nature of the service, procedures, priorities, and budget allocation are determined by each autonomous community. These children are in need of traditional therapies, typically through psychology, speech therapy, and neurorehabilitation. However, only 40% of these children do in fact receive care by the CDIAT in Spain (Pena, 2020) and the network is so overburdened and suffers so much from insufficient planning and resources that it is not able to cater for the growing demand (UCAPP, 2020). The area of private care faces a similar situation. Here the demand for specialized paediatric care by families with premature infants with neurodevelopment difficulties is evident, as well as the possibility of applying advanced treatments involving new technologies that can give them an opportunity for a better future. Most public institutions, however, do not have the most important technological innovations in the field available to them and are not employing science-based approaches. With regard to diagnosis and prognosis, it is becoming increasingly common to identify biomarkers that can predict the presence of disease (Eklof et al., 2019) and that allow the design of minimally invasive personalized therapies. In so doing, the intention is that each individual should receive the appropriate treatment for the specific pathology they suffer from, with maximum efficacy and safety. The current proposal of using digitized models of the brain to predict the effects of a given therapy and to design and optimize intervention protocols, promises to revolutionize the treatment of neurological diseases (Deco et al., 2019).

1.3. Neurodevelopment Brain Institution, NBrain

The creation of NBrain aims to cover the attentional gap for these children and families. It is intended, therefore, that NBrain will be a private clinical institution that responds to the need for specialized therapeutical services for prematurely-born children who are at risk of manifesting neurodevelopmental difficulties and their families. Its main goal is to offer an innovative healthcare model oriented towards comprehensive holistic care of

premature children and adolescents between 0 and 18 years of age and their families, highlighting:

- Clinical attention based on science, development and innovation
- High attentional focus on disorder prevention and early diagnosis detection
- Treatments to restore or reduce the negative impact of the appearing disorder and complications of the symptomatology
- Clinical follow-ups and treatment revisions

NBrain is expected to have four main departments:

1. Specialized Medical Team Service. Attending the most common medical pathologies that can come with prematurity. This service will count on a neuropaediatrician, an epileptologist, and a digestologist.
2. Neurorehabilitation Service. Neuropsychologists, a speech therapist, a physical therapist, and a psychologist will assess, diagnose, and provide rehabilitation intervention plans for the children.
3. Mediation & Family Care and Support Service. Mediators will promote a secure caregiving family environment aiming for a stable and functioning family.
4. Research and Intervention Technology Department. Innovative diagnostic platform and therapeutic interventions using neuroimaging (MRI) and brain neuromodulation (i.e. Neuroelectrics, Safe and Sound protocol).

1.4. Clinical Mediation Service

To the best of our knowledge, NBrain will be the first clinical institution offering comprehensive, advanced Research and Development (R+D) based treatments for premature children and their families. Given the NBrain team's awareness that the family is at the centre of children's neurodevelopment and wellbeing and provides a benchmark for it, it will be the first institution to include a mediation department integrated in the clinic with the aim of aiding families in channelling stress, fostering healthy parent-child attachment and agreements, and developing secure care to promote emotional and family stability.

2. Mediation Service

2.1. Rationale and Aim

The main rationale of the inclusion of a mediation service is to foster family dynamics that provide peace and reduce stress at home, so promoting emotional stability and healthy environments that in turn will facilitate therapeutic intervention and increase their effectiveness both in the short and long terms. Furthermore, the attention to family dynamics will promote resilience and healthier coping strategies for daily events for parents and siblings alike.

The activity of NBrain will pivot between the medical team and the mediation service, which will act as a catalyst for the harmonization and sustainability of families, so favouring children's wellbeing.

2.2. Family Environment and Neurodevelopment

The family environment plays a critical role on moulding the neurodevelopmental outcomes in children (Bush et al., 2020). It can influence neurodevelopment with the subsequent effects on children's motor and sensory development, temperament, cognitive abilities, as well as their behavioural and emotional responses (Bush et al., 2020; Anne Mette Skovgaard, 2022).

When a premature child is born, families need to adjust to new dynamics. The existing routines of all family members are altered. Depending on the level of care that the baby will need, it may, for example, affect parents work responsibilities, the care and routines of siblings care, cause emotional distress, and have an impact on the family's finances. These new dynamic stressors can create family conflict.

