

NEWS IN EARLY INTERVENTION IN AUTISM

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SUMMARY

Background: Autism Spectrum Disorder (ASD) is a complex neurodevelopmental trouble which prevents the child from socio-communicative interaction, and learning from his environment. Non-medical early intervention attempts to improve prognosis. We will review the main current hypothesis, intervention models and scientific supports about early intervention.

Methods: We conducted a search of the literature published on Medline between 2010 and 2015 related to intervention models provided to children with ASD aged less than 3 years. Data were extracted from systematic reviews and recent randomized controlled trials with moderate to high GRADE quality of evidence.

Results: Early intervention refers to brain plasticity theory. With the epidemiological studies of infant "at risk" there is an attempt to intervene earlier before full syndrome is present. Interventions tend to follow more on a developmental hierarchy of socio-communicative skills and to focus on the dyadic relation between the child and the caregivers to improve the core autistic symptoms. Over the last 6 years, there's been news and fine-tuned ways about early intervention, and more and more systematic evaluation.

Conclusion: However, there are only few interventions which were evaluated in trial with a strong GRADE recommendation and all of them have methodological concerns. It is important to be cautious in recommendations for mental health politic, even if it is important to improve access to services for all children and their families, hence finance and design rigorous project in research.

Key words: autism spectrum disorder - early intervention - parent-mediated intervention

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INTRODUCTION

Individuals with Autism Spectrum Disorder (ASD) have a neurodevelopmental disorder characterized by a social interaction and communication skills deficit, associated to a restricted repertoire of interests and behaviors, and atypical sensory reactivity (American Psychiatric Association, DSM-V 2015). ASD is highly prevalent, with males being affected more than female (Fombonne 2003, Yeargin-Allsopp 2008). Individuals with ASD have intellectual disability (IQ<70) in 55%, but also 3% have high potential (IQ>130), according to the epidemiological study of Charman et al. (2011). They frequently have other neurodevelopmental disorders (in particular Attention Deficit Hyperactivity Disorders, specific motor and language disorders), medical, neurological and/or genetic conditions (e.g. Epilepsia). ASD is highly heritable. According to the review of Berg and Gerschwind (2012) concordance rates among monozygotic twins, dizygotic twins, and siblings are 50-90%, 0-30%, and 3-26%, respectively, supporting a major genetic contribution. Thus, ASD is a wide and heterogeneous spectrum composed of individuals with very different behaviors and cognitive skills. It involves individual, family and society (Yeargin-Allsopp 2008, Howlin et al. 2004, Hayes et al. 2013, Ganz 2007). There is currently no curative treatment.

Description of children with autistic syndrome began at the beginning of the 20th century (Ssucharewa 1996, Wing 2005). It was progressively from 1960-

1970s, that there were more detections with the advent of epidemiologic studies (Evans 2013). It was also the beginning of a new developmental conception in terms of cognitive abilities and disabilities (Evans 2013). This will also go hand in hand with the advent of therapies, such as speech therapy and behavioral therapy. Hypothesis to intervene early in development came also at the same time, based on the clinical observation of a better brain ability for compensating after brain damages in early childhood in comparison with adulthood. That was attributed to a better brain plasticity, which allows reorganization for brain area functions (Sperry 1968).

This paper will review the main current hypothesis, intervention models and scientific supports about early intervention.

METHODS

We conducted a search of the literature published on Medline between 2010 and 2015 related to intervention models provided to children with ASD aged less than 3 years. The search strategy cross-referenced terms with the following request: ("child development disorders, pervasive" or "autistic disorder" or "autistic" or "autism") AND ("early intervention" or "intervention") with an age filter ("infant, birth-23 months" or "preschool children, 2-5 years"). Data were extracted from systematic reviews, randomized controlled trials with moderate or high GRADE quality of evidence (Guyatt 2008) and book/ manual about models.

