Getting SMART about Combating Autism with Adaptive Interventions: Novel Treatment and Research Methods for Individualizing Treatment

Panel: Educational Panels
Title: Getting SMART about Combating Autism with Adaptive Interventions: Novel Treatment and Research Methods for Individualizing Treatment
Sub Title: The effective treatment of a wide variety of autism spectrum disorders (ASD) often requires an individualized (personalized), sequential approach to treatment, whereby treatment is dynamically adapted over time based on the individual’s changing course. Adaptive interventions operationalize this type of individualized, sequential, decision making via a set of decision rules that specify whether, how, for whom, or when to alter the dosage, type or delivery of behavioral or pharmacological strategies in the treatment of autism. Adaptive interventions can be used as a guide for clinical practice. Recently, sequential multiple assignment randomized trials (SMART), a type of study design, were developed explicitly for the purpose of developing and optimizing adaptive interventions. However, adaptive interventions and SMART are new to autism researchers. The overarching aim of this methodology-oriented educational panel is to (a) provide an introduction on the application of adaptive interventions and SMART in autism treatment and research, respectively, and (b) encourage a discussion on how adaptive interventions and SMART can be used to address complex ASDs for which there is wide treatment effect heterogeneity, or for which there is an array of effective treatments, some of which may be costly or burdensome.

Type: Oral
keywords: Augmentative Communication, Methodology and Receptive/Expressive Language

Abstract id# 16064
Introduction to Sequential Multiple Assignment Randomized Trials (SMART) for the Development of Adaptive Interventions: Two Case Studies in Autism

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Abstract Text:
Background: An adaptive intervention is a sequence of individually-tailored treatment decision rules that can help guide behavioral or pharmacological strategies, or their combination, for improving outcomes in the treatment of autism. Adaptive interventions realize this goal by flexibly
tailoring treatments to individuals with autism when they need it most and in the most appropriate dose, thereby reducing inappropriate variance in treatment delivery and increasing the total number of individuals who benefit from treatment. Once developed, adaptive interventions can be used as treatment guidelines in public health or clinical practice. The sequential multiple assignment randomized trial (SMART), a new type of research or study design, permits researchers to collect high-quality, experimental data that can be used to develop an optimal adaptive intervention. SMARTs realize this goal by evaluating what are the best treatment components and tailoring variables that lead to an optimal adaptive intervention.

Objectives:

In recent years, there has been a surge of interest in a variety of scientific disciplines in developing and evaluating adaptive interventions, specifically, using the SMART study design. This includes two SMART studies aimed at improving social communication in children with autism. However, despite this overwhelming interest, adaptive interventions and SMART are still new to many autism researchers. The objective of this talk is to fill this education gap concerning adaptive interventions and SMART and to encourage new ideas in the science of adaptive interventions in autism.

Methods:

We will introduce adaptive interventions and discuss why they are important. We will also introduce the SMART study design, and briefly discuss SMART study design principles, including common choices for primary and secondary aims, and allay concerns that SMART designs necessarily require prohibitively large sample sizes. These ideas will be illustrated using two SMART case-studies in autism. Both SMARTs were designed to develop and evaluate adaptive interventions for improving spoken communication in children with autism who are minimally verbal.

Results:

Adaptive interventions provide a framework to guide the individualization (personalization) of treatment for individuals with autism. SMARTs can be used to examine critical questions in the treatment of autism, such as, “Among children with autism who are minimally verbal, is it best to begin behavioral treatment with discrete trials training (DTT) or with joint-attention social play (JASP)?”; “Among children who do not respond successfully to 12 weeks of behavioral treatment, what is the effect of a treatment that combines DTT and JASP principles (DTT+JASP)?”; and “Who are the types of children more likely to benefit from combined DTT+JASP versus continuing longer with either DTT or JASP?”.

Conclusions:

Adaptive interventions have great potential for improving outcomes in individuals with autism, by capitalizing on individual heterogeneity in response to treatment. However, the science of adaptive interventions is still in its infancy in autism. SMART studies have the potential to
improve our scientific understanding of how to develop the best possible adaptive intervention.

Abstract id# 16065
SMART Approach to Increasing Communication Outcomes in ASD

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Abstract Text:
Background: Social-communication impairment is a significant issue for children with autism spectrum disorders (ASD). While most children learn to communicate with spoken language, approximately 25-30% of children with ASD remain minimally verbal, even after years of intervention. Failure to develop spoken language by age 5 years increases the likelihood of a poor long-term prognosis for social and adaptive functioning. Due to the great heterogeneity in abilities of minimally verbal children with ASD, a sequential adaptive treatment design offers potential for improving outcomes in children who have been slow responders to early language based interventions.

Objectives: This study blended two evidence based social communication interventions for language impaired children, JASPER and Enhanced Milieu Teaching and tested the effect of beginning treatment with a speech-generating device in the context of an adaptive treatment design for improving spontaneous, communicative utterances in school-aged, minimally verbal children with autism.

Methods: Sixty-one minimally verbal children with autism, aged 5 to 8 years were randomized to the blended developmental/behavioral intervention (JASP + EMT) with or without the augmentation of a speech-generating device (SGD) for 6 months with a 3-month follow up. The intervention consisted of two stages. In Stage 1 all children received two sessions per week for 3 months. Stage 2 intervention was adapted (increased sessions or adding the SGD) based on the child’s early response. The primary outcome was the total number of spontaneous communicative utterances; secondary measures were total number of novel words, total comments from a natural language sample.