Examination of the impact of the upcoming conflicts on the psychological functioning and structure of each member of the family is crucial. Such study helps to provide a deep understanding of the major conflicts, emotions and behaviours that can appear in a family with a child born with special needs.

The mediators understanding and perceptions of how the family environment affects the child with special needs will make it possible to provide parents with coping strategies and support to solve problems, seek valid information, restructure their values with regard to the meaning of disease, and acknowledge their emotions, while encouraging them to seek emotional support from family and friends.

2.3. Sources of Conflicts in Families with Children with Special Needs

Here there are exposed the three main sources from which conflicts may arise in families after a premature baby is born.

2.3.1. New Family Dynamics and Hierarchy

Family systems theory states that all family members influence one other. Its premise is that the optimal understanding of a family is achieved by analysing it as a unified whole system. This system is intricate, interconnected, and dynamic, comprising various parts, subsystems, and individual family members, each of whom serves a distinct purpose or function (Hammond et al., 2015). In regular healthy terms, a newborn alters the family dynamics. However, when a child is sick or premature it is a stressful event for the parents due to the unexpected uncertainty and fears that this creates (Renske Schappin et al.2013, Ionio, et al.2016). Starting from the abrupt moment when the babies are hospitalized in the Neonatal Intensive Care Unit, family members need to respond

quickly to changes in their lives within and impactful emotional event that can cause guilt, depression, and anxiety. At this time, it is of the utmost importance that the family receives assistance to support the lifestyle and dynamics changes they are facing (Hall et al., 2015; Jimenez-Palomares et al., 2021).

The agreements they make and how the family reorganizes itself will influence children's lives in the short and long term in either positive or negative ways, and not only the child with special needs but also the lives of any other children in the home. The organization of the household and of the individual responsibilities of each of the family members will have to change and the decisions made to bring about this change will be of great importance for all members of the family. For example, assigning the role of "primary caregiver" and differences in parenting styles are going to have to be determined. In particular, if one of the parents has to take the lead in the care of the baby, it can affect his or her family and social environment dramatically (Jimenez Palomares et al., 2021).

In the case of siblings, the adjustment to such a sudden change without a full understanding of the new event can be particularly challenging. They will sense the worry and emotional burden of the parents and parentification is not uncommon.

The term "parentification" was first talked about in depth by Boszormenyi-Nagy and Spark (1973) to describe relationships in which parental characteristics are projected onto an individual (Engelhardt, et al., 201). This is an unconscious process by which children end up becoming the parents of their parents and assuming a degree of responsibility that is greater that that which corresponds to their age and maturity. Parentification is considered pathological when children become obliged to take on adult responsibilities in order to maintain balance in the family system (Hooper, 2007a,b; Levante et al., 2023). There can be two types of parentification (Hooper, 2008):

- A child without disability takes on roles and responsibilities toward his or her parents.
- A child takes on responsibilities towards his or her other siblings and the child with special needs.

Moreover, these two types of parentification can be manifested in two different ways that can cause long term serious personality outcomes (Aldridge, 2006; Hooper, 2007a; Jennifer K. 2009):

1. Instrumental Parentification. This involves the performance of practical daily tasks, such as caretaking of disabled or younger siblings, cleaning, cooking, grocery shopping, and even speaking on behalf of parents when language is a barrier.

2. Emotional Parentification. In this case, the child gives emotional support to the parents by being a confidant for the parents, listening to parents talk about their own problems (without parents listening to their child's problems), being expected

to give advice, being pulled into arguments or issues between adults (triangulations), or witnessing a parent hurt psychologically to others. The child may have to handle shared information that is too much for him or her by, for example, being forced to keep parents' secrets, and serving as a mediator or referee in parents' arguments.

This family dynamic not only affects the relationship between siblings but also the relationship with the parents and, most importantly, can have serious long-term effects on the mental health of the child, especially when the parentification has been of the emotional subtype (Levante, et al., 2023). These long-term repercussions may include:

- Absence of childhood: difficulties in having fun and being spontaneous, relaxing, adapting or being flexible.
- Dissociation between emotions and rational thinking.
- Anxious attachment and anxiety, particularly over abandonment, loss, and caring for others and a tendency to excessively worry over their responsibilities.
- Altered self-worth regarding actions and achievements.
- People pleaser, caregiver roles, and placement of needs of others before one's own.
- Self-blame, guilt, shame, self-criticism, and judgment.
- Social isolation and emotional suppression.

