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Intervention Models in Children with Autism Spectrum Disorders

Gonzalo Ros Cervera^{1,2}, María Gracia Millá Romero³,
Luis Abad Mas⁴ and Fernando Mulas Delgado^{1,5}

¹*Invanep, Valencia*

²*Elda General Hospital, Alicante*

³*Apadis Villena, Alicante*

⁴*Red Cenit, Valencia*

⁵*University Children's Hospital La Fe, Valencia
Spain*

1. Introduction

Autism spectrum disorders (ASD) are a group of developmental disorders of unknown origin that affect children in many important areas, namely language, communication and social interaction. The burden of the disorder, with an incidence of about one new case in every 100 newborns, makes its early recognition a vital task for all professionals caring for children. Although autism is a chronic condition with no specific cure nowadays, advances in the research in the last 40 years predict new hope and a better prognosis for children and adults with this group of disorders.

ASD affect children's ability to understand and interact with their environment. Our mission as therapists is to recognize their difficulties and try to enter their world in order to increase their communication and relationship skills. Therefore, it is essential to carefully observe the child, taking notes and measuring his or her abilities through the use of ASD-specific and general evaluation scales, such as the Childhood Autism Rating Scale (CARS) for parents or the McCarthy or Battelle scales for children. This initial assessment of the child's situation is critical in order to follow and measure his or her improvements, and focus the therapy based on the results.

The diagnosis of ASD is a difficult issue, not only for the child but also for the parents. Parents of newly diagnosed children need time to understand what is happening. Information is crucial, and it takes time to explain the global aspects of the disease and the planned intervention. Parents are a key element in therapy, not only because they spend the most time with the child and can generalize the new skills taught, but also because a well-informed and supportive environment warrants a better prognosis than a chaotic one.

The Early Intervention setting, with its multidisciplinary richness, is the ideal setting in which to contain and educate the family and establish a positive relationship with the aim of improving the child's abilities. Early intervention programs should pursue these goals:

- An interdisciplinary early diagnosis.
- The design and implementation of specific intervention programs.

- The use of effective resources and methods.
- Communication and interrelation with all health, educational and social services involving the child and his or her family.

Early Intervention Programs can make a difference and produce positive and permanent changes in the child. These specific programs have demonstrated their effectiveness in the containment and extinction of the core symptoms of autism, and in improving the social, communicative, attentional, and cognitive and social skills of the child. They require highly-qualified interdisciplinary professionals with definite skills and enough empathy to be in tune with the child and his or her family's needs. The end goal is not only the improvement of the child's abilities; it is also a question of his or her quality of life and well being and that of his or her family.

From a categorical point of view, there are three kinds of approaches to the intervention in ASD: biomedical, psychodynamic and psychoeducational interventions. The first two are clearly outdated, since they are not based on scientific principles. Only psychoeducational interventions, with special emphasis on behavioral techniques, are the leading approaches nowadays.

In this chapter we will review some aspects of psychological intervention in children with ASD:

- Role of Early Intervention in the management of children with ASD and their families.
- General considerations about intervention models in children with ASD.
- Classification of the intervention models.
- Description of some center-based programs.

2. Definition of autism spectrum disorders

ASD are a group of biologically-based neurodevelopmental disorders characterized by impairments in three major domains: socialization, communication, and behavior. Under ASD we refer to the autistic disorder, the pervasive developmental disorder-not otherwise specified (PDD-NOS), and Asperger's disorder. We do not include the other two disorders in the "pervasive developmental disorders" section of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR), i.e., Rett's disorder and childhood disintegrative disorder, because of the poor prognosis and differential approach in the intervention programs (see Table 1). Indeed, we will mostly speak about autism disorder and PDD-NOS, because children with Asperger's syndrome are generally diagnosed at a later age, and they do not require such an intensive behavioral treatment.

The pervasive developmental disorder-not otherwise specified (PDD-NOS) is a diagnosis used to describe patients who show some but not all of the characteristics included in one of the other autistic disorders [APA, 2000]. These children may have milder symptoms or be diagnosed at a later age. This disorder is also known as atypical autism. These children share the core deficits in communication, social behavior, emotion regulation, cognition, and interests that children with other ASD show, but their severity does not fit the restricted criteria for the other diagnoses (Autistic disorder, Asperger's disorder, Rett's disorder or CDD).

3. Early diagnosis in ASD

3.1 Etiology vs. behavioral phenotype

Discovering the etiologic factors in autism is still a priority for scientists involved in this field of study. Autism spectrum disorder can be due to different causes or a combination of

| |
|--|
| • Mental Retardation |
| • Learning Disorders |
| • Motor Skills Disorder |
| • Communication Disorders |
| • Pervasive Developmental Disorders <ul style="list-style-type: none"> • Autistic Disorder • Rett's Disorder • Childhood Disintegrative Disorder • Asperger's Disorder • Pervasive Developmental Disorder Not Otherwise Specified |
| • Attention-Deficit and Disruptive Behavior Disorders |
| • Feeding and Eating Disorders of Infancy or Early Childhood |
| • Tic Disorders |
| • Elimination Disorders |

Table 1. Disorders Usually First Diagnosed in Infancy, Childhood, or Adolescence. Reproduced from: American Psychiatric Association. Diagnostic and Statistic Manual of Mental Disorders, 4th ed. American Psychiatric Association. Washington, DC. 1996.

them, like the conjunction of genetics and environment. In the last few years there has been an increase in knowledge about the neurobiological conditions present in this disorder [Mulas et al., 2005]. However, the innate disturbance of affective contact and relationships exhibited in autism still presents a cryptogenic origin in most cases, which greatly hinders early identification and prevention designed to contain its incidence.

In recent years the empirical findings point to establishing the main cause of autism in genetically-based disorders [Díez-Cuervo, 2005]. A group of scientists has found the first clear evidence that a common genetic variation influences the development of autism. The research focuses on single nucleotide polymorphisms, which are a very common variation in the DNA sequence that affects a single base, adenine, thymine, cytosine and guanine in a sequence of the genome. It is estimated that the variants discovered could be behind up to 15% of the cases of ASD in a population [Wang et al., 2009]. Furthermore, neurobiological research on this disorder focuses on increasingly early ages. Based on the results of a study recently published in the BMC Medicine journal [Bols et al., 2011], there appears to be an endophenotype of familiar autism that is particularly evident in the electrical activity of the brain at 9 months.