Results: Primary aim results found improvements in spontaneous communicative utterances, novel words, and comments all favored the blended behavioral intervention that began by including an SGD (JASP+EMT+SGD) as opposed to spoken words alone (JASP+EMT). Secondary aim results suggest that the adaptive intervention beginning with JASP+EMT+SGD and intensifying JASP+EMT+SGD for children who were slow responders led to better post-treatment outcomes.
Conclusions: Minimally verbal school aged children can make significant and rapid gains in spoken spontaneous language with a novel blended intervention that focuses on joint engagement and play skills and incorporates an SGD. A new research project, AIM-ASD, is focused on further tailoring of intervention components by also including parent training and other methods of communication interventions.

Abstract id# 16975
Modularized evidence-based clinical decision-making: A rescue protocol for non-responders

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Abstract Text:
Background: A vexing issue in treating children with ASD is that there is great heterogeneity in presentation and in response to evidence based treatments (EBTs). Recognition of this heterogeneity in many areas of mental health, along with the realization that EBTs for different conditions have a variety of core principles in common, has led researchers to consider a modularized approach to the application of EBTs. In this approach, modules (or specific behavioral strategies) from one treatment manual may be flexibly applied with those of another treatment manual to address the complex, and possibly heterogeneous, needs of the child. Since the decisions to apply different modules may unfold over time (e.g., across different treatment sessions) as more is learned about the child’s complex needs or as needs change, this modularized approach can be seen as a form of adaptive intervention. However, this treatment approach has not been studied in children with autism. In children with ASD who are minimally verbal, this type of modularized, adaptive approach may be especially useful as a “rescue protocol” for children who have been identified as non- or slow-responders to a previous trial of a manualized EBT, such as discrete trials training (DTT) or joint-attention social play (JASP) intervention.

Objectives: The overarching objective of this presentation is to present pilot data on the application of this adaptive, modularized approach among children identified as non-responders or slow-responders to a 6 week trial of DTT or JASP. Specifically, we will present data on the usefulness of implementing a “treatment dashboard” used to organize the choices of modules in a novel, blended DTT+JASP treatment approach for these non- or slow-responding children. We refer to the blended DTT+JASP intervention as a “rescue protocol”, defined as combinations of modules and strategies from both DTT and JASP.

Methods: Case-studies are drawn from a SMART design in which (i) minimally verbal children with ASD are randomized initially to one of two EBTs (DTT or JASP), and (ii) after 6 weeks, non- or slow-responders to initial DTT or JASP are randomized to continue on their initial treatment for an additional 6 weeks or to the rescue protocol.
Results: We will present data from illustrative case-studies of the treatment dashboard including (i) the assessments, treatment history, and child responses used by clinicians to select from a systematic menu of DTT+JASP modules in the dashboard, (ii) the rules used to make these decisions, and (iii) the benefits, challenges and obstacles to implementing such an approach, including acceptability and feasibility issues.

Conclusions: Minimally verbal school aged children have potential for making significant gains in spoken spontaneous language using current EBTs. However, some will continue to make slow progress, and may benefit from combinations of treatment plans that are systematically implemented based on the child’s treatment history and progress in treatment. A modularized, adaptive intervention approach using new behavioral health reporting systems can assist clinicians and researchers in personalizing the implementation of significant components of these EBTs.

Abstract id# 16066
Adaptive Intervention for Peer-Related Social Skills for Children with Autism Spectrum Disorders: Identifying Patterns Indicating Need for Change in Treatment

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Abstract Text:

Background: Social challenges are a significant concern for children with Autism Spectrum Disorder (ASD) across a wide range of abilities and ages. These challenges may be most evident at school where mainstreamed children with ASD report significant difficulty in developing positive peer relationships. For example, some children appear to be unaware of their peers on the yard, while others attempt to play and join in but their social initiations may be awkward or ineffective. Still others are popular with their peers. This wide variation in the social characteristics of children with ASD suggests that there are likely different intervention needs. Adapting interventions based on children’s response to intervention is a necessary next step that is currently limited in the autism research literature.

Objectives: The purpose of this study was to explore methods for understanding the trajectories of children’s response to treatment prior to end of treatment in order to inform adaptive treatment models for future studies.

Methods: Participants with ASD were drawn from a randomized controlled trial comparing two different social skills interventions at children’s schools. We explored whether playground engagement scores measured at entry and midpoint of treatment predicted their engagement scores at exit using the Classification and Regression Tree (CART) method. The CART method defines splits in the data that can then help professionals make data-based decisions about the individualization and
adaptation of evidence-based social skills interventions.

Results: Using the CART approach, four meaningful subgroups based on children’s playground engagement scores measured at entry and changes from entry to midpoint were identified using three splits. All the splits were determined recursively by the CART algorithm. The first split was based on how much the children’s percent time engaged changed from entry to midpoint by at least 14.01% from entry to midpoint. Among those who did not increase at least 14.01% from entry to midpoint, a second split was conducted. The second split was based on whether the children’s total percent time engaged with peers was greater than 51% at entry and this split separated theses children into two subgroups. Lastly, among those who did increase from 14.01% from entry to midpoint, again a third split was applied. For this group, the third split was based on whether the children’s total percent time engaged with peers was greater than 19.38% at entry and separated them into another two subgroups.

Conclusions: This study illustrates the substantial heterogeneity in children’s response to treatment with multiple clinically salient subgroups embedded within the larger group. The data suggest that measurements of children’s behavior mid-study can be used to predict children’s treatment outcomes. Such data may be used to inform decisions to augment or alter programming prior to treatment exit in order to tailor intervention to best meet the needs of individual children and the CART method can be useful in defining metrics that could be used to build an adaptive treatment sequences for children.

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