The mediator will make an exhaustive narrative diagnosis of the family dynamics to ensure the safety of the family members and to put the risks they face into focus.

2.3.2. Medical needs, Support, and Communication with Medical Personnel

There is a clear need for further training and resources for community health professionals in terms of the specific support needs of parents with premature babies (Lorié ES, 2021). Preterm birth not only affects the infant's health but is also associated with higher stress levels in parents. The emotional shock and further actions of the parents have an incisive influence in the treatment and care of the child. Initial information by the medical services might not be sufficiently clear due to the use of technicisms, difficulties in accessing the doctors, and the parents not being emotionally prepared to take in the information given to them. This can have the effect of making parents enter in a loop of gathering information from poor or inaccurate sources, or of initiating a quest among professionals for second opinions until they confirm what they unconsciously want to hear, and of spending exorbitant amounts of money on inefficient non-targeted therapies for the problems of their child. The lack of support increases stress even more and increases family conflicts and alters daily dynamics.

2.3.3. Emotional and behavioural conflict: Stress

As mediators it will be of paramount importance to know how to help the families recognize their emotional needs and work from them, and to understand which values

and emotions are creating the main stressor, and hence conflict, within the families. Only from this premise will it be possible to assist the families to make a future contingency plan and reach agreements to move forward, taking care of all of their members in the healthiest manner possible and avoiding future conflicts.

The range of emotions is wide and will depend on the family member. The reactions of the children will depend largely on the deterioration caused by the pathology in their daily life and on the reactions of the parents. As set out in much detail by Dr. Sánchez Díaz (2012) the emotional burden supported by each member of the family is different:

In the child of special needs, we can see feelings of denial, rebellion, doing what is prohibited due to illness, anger, protest, isolation, apathy, depression, and fear.

In the lives of the parents, there can be strong feelings of grief, denial of the disease, rejection of the situation, disbelief, multiple consultations, a state of shock, a feeling of having lost control of one's life, confusion, fear, anxiety due to uncertainty of the future, and misunderstanding.

Since parents will be focusing a lot on the sick child, other children at home can feel forgotten and neglected and may be angry, have tantrums or they act like a perfect child, always willing to help. Regressive behaviours, somatizations, a feeling of loss of normal family life, a fear of getting sick or of their parents getting sick, pretending to be sick so that he or she can also be taken care of are all common reactions that need to be understood.

In the case of grandparents are co-living in their lives, they can show a double feeling of sadness for their sick grandchild and for the difficulty that their own child is going through.

Here it is important to acknowledge and reinforce the idea that what we see in these families' conflict on the surface through their emotional state can be summarized in a single word, stress.

Today there is ample research evidence showing that stress is not just a feeling in our body. From a biological point of view, stress can have tremendous repercussions in children's development and their futures. What we see in the expression of that emotion or through stress-induced behaviour goes far beyond our eyes.

Epigenetics is a scientific discipline that explores the mechanisms by which cells control gene activity without making changes to the DNA sequence itself. Epigenetic changes involve modifications to DNA that govern the activation or suppression of genes (National Human Genome Research Institute, 2020). From the research in epigenetics, we now know that environmental experiences affect the expression of genes in either positive or negative ways (Non, A. L. 2021).

When children sense stress, conflict and anxiety at home, feeling threatened or unsafe, they can develop physiological responses and coping behaviours attuned to what they are experiencing at the time but which are at the long-term expense of physical and mental well-being (Lerwick, 2016). Stressful and challenging life circumstances will leave a unique epigenetic mark on the genes and these marks, which can lead to the temporary or permanent activation or deactivation of gene functions (National Scientific Council on the Developing Child, Harvard University, 2010).