These scientific advances are opening up new possibilities for early detection and for providing increasingly more accurate and appropriate tools and diagnostic criteria. But while progress is being made in understanding the true etiology of autism, there is a greater need to delve into the diagnosis of early signs and symptoms, identifying prototypical behaviors and indicators that manifest at an early age, the functional diagnosis of all the skills and strengths of children with ASD, and the entire set of consequences associated with the cognitive, linguistic, emotional and social areas.

3.2 Early symptoms in autism

Early detection of autism is the first step towards addressing the problems involved in this disorder, in order to influence the child and, if possible, improve his or her development, and enable the family to handle the difficulties arising from this situation with greater knowledge and better strategies. Despite progress in identifying characteristics of autistic

traits in the first year of life, ignorance about the presence of autistic signs on the part of the family and health and education staff limits detection and early diagnosis. The first autistic manifestations can be seen, in some cases, after six months, although they usually arise between the age of 18 months and two years [Martos, 2001].

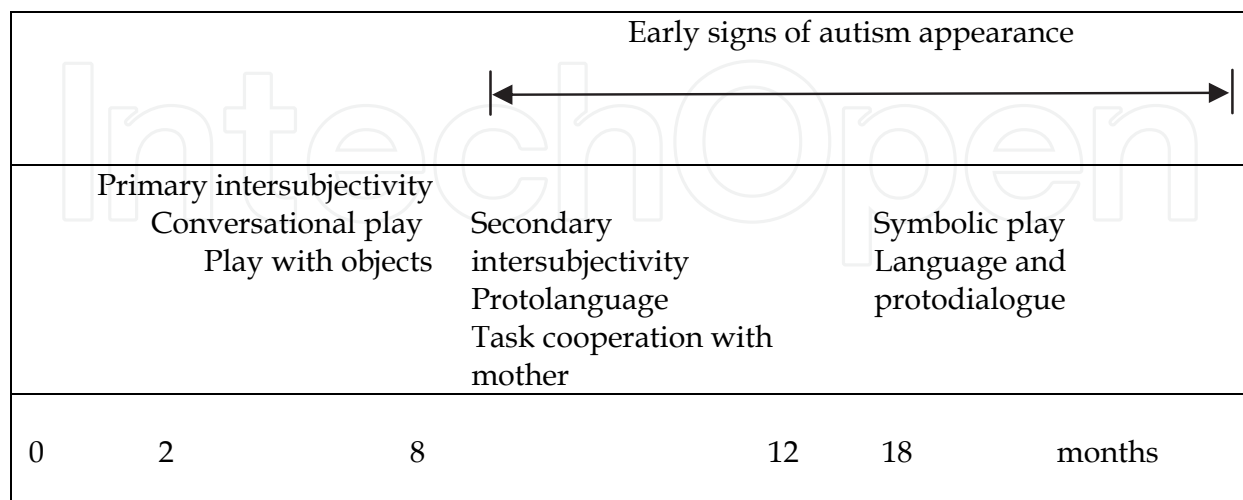


Fig. 1. Normal development and appearance of autism signs [Martos, 2001]

The first symptoms are related to social behavior areas, intersubjectivity and interpersonal relationships. We can find alterations in the response to stimuli that have a strong social component, such as eye contact, looking at the face, maintaining joint attention, pointing behavior, showing objects, or responding in some way when we say the child's name. We can also observe the presence of abnormal sensory and perceptual integration. It must be kept in mind that during the child's first year of life we can identify warning signs that correlate with this disorder (see table 1).

All of these early symptoms can occur with variable intensity and timing of their appearance. They usually anticipate the presence of qualitative impairments in social interaction and the difficulties that these children have in adjusting their behavior to others and sharing the emotional world. Likewise, they can anticipate qualitative changes in the communication skills and difficulties in the development of functional speech. Early on, there is a presence of restricted patterns of behavior and an interest in spontaneous play that tends to be unimaginative and repetitive, as well as showing little or no playing interaction with others. Anxiety expressed about changes in the environment and routines, stereotyped body movements and consolation difficulties are other features that may present at an early age.

3.3 Diagnostic process in the child with ASD

First, information about the developmental history of the child will be gathered by interviewing parents and educators. In this first phase of the diagnosis, data will be collected about the child's neurobiological development, status in the achievement of milestones in communication, social competence, receptive response, motor skills, and the onset of the first autistic symptoms. The style of relations, patterns of behavior, interactions with peers and adults, level of participation in structured dynamic groups, and adaptation to nursery or childhood education will also be investigated. To address this part of the analysis, the following tools are very useful:

| Early markers | Clinical characteristics | Associated problems |
|---|---|--|
| <ul style="list-style-type: none"> -Little or no interest in eye contact. -No orientation response when the child is mentioned. -Lack of protodeclarative pointing. -Absence of protodeclarative showing. | <ul style="list-style-type: none"> - Indifference toward the parents. - The child is not involved in social interaction games. - No answer or anticipation of beginnings of oral communication. - Absence of babbling and jargon. - Does not imitate sounds, gestures or expressions. - Not interested in toys offered. - Shows fascination with his own hands and feet. - Smells or sucks objects more than expected. - Has fragmented sleep. | <ul style="list-style-type: none"> - Sleep disturbances. - Problems with food. - Low interest in playing. - Low consolation ability. |

Table 2. Early markers of autism, clinical characteristics and associated problems.

- Autism Diagnostic Interview-Revised (ADI-R) [Lord et al., 1994]: This is a semi-structured interview for parents that makes it possible to obtain meaningful information in three key areas: reciprocal social playing interaction, communication and adaptive behaviors.
- Diagnostic Interview for Social Communication Disorder (DISC) [Wing et al., 2002]: Semi-structured interview that makes it possible to collect developmental information from different sources.
- Diagnosis Checklist for Behavior-Disturbed Children, E-2 [Howlin, 1998]: This is a questionnaire for parents that provides information about the causes and type of behavior disorder of the child.