RESULTS

Toward intervention on risk factors

ASD is a developmental disorder and as such it results probably from complex interactions between genes and environment that alter progressively the development of brain structures and brain functions. The consequence is an alteration to learn from environment (Glica et al. 2014). Cohort of infant “at risk” looks for early particularities observed in infants, who will later develop ASD. Early particularities frequently detected are deficit in social orientation, poor eye contact, atypical object manipulation or sensorial particularities and deficit in flexibility. A developmental hypothesis is that these symptoms involve, each time, different experiences of environment and progressively alter the course of early development (Dawson et al. 2008, Webb 2014, Klin et al. 2105). For example, it is hypothesized that early social particularities impact social interaction reciprocity, “platform” for social and language skills development, and thus social brain specialization (Klin 2015). Furthermore, early particularities can impact flexibility (tested for e.g. with attention disengagement task), and thus attention brain specialization (Glica et al. 2014). Thus, current hypothesis is to detect infants at risk before the full syndrome is present and to implement treatments to alter the course of early behavioral and brain development (Dawson et al. 2008). However, symptoms observed after 3 years in the complete clinical diagnosis probably do not result only from early neurodevelopmental particularities, but also from adaptations and compounded effects resulting from altered patterns of interaction between the child and his/her physical and relation environment (Glica et al. 2014). A child who looks for less social interaction than another one can lead fewer social answers of the environment and thus fewer social experiences. That is even more likely to decrease its social abilities. Thus, modifying answer of the relation environment (e.g. parent responsiveness and sensitivity) could have an effect on the development of the child “at risk” of ASD. There is only one paper with moderate/ high GRADE quality of evidence about this subject (Green 2015).

Toward developmental orientation and parent emphasized intervention

Interventions can be divided into comprehensive and targeted interventions. We will review here only targeted interventions focusing on socio-communicative skills. These interventions aim to improve the core of autism symptoms. However, we don't deny the importance in targeted interventions focusing on management of comorbid conditions, food selectivity and challenging behaviours.

Interventions can be driven by professional and/or mediated by parents. We will review here only interventions, in children younger than 3 years, who have been

evaluated in trials with moderate or high GRADE quality of evidence (Guyatt et al. 2008) according to the last review of Zwaigenbaum et al. (2016).

Early intensive behavioral intervention (EIBI) refers to interventions which consist of the application of applied behavioral analysis principles and procedures in the goal of a comprehensive habilitation of young children with ASD (Granpeesheh et al. 2009). EIBI were not first designed to address primarily socio-communicative interaction deficit. EIBI was first designed for “Teaching developmentally disabled children” as titled by Lovaas (1981). It attempts to address all impaired areas of functioning. EIBI interventions are founded on what is usually called principles of learning and motivation, such as positive reinforcement, extinction, stimulus control, and generalization. EIBI programs were first primarily composed of discrete trial training (DDT), which is a structured teaching format. Later, EIBI programs have used less DTT and more natural environment training (NET). According to the authors, that teaching format, learning trials are more initiated by the learner than the therapist (Granpeesheh et al. 2009). This teaching format is used in therapy such incidental teaching, “milieu” teaching and pivotal response training (Kaiser & Trent 2007, Koegel et al. 2010). NET may lead to enhanced generalization of skills and fewer negative reactions from the children.

Denver model was developed in the 80s (Rogers et al. 2010). It was founded on communication, language, cognition, perception, and emotional developmental principles of Jerome Bruner, Jean Piaget and Daniel Stern and their followers (Bruner 1983, Piager 1963, Stern 1985, Tomasselo et al. 1992, Rogers et al. 2010). First goals of Denver model were to improve reciprocal social imitation, pretend play, non-verbal communication and flexibility which are the core autism symptoms. According to the manual, intervention is based on quality of joint activity routine and dyadic engagement. Denver techniques may allow tuning and adaptation to the atypical relation in ASD (Tordjman et al. 2015). To do that, the interaction and activity begin from the interest of the child such as desired object, sensorial interest, etc. Activity is co-constructed with the child and elaborated to progressively bring him toward new skills. The last version of Denver model-Early Start Denver Model (ESDM) is completed by behavioral approaches. ESDM can be implemented by professional and/or by parents (Rogers et al. 2012).

Joint Attention intervention and More than word program or Hanen program (Kasari et al. 2010, Kasari et al. 2012, Carter 2010) are brief socio-communicative targeted interventions. They are implemented by professionals and/or caregivers.