Neurobiologically, stress causes inflammation in the brain. Studies have shown that the neurodevelopment of neurons in the brain in early stages in children that have been under stress affects the brain connectivity structure and function (Padilla et al., 2014; Padilla et al., 2017; Graham, et al., 2021). This can lead to cognitive dysfunctions due to reductions in brain connectivity in the prefrontal cortex and hippocampus among other areas of the brain involved in executive functions, memory, emotional regulation, attention, and decision-making. The consequences involve difficulties with impulse control, emotional regulation, and decision-making later in life. In addition, chronic stress can also lead to a reduction in the size and volume of certain brain structures, including the hippocampus and amygdala, which are important for memory, learning, and emotional processing (Bremner, 2006; Buss et al., 2012; Ting et al., 2017).

Once the perspective described above is properly understood, the rationale behind including a mediation service within a clinical service for children with special needs becomes apparent. It would be counterintuitive to provide children with neurodevelopmental difficulties with advanced R+D treatment and brain therapies without ensuring that the home environment is balanced and safe for all the children.

Mediators will help families to achieve resilience and environmental transformation with the main purpose of reducing stress and promoting healthy dynamics among caregivers (families) that will allow the children to grow while coping with the situation. In turn, this will increase the efficacy of treatments and avoid contingencies, such as short and long-term repercussions in the emotional and behavioural personality patterns in siblings. Therefore, mediators will help harmonize and potentiate a peaceful environment by helping families to achieve awareness of their experiences and help them establish a responsive and supportive structure for all the family members so that they can buffer the adverse effects of other stressors.

Part II. Methodology

3. Envisioning the Mediation Service at NBrain

3.1. Mission

The mediation service of NBrain will work to enhance the parents' role and coparenting dynamics, prioritizing the best interests of the children in order to induce a peaceful environment at home.

In providing this service, we will be putting into action the commitment of Catalonia to respect the Convention on the Rights of the Child in relation to early childhood.[1]

3.2. The Role of the Mediator at NBrain

The role of mediators at NBrain will be to identify conflicts, whether ongoing or potential, at an early stage and to assist families in improving their relationships. Acting as an impartial third party, the mediator will help the family members to achieve self-awareness so they can transform the conflict in their terms and find an equilibrium between individualism and responsiveness to others.

This role is in line with and partially inspired by the groundbreaking work in mediation by Bush & Folger, 2005. The so-called transformative model they describe, envisions conflict as a "dynamic of ebb (conflict de-escalation to pursue constructive change) and flow (conflict escalation to pursue constructive change)" (John Paul Lederach, 2003) and aims to end conflicting scenarios to construct new ones that are more desirable and less stressful.

This approach focusses on the embedded relationships between family members and, in so doing, seeks to promote constructive changing situations that will have lasting effects in the medium- to long-term.

3.3. Mediation Interventional Models

Within the framework of a clinical institution and the mediator role, the mediation interventions will be based on the Circular Narrative and Transformative mediation models. Other models such as The Harvard model can provide us with some useful tools for the mediator's intervention, but the vision of their model deviates from the premise of promoting an improved relationship between the parties. What we are looking for at NBrain is to transform the conflict among members, not to reach just agreement *per se*.

- *Circular narrative mediation.* The circular narrative mediation model, pioneered by Sara Cobb and further developed by Marinés Suares, explores the circular causation of conflicts through narratives, while integrating principles from systemic psychology. Each individual creates and constructs their unique world of experiences by their narratives and people tend to make decisions based on these stories rather than objective facts. A key component of the narrative concept is that the narrative we articulate gives rise to the problem. Therefore,

[1] Llei dels drets i les oportunitats en la infància i l'adolescència
https://www.parlament.cat/document/nom/TL115.pdf

conflicts arise from the divergence of expectations, understandings, meanings, and perceptions, as we construct narratives to give significance to our experiences, which in turn shape our identities. The circular narrative model allows dominant stories conditioning relationships to be analysed and worked out, seeking internal movement to destabilize the systems, and then rebuild from a more empowered and factual point of view to achieve the most beneficial agreement for the parties (Markus, 2013). The mediator helps the participants to reframe the meaning of their conflicts through communication and storytelling. This process allows for new perspectives and a deeper understanding of the other party's point of view. Ultimately, this approach facilitates the exploration of alternative situations and narratives, creating opportunities for reaching mutually agreeable resolutions (Munuera, 2007).