Subsequently, the clinical examination will be carried out through observation and direct interaction with the child and the application of specific tests. This part of the diagnostic evaluation should objectively determine the child's strengths in several areas of development. The diagnosis of autism should include the use of specific diagnostic instruments of strong sensitivity and reliability. It is necessary to use tools that specifically assess the presence of autistic symptoms [10]. The diagnosis and evaluation of the ASD must be an interdisciplinary task by a specialized and experienced team, using appropriate diagnostic criteria and various procedures, and concluding with a reliable clinical judgment. It is necessary to analyze the developmental history of the child and the autistic symptoms, adaptive behavior, intellectual functioning, communication skills, social competence, interests and activities of the child. The early indicators to be assessed are the following [11]:

1. Child's social relation ability:
 - Eye contact,
 - Joint attention and action,

- The initiative for interactions,
- Emotional states,
- Reactions to physical contact,
- Response to activities with others,
- Adaptation to social patterns of behavior,
- Intersubjectivity.
- 2. Communication and language:
 - Gestural communication,
 - Comprehension and verbal expression,
 - Communicative functions,
 - Unique language characteristics of the child,
 - Presence of echolalia,
 - Ability to track orders,
 - The ability to differentiate between literal and metaphorical meaning,
 - Adequacy of the vocabulary and syntactic constructions.
- 3. The game:
 - Ability to manipulate and functional or stereotyped interaction with objects,
 - Imagination and spontaneity,
 - Symbolic play.
- 4. Behavior and mental flexibility:
 - Adaptation or opposition to changes in the environment,
 - Presence of stereotypes,
 - Rituals,
 - Presence of limited interests,
 - Obsessive behaviors.

3.4 Tests for ASD diagnosis in the early years

Currently, there is a series of tests specifically designed for the diagnosis of children with ASD that facilitate the early assessment of the child. Next, we refer to those that are more common and have a higher scientific recognition.

- Checklist for Autism in Toddlers (CHAT) [Baron-Cohen et al., 1992]. Allows early detection of the disorder by observation of deficits in three areas, for children between 18 and 36 months:
 - a. Social skills: lack of joint reference gaze and significant limitation in the interest in and emotional involvement with others.
 - b. Communication: absence of protodeclarative function.
 - c. Imaginative ability: lack of or deficit in social play and symbolic activity.
- Autism Diagnostic Observation Schedule (ADOS-G) [Lord et al., 2000]. This is a tool for the standardized observation of social behavior of children involved with different types of materials and tasks.
- Childhood Autism Rating Scale (CARS) [Schopler et al., 1990]. Evaluates 15 aspects of behavior.
- Gilliam Autism Rating Scale (GARS) [Gilliam, 1995]. This is organized into four categories: stereotypes, communication, social interaction and developmental disturbances.

- Behavior Observation Scale for Autism (BOS) [Freeman & Ritvo, 1978]. This is a scale based on the analysis of recorded video sessions.
- ACACIA [Tamarit, 1994]. This is an instrument designed for the assessment and analysis of communicative behavior and social/interpersonal skills in children with serious developmental disorders.
- List of indicators of autism typical of the 18-36 month stage by Rivière [Rivière, 2000], which describes 22 behaviors and traits that can be detected in cases where one can see the presence of this disorder.

| List of indicators of autism typical of 18-36 month stage |
|---|
| <ol style="list-style-type: none"> 1. Apparent paradoxical deafness. Failure to respond to calls and instructions. 2. Not sharing attention hotspots with the gaze. 3. Tends not to make eye contact. 4. Does not look to adults to understand relational situations that interest or surprise. 5. Does not see what people do. 6. Does not usually look at people. 7. Repetitive or ritualistic play or sort rituals. 8. Resists changes in clothes, food, itineraries and situations. 9. Greatly alters, especially in unforeseen or unexpected circumstances. 10. Novelties upset him or her. 11. Watches the same films obsessively, again and again. 12. Has tantrums in situations of change. 13. No language or, if so, in an echolalic or dysfunctional way. 14. It is difficult to "share actions" with him or her. 15. Does not point his or her finger to share experiences. 16. Does not point his or her finger to ask. 17. Frequently "passes through" people as if they were not there. 18. Does not seem to understand or "selectively understands" only what interests him or her. 19. Asks for things, situations or actions, leading by the hand. 20. Does not usually initiate interactions with adults. 21. To contact him, you have to "jump over a wall": i.e., requires facing each other, and producing clear and directive gestures. 22. Tends to ignore. |

Table 3. Early indicators of autism disorder [Riviere, 2000]

To complement all these tests and obtain further information, where possible, we will use scales of development like the Battelle Developmental Inventory [Newborg et al., 1998], which gives us information on the personal/social, adaptive, motor, communicative and cognitive areas up to eight years of age, and the Bayley Scales of Infant Development (BSID) [Bayley, 1977], with which we can evaluate children up to three years of age in the mental, motor and behavioral domains.

Regarding the assessment of cognitive potential in young children with ASD, tests to be used are:

- Uzgiris / Hunt 's Scales of Infant Development [Dunst, 1980]. Assesses the cognitive development of children less than two years old.

- Merrill-Palmer Scale of Mental Tests [Stutsman, 1931]. From 18 months.
- Leiter International Scale [Leiter, 1948]. Most suitable to evaluate the intellectual profile of people with autism from age two, it is a nonverbal test, including batteries for the assessment of thinking skills, visualization, attention and memory.
- Psychoeducational Profile Revised (PEP-R) [Schopler et al., 1990] Mesibov, Schopler and Caison (1989). An observational instrument used for nonverbal children from a mental age of 2 years.
- McCarthy Scales of Children Abilities [McCarthy, 2006]. They are composed of six scales for children from 2.5 years.
- K-ABC Kaufman & Kaufman [Kaufman & Kaufman, 1997]. This is a battery for the diagnosis of intelligence also from 2.5 years.