Pre-school autism communication therapy (PACT) is also a brief socio-communicative targeted intervention. It is parent-mediated and video-aided intervention designed to improve socio-communicative skills in children with ASD (Green et al. 2010). It follows a

developmental orientation. The aim of the intervention is to increase parents' responsiveness and sensibility to child communication. Parents learn to identify window of opportunity to facilitate joint interactions, enhance emerging communication, elicit child intentionality and to support language comprehension according to the PACT manual.

The course of the early interventions emphasizes social interaction and the role of parents. Social interaction becomes not only a reinforcer but the focus of the intervention. Moreover, parent-mediated interventions are highlighted because they facilitate the integration of learning opportunities into everyday activities, capitalization on "teachable moments", and generalization of skills (Zwaigenbaum et al. 2016). Parent-mediated intervention can be isolated or be completed by an intensive professional-driven intervention. Isolated parent-mediated interventions are also emphasized because of the low cost.

Limited outcomes

The last decades have seen an explosion of new studies. However, all these publications have more highlighted the limits and the challenges to early intervention in ASD according to Charman (2014). In the systematic review of early intensive intervention of Warren et al. (2011), strength of the evidence overall ranked from insufficient to low. He highlights that studies EIBI and the Early Start Denver Model result in some improvements in cognitive performance, language skills, and adaptive behavior skills in some young children with ASDs, although literature is limited by methodologic concerns (Warren et al. 2011). Systematic review of Maglione et al. (2012) conclude that there is some evidence that greater intensity (number of hours per week) and duration (number of months) in developmental and behavioral intervention led to better outcomes, while acknowledging that intervention research has many gaps.

Last review of early intervention for children aged less than 3 years old raises 4 RCT with a strong GRADE recommendation (Kasari et al. 2010, Ingersoll et al. 2010, Green et al. 2010, Dawson et al. 2010, Zwaigenbaum et al. 2016). Most of them have a population inferior to 50 children with ASD, and raises the question if the population was representative of the general heterogeneous population of children with ASD and if the results might be generalizable.

On the contrary, Green and al. (2010) have a large population (N=152 children). However they don't have positive outcome in children. It was probably due to the choice of the tools measuring the first criteria. Criteria of a good quality RCT in early intervention are established, however the choice of the first outcome is still challenging because of the complexity and the heterogeneity of the ASD (Bishop et al. 2011). Moreover few tools are available and validated to measure outcomes, on longitudinal studies, for very

young children with ASD (McConachie et al. 2015). Camaratas (2014) also highlighted that the current state-of-the-art for identifying ASD in infants and toddlers brings problems to fairly test the effects of early intervention.

Then, early intervention studies are different in term of type, duration and intensity of intervention, but also in first outcome. So, it is not possible to compare them in term of efficiency. No model showed its superiority on another one. It is important that next study focus more on understanding the effective components of models. It would also help to better understand ASD etiology. It could be argue that it may be easier to study effective component on targeted intervention versus comprehensive intervention.

The major challenge is the long-term evolution of children. As long as we know, there is no study with at least moderate GRADE quality of evidence about this subject.

Finally, it is important to have evidences about children, however, it would be important to have more evidences intervention impact on parents and family (Wainer et al. 2016).

DISCUSSION

This paper summaries knowledges and concerns in early intervention based on the more recent and major papers. It is not meant to be a comprehensive or systematic review of the subject. It aims to have a scoping approach to better appreciate heterogeneous information's in the field of early autism intervention.

CONCLUSION

Early intervention models in autism are often intensively disseminated by author's models through training program and recommended by mental health policy. However the evidences of efficiency are weak or moderate (Warren 2011, Maglione 2012, Oono 2013, Dawson 2010, Green 2010, Zwaigenbaum 2016). this time, mental health policy should stay cautious and aim to give access to at least minimum services for all children and their families. That is access to diagnosis, information about ASD, support for preschool and school, short break and crisis management services (NICE 2013). And it is essential to design and fund rigorous projects in early intervention research (McConachie 2015).

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