- *Transformative Mediation.* Central to transformative theory is the idea that human beings not only seek to satisfy their individual needs, but also have a desire for connectedness. This model describes conflict as an emergent, dynamic phenomenon "whose resolution requires, not the once-and-for-all solving of problems, but a process to tackle this and future conflicts" (Bush & Folger, 2005). It asserts that human beings have inherent capacities for strength (self-agency, autonomy) and responsiveness (connection or understanding) and that our "social" or "moral" impulse brings these into play when we are faced with conflict and confronts how people interact. This sets up a vicious circle where people feel weak and therefore become self-absorbed, fuelling a similar reaction in the other. Ameliorating conflict involves reversing this process and setting in motion a virtuous circle of strength and connection. Mediators, as a third party, will work with families to change the quality of their conflict interaction and to make positive interactional shifts by supporting empowerment and encouraging inter-party recognition (Bush & Folger, 2004).

3.4. Welcome to mediation at NBrain

3.4.1. Mediation Referrals to NBrain

Families that ask for a consultation at NBrain because they have a child with neurodevelopmental disorders will undergo a first round of visits by different medical specialties for initial evaluation, diagnosis, and needs detection, including mediation. This initial loop will include:

- Neuropaediatrician medical subspecialties services (digestology and epileptology), and neuropsychology.
- Mediation Service.

After the evaluation by each service, the NBrain team will gather to discuss what has been observed in the consultations and will decide on the best clinical action approach

for the children and their families (i.e. speech therapy, neuropsychology, neuroeducation, mediation, brain protocol stimulation, etc.).

The mediation service in this particular specialized clinical environment will start in an unconventional way. Commonly, one of the parties in a conflict seeks the services of a mediator when there is a conflict. Although this type of direct request may take place, in NBrain, the mediation service will be included as part of the standard round of visits in the first main evaluation with the medical specialties. It will act as a first filter for early conflict detection, prevention, and characterizing in detail the needs of the family. Hence, in NBrain there will be three different ways of accessing the institution:

- As part of the first circuit consultation complementarily to the medical evaluation services described above.
- By direct internal request to the mediation service once the children have been evaluated by the medical service and a new need has been detected.
- By external request to the mediation service, which in this case will also include a first consultation with the neuropaediatrician.

3.4.2. First Mediation Visit

During the first visit the mediator will use a multifactorial approach to evaluate the family environment and conflicts.

Main goal: to have an overview of the family dynamic, risks for the children, conflict detection, and emotional status.

For this purpose, the first visit will be exclusively with the caregivers. The mediator will start explaining to the families:

- What the mediation space is, its purpose and how we can help.
- Why the environment at home is key to a healthy environment for the children.

After this, the mediator will become an active party who is involved in the family narrative with the purpose of characterizing the family habits and patterns among the family members and caregivers. Following the circular narrative model with open questions and leaving space for them to tell their stories, information is obtained on how they experience and handle stressful experiences, conflicts, their main concerns, and needs.

After this free space to express themselves, the first mediation consultation can be complemented with additional quantitative information from objectively standardized tools available to help identify early family conflict in even more detail. These tools can be used in a more open interview style or, and depending on how the family is functioning, they can be answered privately (i.e. depending on the degree of emotional impact and willingness to participate). They can also add value by allowing the mediator to understand the underlying emotions and behaviours of the participants faster.

Among the different questionnaires available, the mediation service of NBrain proposes to specifically use as part of the first interview the “McMaster Family Assessment Device” (FAD) (Epstein et al., 1983). The FAD assesses the structural and organizational properties of families and patterns among family members. It has been found to distinguish between healthy and unhealthy families and include the evaluation of six family interaction dimensions:

- Problem Solving: the family’s ability to resolve problems to maintain effective family functioning.
- Communication: the clarity of verbal messages with respect to content and the family member to which they are addressed.
- Roles: established patterns of behaviour for handling a set of family functions. In addition, it includes consideration of whether tasks given are clear, equitably assigned, aligned with the family roles, and whether tasks are carried out responsibly.
- Affective Responsiveness and Involvement: the extent to which individual family members are able to experience appropriate affection and provide a safe space where each party's concerns can be heard and understood.
- Behaviour Control: behaviour in situations of different sorts (dangerous, psychological and social) is assessed, as are different patterns of control.