3.5 Assessment of the familial and social environment

For the child with autism, the environmental aspects have a special meaning, so that it is necessary to perform a systematic analysis of the child's life context. It is, therefore, necessary to understand the reality in which the child lives and his or her requirements by analyzing:

- The functional relationships between the behaviors of the child with autism and the contingencies of the environment in which they occur (e.g., in what situations the temper tantrums occur and the consequences they have.)
- The real opportunities for interaction and learning in the family.
- The perceptions that other people who are related to the child have of him, his level of anxiety, frustration, helplessness or assimilation.
- The degree of structure, directionality and predictability of the contexts in which the child develops.

Knowing about the situation in which the child grows is essential in order to help him develop his knowledge and ability to communicate, so that he connects well with others, and to adapt the settings to suit his needs. An analysis of the fostering environment should serve to improve the adaptation to the physical and relational environment, and to help the family to improve their skills and resources. The family should be aware of the resources available to the child and family and the social, health and education resources at their disposal.

4. Role of early intervention in the diagnosis and treatment of ASD

4.1 Programs of early intervention in ASD

Early Intervention programs can promote development and produce significant and lasting improvements [McEachin et al., 1993], positively modify the course of development of children with ASD [Dawson, 2003], and improve their individual understanding of the social reality in which they live, their communication and teaching. The effectiveness of these programs and the improvements experienced by children with ASD in terms of their IQ, language and visuospatial abilities have been shown [Smith et al, 2000]. In many cases there is a contention or elimination of the autistic symptoms, as well as significant improvement in perceptual responses and attentional, cognitive, communicative and social skills.

Intervention in the ASD has to target the child, family and environment, and it must be properly coordinated among all the actors involved in this task: Early Intervention Centers

(EICs), family environment, kindergarten, social and health resources and community environment. It aims to promote the adaptation of children with ASD to their living environment and community, respecting their autonomy and individuality. In addition, it must provide the family with the attention they require, so that they can improve their knowledge and strategies to promote a good family atmosphere.

Intervention should begin as soon as possible and must be based on careful individual assessment of the capabilities and difficulties of the child. Implementing an intervention program early on is highly desirable, even before definitively clarifying the diagnosis, in order to promptly manage the autistic symptoms. Interdisciplinary Early Intervention professional teams must develop comprehensive intervention programs working collaboratively with parents. They must also keep in mind that the child with ASD may experience an evolution over time. Therefore, they must respond to changes as they occur in the child due to his or her maturity and changes in capabilities and needs. Based on this, it is necessary to keep in mind the following principles of intervention:

1. Early Intervention programs should be flexible and tailored to each child's individuality and the uniqueness of his family.
2. Each child shall be given a cognitive-behavioral and environmental intervention process.
3. The intervention has to address the child with ASD, the family and all the environments in which the child develops.
4. The intervention has to promote the welfare and quality of life of children with ASD throughout their developmental process.

The working plan has to fit the particular cognitive characteristics and relationships of each child, procuring well-structured environments in which to facilitate the keys to understanding the tasks and anticipating what will be done at each point in time. It is necessary for the program activities to be playful, meaningful and functional, adapted to the child's cognitive potential, with reference to his or her natural surroundings. Empathy and positive reinforcement are of particular significance in the Early Intervention program for children with ASD. We must use those aids, visual, physical or verbal, that can facilitate the child's internalization of the reality and enable improvements in his or her understanding and adaptation.

We believe, as indicated by Juan Martos [Martos, 2005], that any program which provides early intervention with a sufficient and regular external organizational scaffolding that encourages the application of the child's cognitive and self-regulatory capacities in a wide variety of social interaction tasks can be of great benefit to children with autism throughout the preschool years. As long as this intervention is not aversive, the child may benefit from social stimuli, which can mitigate the secondary neurodevelopmental disturbances; such disturbances may be related to the difficulties of the diminished social interaction in the early years of life. Therefore, providing a service of quality which responds fully and satisfactorily to the issues presented by the children, arising from disabilities such as ASD or the risk of suffering them, to their families, and to the environment in which life develops, is a very large and complex task. It requires a set of material resources and highly-qualified human teams [Millá, 2005], in addition to specific skills and the necessary empathy to be in tune with child and family. The intervention must also be conducted in an interdisciplinary way in order to address all aspects of eventual dysfunctions, either in social behavior, in the management of communication and language or in the behavior. The intervention aims to improve the situation and skills of children with ASD, while providing welfare and quality of life.

Professionals working with children with ASD should remember that the intervention will consist mainly of promoting and improving their adaptation to their physical, cultural and social environment and helping their families to participate in this task and improve their skills and resources for dealing with having a child with ASD. Achieving improvements in the conditions of child development requires the involvement of people around the child and the support of social, health and education providers, who foster major changes in the management of this disorder in the child's daily life and in his or her social and family status.

4.2 Intervention with the child

The planned intervention from the field of Early Intervention should consider the whole child with ASD, caring for all areas of development. In the intervention program, priorities for action should be established to improve social competences, communication and language skills, play and adaptive and behavior skills.

One of the biggest challenges associated with ASD children is their lack of social approach and the absence of response to the initiatives of others towards them. The intervention means that professionals must make a deliberate intrusion into the child's solitary activities, so that he will be involved with other people in doing his or her favorite activities. This effort should be undertaken in such a way that social interaction is pleasant for the child, structuring interactions to be reciprocal and social rather than isolated and lonely. The active structuration of the early social experiences can lead to significant improvements in social interactions of children with ASD. For more and better social responses of children with this disorder, Early Intervention professionals have to adapt themselves to the idiosyncrasies of the child and family, and direct and be persistent in their interactions and play with the child.

The contents of the intervention program must be established on the basis of the results of the diagnostic evaluation of the child with ASD. It should be based on the skills and competences that the child has, and then continue with the behaviors that begin to emerge and those that, from a developmental standpoint, he should acquire. In the work program for children with ASD, every dimension of child development must be considered and improved globally in all areas: Personal / social, Cognition, Communication, Motor, and Adaptive. However, specifically, we believe that the Early Intervention program for these children has to mainly contemplate perceptual enrichment, and it should put an emphasis on communication and social skills training and intersubjectivity.

Perception and joint attention play a fundamental role in capturing and internalizing the surrounding reality, so that the work on these skills in children with ASD has to be performed from the start of the intervention. The improvement in cognitive abilities by imitating actions, through observational and modeling learning methods, the internalization of concepts or cultural elements, is central to early intervention. We must improve the knowledge the child has of the reality in which he lives through meaningful experiences that will lead him to the reality he should know. Enabling the communication and language of children with ASD is a substantial issue that will improve their skills in symbolic representation and interaction with others. If oral skills cannot be developed, augmentative and alternative systems of communication can help mitigate this limitation. By means of the Early Intervention program, it should be ensured that the child with ASD can improve his or her ability to understand and assimilate interactions with others and improve intersubjective relations, co-regulation and social behavior. To enhance all these skills, the Early Intervention program should [Millá & Mulas, 2009]:

- Create a work environment that offers security to the child in establishing emotional links and enhance empathy.
- Propose an individualized program which starts with the domains and skills the child with ASD has to move forward systematically in his or her area of potential development.
- Carry out the activities in a fun and functional way using as a working model of meaningful learning and incorporating elements of the everyday life context in the child's language.
- Respect the work rate of the children, introducing in the sessions a variety of tasks that meet their learning style, their motivations and interests.
- Use technical aids, visual signs, or augmentative communication systems that allow alternative language to enable the child's language, with the Early Intervention technicians offering a transparent verbal model about the meaning that is simplified in lexical selection and verbal structures.
- Enhance assimilation and adaptation to social situations, encouraging personal interactions with members of the family system, with EIC professionals, and the integration with other children in their environment and kindergarten or school mates.
- Provide children with necessary aid to do the activities of early intervention programs, so that those that will be performed at home or in the school context can be understandable and predictable for him.
- Promote the reduction and elimination of rituals, stereotypes or routines through extinction strategies and behavior modification techniques.
- Following criteria for generalization and individualization and providing structured and predictable environments for children help to obtain better responses from the child, improving his or her skills and quality of life.
- Provide the family with the knowledge and strategies needed to participate in the Early Intervention program and to assist in achieving the objectives.

Systematic and structured Early Intervention Programs demonstrate that they are the most effective intervention from early childhood to improve the prognosis of children with ASD, as most of these children respond favorably, changing the autistic symptoms and improving their attentional, cognitive, communicative and social skills, which contributes significantly to improving their adaptability and their behavior [Grupo de Estudios de Trastornos del Espectro Autista, 2006].

4.3 Intervention with the family

The diagnosis of ASD means the beginning of a process of assimilation of a new and complex reality by the family. Having a child with this disorder causes a breakdown of the expectations that were created around having a child. The initial emotional shock of the parents is a sense of personal failure and feelings of confusion. They find it very difficult to understand the new situation, and they need clear and concise information to start adapting to it, accepting it and learning to live with the problems generated by having a child with ASD.

We must consider the family as a partner in developing the intervention program with the child, but at the same time, it also has to be the subject of intervention. The interdisciplinary teams should first seek familiar cohesion and provide the necessary support and the accompaniment in light of the new family circumstances. The main goal of family intervention is to help parents overcome the various phases of the process of assuming the new reality and meet their demands and needs. The information provided about ASD in

general, and the situation of the child in particular, should gradually be offered by the Early Intervention professionals, so that the family can properly assimilate and integrate it. It is very important to achieve the adjustment of parental expectations to the real possibilities of the child. Parents need to understand the characteristics of ASD so they can realistically accept symptomatic manifestations of their autistic child. To the extent that parents have a better understanding of the reality of their child and can adapt their environment to the physical, emotional, mental and social needs of the child, the better the child's development will be [Millá, 2005].

The training we can provide parents reassures them in their parenting role and improves their ability to participate actively in their child's development. Family intervention has to provide guidelines for a structured environment for the child in order to encourage communication and empower his autonomy, to improve family interactions, and to perform daily activities and games to enhance the desired routines, behavior and emotional responses of the child. The family environment is the primary socializing agent of the child with ASD, and in this environment behavioral patterns have to be offered that help in his developmental process and improve the developmental course. Benchmarks to adjust the family situation include the following:

1. Organize the environment to make it more predictable for the child.
2. Use clear gestures and simple language to facilitate understanding.
3. Parents must provide the child with experiences in a fun and safe environment, fostering his or her emotional development.
4. Avoid complex environments that are noisy, very stimulating or unstructured.
5. Be patient and have strategies for setting limits on behavioral disturbances and stereotyped behaviors or rituals.

EICs should also ensure the families the support they need to improve the functioning of the family system, providing them with available community resources, financial assistance, respite services, etc.

The presence in the family of a child with ASD can be an awkward situation for siblings. They suffer from broken expectations, expecting a sibling with whom to play and share, but having to deal with a very different reality. The Early Intervention program should also offer support for siblings of children with ASD, creating a space in which to express their concerns and anxieties, where they can feel supported and acquire knowledge, skills and strategies to interact more effectively with their sibling. In this sense, it is necessary to explain and educate them about the difficulties of the child with ASD, request their participation in simple tasks of the intervention program, make them feel they are very important people and responsible for acting with their brother or sister, and set aside time to stay and play with him or her and express their affection.

4.4 Intervention with the environment

Children with ASD, like the rest of the child population, are involved in idiosyncratic social contexts where they have to incorporate cultural references, language or behavior particularities, and where they will grow in the company of their families. As some of the major characteristics of ASD are the social deficits and the difficulty in interacting with the environment, it must be ensured that these children have access to community resources in a manner that fits their style of relationships and their adaptive possibilities. It is very important that from a young age they become familiar with the physical and social environment where they live, the home, neighborhood, park, kindergarten, etc., as a way to

join the social life that corresponds to them by age. From the Early Intervention teams, it is necessary to influence the participation of the elements and agents of the child's world and the suitability of the environment to the individual characteristics of the child.