This test has been widely used in both research and clinical practice to screen and identify families experiencing problems. It has been found to distinguish between healthy and “unhealthy” families and has been validated by underlying constructs derived from clinical experience (Epstein N, Baldwin LM, Bishop DS. (1983) Adlerfer (2008), McBarney (2005).

After this first mediation visit and the sharing of views with the Service Team, the mediator will decide whether to offer mediation services and, in the case of deciding to do so, will start designing a targeted mediation proposal for the family in relation to the needs and conflicts detected. In addition, the mediation service will also decide whether cooperation is required with psychological intervention or other services of NBrain.

In the event that conflict is detected, families will be strongly recommended to follow the mediation plan of action but ultimately participation will be voluntary.

3.5. Intervention of the Mediation Service

As mentioned above, if a family is recommended to attend mediation services after the first mediation consultation, a tailored intervention proposal will be offered to the family taking into account their specific needs and the existing conflicts.

Conflict Identification. As in section 2.3, we identified three main sources of conflict in these families: new family dynamics and family hierarchy, support and communication

with medical personnel, and emotional and behavioural conflict: stress. It is important to note that even if treated as separate instances for the purpose of clarity, the three elements are inherent and interconnected with one another: facts and actions become entangled with feelings.

After the first visit listening to their difficulties, and with the information gathered with the test and NBrain Team, we can then establish with the families and caregivers which the main conflict of priority for them is.

Following the above-mentioned main roots of conflict, some of the conflicts we might observe in consultation may be expressed in forms of:

- Burnout due to difficulties in time and organization in the management of the tasks and healthcare actions of the child with special needs and the balancing of essential needs with other members of the family.
- Arguments due to different conceptions about the habits of how to take care of the child: sleeping, feeding, school, therapies, etc.
- Coping with unexpressed emotions of anxiety, guilt, and uncertainty for the future causing communication problems among caregivers.
- Financial disputes about expenses and medical needs.
- Conflicts with regards finding balance between children's daily needs, work responsibilities, and care time for all members of the family, which can lead to inappropriate routines for the family members.
- Arguments about the best therapeutic approach for the child.
- Parents' divorce.

3.5.1. Mediation Plans, Strategies, and Techniques

Three modalities of Mediation will be offered at NBrain and recommended depending of the needs of each family:

A. Transformative Mediation Sessions

Individual family visits that will involve private and common family/caregivers visits and will be based on Maria Munné's (2012) guidelines on "Mentalization Based Mediation" (MBM).

Goals: (1) to foster re-evaluation of the conflict by supporting each party's deliberation and decision-making especially during key moments of the session when choices need to be made, (2) to promote change through recognition by encouraging and supporting, without coercion, the individual efforts made by each party to gain a better understanding of the other's perspective, and (3) create a transformative new agenda for the parties.

To achieve these goals, six initial sessions of mediation will be proposed:

- Analysis and legitimation of the elements of the mediation process (joint20min/20min individual sessions with each party/joint 20min).
- Second session (joint 90min): Empowerment.
- Third session/Fourth session (individual 90min): Focused mainly on Empowerment and Recognition.
- Fifth session (joint 90min): The Mediator will give feedback to the parties on what has been observed and resulted from the previous sessions. Dialogue between the parties mutual recognition and empowerment will be favoured.
- Sixth session: Transformation and the agenda of pacts will be built with the parties.

Follow-up sessions. Depending on the needs and evolution of each case, the mediation service will suggest either a follow-up or continuation through another round of six sessions.

At any time during the process, the mediator may also propose additional sessions to give voice to the child and siblings if applicable unless not appropriate due to age or the type of conflict.

Strategies

The main strategies the mediator uses in the transformative mediation sessions are:

- *Empowerment.* Cobb conceptualizes empowerment as a collection of discursive strategies that amplify the involvement of individuals in a dispute. According to Cobb, participation entails the collaborative or joint construction of a shared narrative. In some cases, individuals may feel so disempowered that they believe they lack choices so in the context of mediation, empowerment enables individuals to take charge of their own lives and effectively handle situations that have a direct impact on them. This process involves helping individuals recognize new possibilities and alternatives that were previously unseen. Empowerment, ultimately, is about gaining a new perspective and the ability to perceive options. Empowerment is “seeing”.