As for health services in general and pediatric neurology services in particular, there has to be a close collaboration and coordination among professionals and the EIC, in order to address the diagnostic and intervention planning. It is necessary to maintain this coordination while carrying out the specific program of Early Intervention, which will unify criteria for action and offer common information to the family, avoiding confusion and contradictions.

Toddlers with ASD are usually enrolled in kindergartens or nursery schools; for that reason, professionals in these centers and Early Intervention professionals together must agree on the objectives and methodology to be followed, the most suitable adaptation of the environment, the selection of teaching contents, and the support in the school setting. The relationship between infant school and EIC must be based on collaborative attitudes, and it has to provide resources and advice to facilitate the integration process and the maximum development of the child. It tries to procure a context as normalized as possible and adopt measures that encourage the incorporation of the child into normal dynamic activities.

In certain cases, it may be necessary to use the social services to provide support for the child or the family in certain circumstances of socioeconomic disadvantage or difficulties. It can also be necessary to use, in the presence of specific problems, mental health services for children and adolescents. In sum, the specific program of Early Intervention also has to address all the factors from the environment that can contribute to improving the living conditions and opportunities for the development of the child with ASD.

5. Common features of an effective intervention program

There are dozens of intervention programs suggested in the literature. All of them claim benefits from their use. The problem lies most of all in the generalization of the benefits, because children with ASD do learn new skills, but they often fail to use them in settings other than the educational or center-based ones.

In general, there is a consensus that education and community help are key elements to promote communication and social skills in children with ASD [Fuentes-Biggi et al., 2006]. Core features that a successful autism educational program should include have been suggested [Dawson & Osterling, 1997; Myers & Jonson, 2007; NRC, 2001]:

- A high staff-to-student ratio (1:1 or 1:2).
- Individualized programming for each child.
- Teachers with special expertise in working with children with autism.
- Ongoing program evaluation and adjustment.
- A curriculum emphasizing attention, imitation, communication, play, and social interaction.
- A highly supportive teaching environment.
- Predictability and structure.
- Functional analysis of behavior problems.
- Transition planning.
- Family involvement.
- Close monitoring and modification as the child's needs change.

6. Classification of the intervention models

Intervention in children with ASD has changed a lot since the early beginnings in the 1950s, when the psychodynamic theories were predominant. Until the 1980s, most ASD children didn't go to school; they were simply rejected or institutionalized, as if they were fools or insane. A bad relationship between children and parents was assumed as an explanation for the disorder. Since then, the Special Needs Education Program has offered a curriculum for all these children, which nowadays is called the Individualized Education Program (IEP).

The IEP is a paradigm that exists in the United States, following the Individuals with Disabilities Education Act (IDEA), which is a law from 2004 intended to protect children with disabilities and ensure them a correct education plan [IDEA, 2004]. It is a multidisciplinary, team-developed plan required for every child receiving special education services, and should include: the present level of the child's development, the annual goals and how they will be measured, the school personnel needs and how long the child will participate with children without special needs. With variations, the idea of a curriculum for people with ASD is developed in all countries managing these children.

In general, there is a secular trend toward improvement in the ASD symptomatology with the intervention programs. Howlin categorizes the outcome of the ASD programs as good, fair and poor (see Table 3), depending on the independence achieved by the children after the intervention (Howlin, 2005). There has been a change from the initial interventions before the 1980s to the later ones [Volkmar, 2011]. Of course, the outcome is related to the initial severity of the core symptoms, and a higher IQ and better language capabilities of the child at the time of diagnosis have been correlated with a better prognosis in communication and social competence [Sigman & McGovern; Szatmari et al., 2003].

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|---|
| Good: moderate to high levels of independence living/job, some friends/ acquaintances |
| Fair: need support at work/home but some autonomy |
| Poor: living in situation with close supervision in most activities |

Table 4. Classification of outcomes in the ASD intervention studies

There is a general lack of good scientific validation of the effectiveness of the various intervention methods [Seida et al., 2009]. The scientific approach, with random assignment to the groups and even separation into treatment and no treatment groups, makes it difficult and sometimes illegal to keep autism children from receiving treatment.

In order to classify the intervention programs, there are different criteria to use. For example:

- According to the setting where it is instructed:
 - Center-based programs.
 - Home-based programs.
 - School-based programs.
- According to the target age of the children:
 - Early Intervention programs (until 3-4 years, depending on the country).
 - School age programs.
 - Adult age programs.

In this review, we will summarize the intervention models based on the type of intervention, i.e., according to its nature. Each model focuses on some or all of the aspects involved in the definition of ASD, in trying to:

- Increase social skills.
- Increase communication skills.
- Decrease maladaptive behaviors.

We will not discuss whether school-based, home-based or center-based interventions are best because there are many issues that make it difficult to interpret and generalize the results about the efficacy of the different intervention programs [Matson, 2007; NRC, 2001; Ospina et al., 2008]:

- ASD represents a complex diagnosis, involving a wide repertory of symptoms. Therefore, each intervention program can focus on improving some symptoms but not others. Thus, it is important to be aware of this while evaluating the study population and the outcomes of each paper reported.
- Interventions in children with ASD, by their nature, are complex and varied. There are many components suitable to be implemented in different ways and by different personnel (sometimes not professional) and in different settings, making it difficult to generalize the outcomes.
- Group comparison can be delicate because there are many studies that compare an active group receiving treatment with a no treatment or waiting list group, thus overestimating the intervention effect, due to the negative perspective of the no intervention group.
- Outcome variations can be accounted for by a different follow-up period. The time to follow-up must be in accordance with the nature of the intervention, and it must be studied whether the effects remain in the long term.
- Results should be rated according to the methodological quality and its bias potential (over or underestimation of the treatment effect). Furthermore, the publication bias tends to publish fewer studies with no or a negative effect.