- *Recognition.* Refers to the aptitude of comprehending and considering the viewpoints of others (Folger & Bush, 2005). It is closely associated with individuals' empathic abilities and entails the ability to metalize and understand others.

Apart from the abovementioned empowerment and recognition, two more strategies will be applied for the families with conflicts in NBrain that have been demonstrated to improve the effectiveness of the transformative mediation method (Ali, 2010) especially in cases where progress seems slow due to lack of ability in communication:

- *Relationship Enhancement Strategies*. Relationship Enhancement (RE) The objective is to provide individuals with the necessary tools to recognize and manage sources of stress and conflict within their family relationships. Influenced by Sullivanian existential and Rogerian client-centered approaches, RE is rooted in principles such as empathy, proficient communication, emotional consciousness, and self-acceptance, as well as acceptance of others (Ginsberg, Barry G.). Empirical evidence supports the effectiveness of RE in enhancing empathy, listening, and overall communication skills (Guerney, 2000). The primary objective of RE is to assist developing strong communication and listening abilities to better understand each other's needs. Implementing Relationship Enhancement as an intervention to enhance participants' communication skills in mediation may lead to a greater likelihood of participants feeling heard and understood (Ali, 2010).

- *Interpersonal feedback Learning.* When people gain insight into their own and others' behaviours and feelings, this is known as interpersonal learning (Meagan E Gallagher). Interpersonal feedback is a group process intervention that is hypothesized to help people increase their interpersonal learning by becoming aware of how to give and receive feedback and the impacts that this has (Yalom, 1995). This strategy is often used when working on improving the dynamics of groups but here we would be using it within the context of families. The participant learns how to how to give and receive feedback with the mediator's help.

Techniques

Different techniques will be used during the sessions and needs. Some of them include:

The Mirror technique involves "reflecting" back what was exactly said to the mediator with almost their exact words in an individual session. The purpose of this reflection is to ensure that the person's thoughts and feelings are accurately mirrored and listened to "out of self". By employing this technique, trust can be fostered between the mediator and the participant.

The Warm Chair technique involves a joint session where the parties are physically separated but present in the same mediation room. During this session, one party engages in a conversation with the mediator while the other remains silent in the background. The purpose is to create an environment where both parties actively listen to the questions and responses exchanged between the mediator and the speaking party. This allows each participant to gain insight into the other party's perspective and effectively position themselves in the mediation process.

The Changing Roles technique is specifically developed to facilitate the parties' comprehension of each other's actions, thoughts, and emotions, and to integrate them into their own communication.

The technique of Externalization guides individuals in perceiving their problems or behaviours as separate from themselves, rather than inherent and unchangeable aspects of their identity. This technique can be applied by identifying a specific emotion and engaging the participant in a dialogue using two chairs, where the emotion is given a separate voice and perspective, similar to that of another participant.

B. Family Circles

Talking Circles provide secure environments where relationships can be developed, nurtured, strengthened, and occasionally restored. These circles act as platforms for setting norms and values, as well as for fostering intellectual and emotional connections between participants. At NBrain we will use circles in two different contexts:

- *Dialogue circle for conflict transformation and accomplishment of pacts as part of the process of favouring implicit mentalization.* This circle aims to create a space that brings people together in a safe environment for dialogue and the exchange of thoughts, emotions, and stories. The circle has four objectives: to analyse the conflict situation, to change perceptions, to propose agreements, and to create new values (Munné, 2020). Once agreements are reached, decision circles can take place.

- *Circles with the Neuropsychology Mediation services. Dialogue and Neuroeducation:* These talking circles will be designed just to give free and safe spaces for families that face similar challenges due to having children with neurodevelopmental disorders to share experiences and give support to one other. We will also introduce in these sessions a Q&A section so that parents can ask the neuropsychologist questions on understanding what happens in the brain of their children structurally and cognitively to enable them to better understand the daily difficulties that their child faces and adjust routines accordingly. This in turn should help prevent relationship conflicts at home.

C. Mediation with Medical Personnel

Although we believe the NBrain Team and the abovementioned mediation circles will be able to resolve the main conflicts that emerge from lack of understanding of the medical sources, the mediator in the institution may also offer sessions with the families and external institutions if requested.