A main classification of the intervention models follows [Roberts, 2004], which we will use to discuss the main intervention models (see Table 4 for details):

- Biologically Based Interventions
- Psychodynamic Interventions
- Educational Interventions

6.1 Biologically based interventions

Although educational interventions seem to be the most effective approach in the rehabilitation of children with ASD, there has been a continuous sprouting of new controversial treatment approaches that claim to “cure” the autism [Weiss et al, 2008]. Of course, there is a role for medication in treating challenging behaviors (i.e., typical and atypical antipsychotics) and attention-deficit (stimulants and non-stimulants), and for the treatment of epilepsy-associated problems. We will briefly discuss some medications or medical interventions that are supposed to be aimed at treating the core deficits in ASD [Weissman et al., 2010]:

- Melatonin: we are not referring to its use in sleep regulation in children with ASD after trying behavioral interventions, where it can be of benefit [Garstang & Wallis, 2006; Paavonen et al., 2003]. Although some studies suggest an abnormal production of melatonin in children with ASD [Johnson et al., 2009], there is no evidence that its use improves the core deficits in ASD.

| |
|---|
| <ul style="list-style-type: none"> - Biologically Based Interventions <ul style="list-style-type: none"> o Medication o Complementary and alternative medicine |
| <ul style="list-style-type: none"> - Psychodynamic Interventions |
| <ul style="list-style-type: none"> - Educational Interventions <ul style="list-style-type: none"> o Behavioral Interventions <ul style="list-style-type: none"> ▪ Early intensive behavioral intervention (EIBI) ▪ Contemporary Applied Behavior Analysis <ul style="list-style-type: none"> • Pivotal Response Training (PRT) • Natural Language Paradigm (NLP) • Incidental Teaching o Developmental Interventions <ul style="list-style-type: none"> ▪ Floor Time (DIR) ▪ Responsive Teaching (RT) ▪ Relationship Development Intervention (RDI) o Therapy Based Interventions <ul style="list-style-type: none"> ▪ Communication Focused Interventions <ul style="list-style-type: none"> • Visual Strategies and Visually Cued Instruction • Manual Signing • The Picture Exchange Communication System (PECS) • Social Stories • Speech Generating Devices • Facilitated Communication (FC) • Functional Communication Training (FCT) ▪ Sensory-Motor Interventions <ul style="list-style-type: none"> • Auditory Integration Training (AIT) • Sensory Integration o Combined Interventions <ul style="list-style-type: none"> ▪ The SCERTS Model ▪ Treatment and Education of Autistic and related Communication Handicapped Children (TEACCH) ▪ Learning Experiences-An Alternative Program for Preschoolers and Parents (LEAP) o Family Based Interventions <ul style="list-style-type: none"> ▪ Family-Centered Positive Behavior Support (PBS) Programs ▪ The Hanen Program (More than Words) |

Table 5. Classification of the intervention models in ASD.

- Naltrexone: is an opiate antagonist that has been hypothesized to be helpful in reducing the symptoms of autism by blocking endogenous opioids that may be released during self-injurious repetitive behaviors, but it has not been effective in improving the core deficits in autism, although it can ameliorate the challenging behaviors [Posey et al., 2008].
- Secretin: is a gastrointestinal hormone that inhibits intestinal mobility and release of gastric acid and stimulates secretion of pancreatic fluid and bicarbonate. It has been studied because of the frequent complaints of abdominal pain in children with ASD, but it has shown no evidence in multiple studies [Williams, KW et al., 2005].
- Antifungal agents: based on a supposed urinary candida overgrowth in children with ASD, there have been several antifungal agents used (e.g., nystatin or fluconazole). There are no systematic reviews of the efficacy of this treatment, and most clinical guidelines do not recommend its use.
- Intravenous immunoglobulin: based on the fact that fetal brain development is related to a prenatal immune response, its use has potential adverse effects, and it has not shown any improvement in the core deficits in ASD [DelGiudice-Asch et al, 1999; Pliopys, 1998]. It is not recommended as a treatment for autism [Feasby et al, 2007].
- Chelation: is the process of administering substances (like ethylene diamine tetra-acetic acid [EDTA] for example), to remove heavy metals from the body. Linked to the thimerosal and vaccines theory, there is no evidence to suggest that these treatments are effective [Demicheli et al., 2005; Madsen et al., 2003].
- Hyperbaric oxygen: based upon the hypothesis that increasing atmospheric pressure enhances oxygen delivery to the brain, there was an initial interest in its use for treating the core deficits in ASD [Rossignol, 2007], but a recent study [Jepson, 2011] failed to replicate the benefits.
- Dietary Interventions: there have been multiple proposals of avoiding or supplementing diets in order to benefit ASD symptoms. From omega-3 fatty acids [Bent et al., 2009], B6-magnesium supplementation [Nye & Brice, 2005], dimethylglycine [Kern et al., 2001], probiotics [Parr, 2008], folic acid [Main et al., 2010], methycobalamin, vitamin C, zinc, digestive enzymes [Levy & Hyman, 2008], to gluten-free or casein-free diets, none of them has achieved significant and clinical relevance in ameliorating the core ASD deficits [Millward et al., 2009].

6.2 Psychodynamic interventions

Psychodynamic therapies are based on the assumption that autism is the result of the exposure of a developing child to a “cold” ambient, i.e., the cause of the symptoms would be found in the way parents had raised their child. This explanation was raised in the psychoanalytic years, where Kanner [Kanner, 1943] described his first patients, and it reached its height with Bettelheim [Bettelheim, 1967], who sometimes treated them with a “parentectomy”, putting them in residential institutions.

Psychodynamic therapies are seldom used today, as there is strong evidence to support the perspective that autism is a developmental and cognitive disorder, rather than an emotional disorder, and there is little empirical evidence demonstrating the effectiveness of psychodynamic interventions. Today there are still some authors who support these theories [Hobson, 1990], and intervention models like “Holding Therapy” [Tinbergen & Tinbergen, 1983] or “Pheraplay” [Des Lauriers, 1978] were developed, although there is no evidence of their utility.

6.3 Educational interventions

The importance of early intensive and educational interventions in improving the core deficits in ASD is well-documented [Howlin et al., 2009; Ospina et al., 2008; Seida et al., 2009; Spreckley & Boyd, 2009]. The goals of treatment are to maximize independent functioning and improve quality of life. Nowadays, there is no doubt that certain behavioral and educational treatment strategies improve the core deficits in ASD (behavior, language and peer interaction) and intelligence scores, so the questions are how soon to begin a particular intervention program and how to choose the appropriate method for each child [Reichow & Wolery, 2009; SIGN, 2007].

The educational interventions can be described as behavioral, developmental, therapy-based or combined.

6.3.1 Behavioral interventions

Behavioral interventions are now considered an “established” treatment for ASD children, although they should not be expected to lead to normal functioning [National Autism Center, 2009; Spreckley & Boyd, 2009]. They may improve the core symptoms of ASD, mainly in the first 12 months of treatment. Behavioral interventions are those in which instrumental learning techniques constitute the predominant feature of the intervention approach, based on the principles of behavior modification.

Ivar Lovaas and colleagues pioneered one of these intensive behavioral interventions, Applied Behavioral Analysis (ABA) in the 1960s [Lovaas & Simmons, 1969]. It seeks to reinforce desirable behaviors and decrease undesirable behaviors, teaching new skills and generalizing them through repeated reward-based trials. It requires a low student-to-therapist ratio and very intensive intervention (at least 25 hours a week). At this time, this is the only evidence-based approach to intensive early intervention for children with autism [Frea & McNerney., 2008].

Discrete trial training (DTT), originally developed by Ivar Lovaas, is the most structured form of intensive therapy. It consists of breaking down skills into more discrete components to be taught in a stepwise fashion: the therapist presents an instruction (stimulus), prompts a response, waits for the child’s response, and provides an appropriate consequence depending on the response [Francis, 2005]. The original behavioral interventions, based almost exclusively on DTT techniques, were developed at the University of California, Los Angeles under the Young Autism Project [Lovass, 1987; Lovaas, 2003], and although they have demonstrated benefits in attention, imitation, obedience and discrimination, they have been criticized because of the lack of generalization and because the structured setting does not represent more naturalistic interactions between adults and children [Myers, 2007].

For this reason, contemporary ABA programs have been developed, which are taught in more naturalistic settings, with methods like Pivotal Response Training (PRT), the Natural Language Teaching Paradigm [Koegel et al., 1998] or Incidental Teaching [Hart & Risley, 1975], where the child initiates the interaction, improving the generalization of the skills [Schreibmann & Ingersoll, 2005]. In the current literature, the term Early Intensive Behavioral Interventions (EIBI) has arisen to summarize all these approaches, and it is accepted that they promote changes in the intelligence quotient and positive changes in adaptive skills and expressive and receptive language skills. New trends in the Contemporary ABA techniques include Positive Behavioral Support [Horner et al., 1993], Functional Assessment [O’Neill et al., 1997] and Functional Communication Training [Durrand, 1993], with its “errorless” teaching.

6.3.2 Developmental interventions

Also known as normalized interventions, they focus on the ability of the child to form positive relationships with other people. They focus on teaching essential skills (social communication, emotional relationships, cognitive abilities) that were not learned at the expected age, and include the Denver model, the Developmental Individual Difference Relationship-based approach (DIR or Floor Time) [Greenspan, 1998] and Responsive Teaching [Myers & Johnson, 2007].

6.3.3 Therapy based interventions

The Communication Interventions are strategies that promote communication skills in order to improve overall functioning. They include the use of behavioral strategies like Functional Communication Training, or the use of augmentative communication strategies.

The Sensory-Motor interventions are based on the hypothesis that various sensory experiences (e.g., visual, tactile, auditory) will help to guide development. The studies have not clearly demonstrated significant benefits [Parr, 2008].

6.3.4 Combined interventions

They include more than one interventional model, but mainly based on a specific approach. For example, the Social Communication, Emotional Regulation, Transactional Support (SCERTS) program is a developmentally-based model [Wetherby & Prizant, 2000]. The Early Start Denver Model (ESDM) uses a mixture of a clear behavioral approach with a relationship-based model, and it uses the parents as therapists [Dawson et al., 2010]. Another approach is the Learning Experiences-An Alternative Program for Preschoolers and Parents (LEAP), with a developmental basis and behavioral instruction for parents [Strain & Hoyson, 2000].

The Treatment and Education of autistic and related Communication-handicapped Children (TEACCH) method is a “whole life” approach, and focuses on structuring the environment in order to facilitate skill development and independence. It is currently an “established” model in interventions with children with ASD [Panerai et al., 2002]. The principles of the TEACCH model are (www.teacch.com/whatis.html):

- Understanding the culture of autism
- Using an individualized person- and family-centered plan
- Organizing the physical environment
- A predictable sequence of activities
- Visual schedules
- Routines with flexibility
- Structured work/activity systems
- Visually structured activities

7. Conclusion

The intervention in the child with ASD will be mainly based on promoting a better adaptation to his physical, cultural and social environment, and helping his family to participate of this labor and improve the skills and resources with which to confront having a child with this disorder.

Early intervention programs for children with ASD should be aimed at improving the overall situation of the child, his abilities and skills, but they must also try to improve his

quality of life and that of his family. These programs produce significant and lasting improvements, but this intervention must be carried out with a holistic and interdisciplinary approach, addressing all issues that pose dysfunctions.

There are multiple intervention models, most of them claiming clear benefits. There is a lack of good, controlled, unbiased studies with a large enough population to establish good scientific evidence that would recommend one intervention or another. Of all the models, the behavioral one has shown some benefits, although the developmental and communication-focused approaches can also improve the social and relation skills of the child with ASD. Nowadays, the trend is to combine the best of various models in a structured fashion and with testing to measure the benefits achieved. The prognosis of children with ASD has improved in the last 50 years, when some children were institutionalized as the only treatment.

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Autism spectrum disorders are a major topic for research. The causes are now thought to be largely genetic although the genes involved are only slowly being traced. The effects of ASD are often devastating and families and schools have to adapt to provide the best for people with ASD to attain their potential. This book describes some of the interventions and modifications that can benefit people with ASD.

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University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
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Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

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