4. The Training and Values of Mediators

4.1. The Professional Background of Mediators

Mediators involved in NBrain, apart from having a degree in mediation, will also ideally have either a clinical or social work background or be trained for the specific area of expertise.

4.2. Mediator Principles

The main characteristics of the role of the mediator in transformative mediation practice are set out in Folger & Bush (1996):

- To describe the role of the mediator and the objectives of the mediation in an opening statement
- To leave the responsibility for outcomes with the participants
- To consciously refuse to be judgemental about the participants' views and decisions
- To take an optimistic view of participants' competence and motives
- To allow, and be responsive to, participants' expressions of emotions
- To allow for, and explore, participants' uncertainty enabling clarity to emerge from confusion
- To remain focused on the here-and-now of the conflict interaction
- To be responsive to participants' statements about past events since they have value for the present
- To view an intervention as a single point in a larger sequence of conflict interactions
- To feel a sense of success when empowerment and recognition occur, even in small degrees

Co-mediation, the use of two mediators to assist the participants, might be considered in complex cases, when gender balance is required or greater technical expertise is desirable. External consultancy will be used when necessary.

4.3. Limits of mediation

- Participants do not have the basic cognitive, interpersonal or emotional capabilities to represent themselves, have totally incompatible interests, or experience barriers in communication or prefer other modalities to address their conflicts.
- Cultural incompatibilities among family members.
- Situations of violence, violations of human rights, and other unsafe conditions.
- Obstacles that go beyond individuals and their relationships.

5. Conclusions

This thesis has considered the potential of N-BRAIN to significantly improve the quality of life of preterm children with neurodevelopmental difficulties and the wellbeing of their families.

By definition, mediators actively contribute to the construction of peace. For the first time it is proposed that mediators be involved in a clinical service. In the sudden impactful

situation that parents confront when a child is born prematurely, it is argued how mediators can play a significant role in assisting families to adapt to these new circumstances, guiding the participants to heal broken family patterns that occur due to the range of stressful emotional events that can disrupt harmony and peace in their daily lives. The successful application of these methods will positively benefit the relationship between parents and promote the healthy neurodevelopment of the children both from an emotional and neurobiological standpoint.

Mediators will be the first filter in the institution for the early prevention of conflict and the detection of it when this has already begun. By using methodologies based on narrative and transformational relationship dynamics, they will make an assessment of the family environment and, based on these observations, propose an action plan.

Study cases and research will be necessary in the future to confirm the benefits for children and families of the mediation service in this clinical context as well as to adjust as needed the methodology and structure of the service from a practical point of view.

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NBrain

KEY PARTNERS

- CIMA Sanitas Hospital
- Children's hospitals, neuroimaging centres, universities (UPF, University of Oxford, Aarhus University, Karolinska Institute)
- Family mediation services
- Neuroelectrics (neuromodulation therapies)
- Barcelona Medical College
- College of Psychologists of Barcelona
- Specialist clinics

KEY ACTIVITIES

- Assisting Families
- Neurorehabilitation programmes
- Technology & Research R&D
- Data Analytics
- Scientific

KEY RESOURCES

- Staff
- Technological equipment
- Partners
- Financing
- Marketing

VALUE PROPOSITIONS

- Highly specialized professionals in neurodevelopmental disorders
- First institution to integrate mediation in a clinical service to support the wellbeing of children and families
- The mediation service will enhance therapeutic treatments by detecting family conflict and helping to construct peace in homes
- Innovative institution with R+D-based therapies

CUSTOMER RELATIONSHIPS

- Website
- Newsletters
- Webinars
- Social networks
- Online and onsite consulting

CHANNELS

- Website
- Social media
- International conferences
- Paediatric services
- Reputation-based referrals

CUSTOMER BASE

- Users: families, private hospitals, educational institutions, kindergartens.
- End users: children between 0-18 years born prematurely.

COST STRUCTURE

- Rental of premises
- Neuroimaging centre for the perfomance of magnetic resonance imaging
- Cloud services, web platform
- Psychological evaluation material and non-invasive wireless brain stimulation technology
- Salaries
- Other costs

REVENUE STREAMS

- Consultation and follow-up packs, support and treatment by specialists
- Sessions of clinical therapy and brain stimulation
- Individualized sessions of mindfulness for the families
- Specialized courses and webinars for the families