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Information and Documentation:

Data Elements within Rethink's Medical Necessity Assessment for ABA and Autism

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Contents

Introduction to Rationale Behind Use of AI within the Medical Necessity Assessment

Predictability is a common concern in the delivery of healthcare services. Patients typically want to know how likely it is that each of several treatment options will be effective (e.g., Meyer et al., 2021); and they want to know the potential treatment length and cost relative to their personal budget and calendar so they can plan and budget accordingly (e.g., Bhargava & Loewenstein, 2015; Han et al., 2012). Likewise, insurance companies often want to know how potential treatment length and cost so they can forecast expenses and plan strategically for the future (e.g., Papanicolas et al., 2018). Finally, healthcare practitioners want to know potential treatment length, the possible range in which outcomes can improve, and the resources it will require so they can manage things such as caseloads, waitlist communication, hiring, and business operations (e.g., WHO, 2015).

It is through this lens that the current work sits relative to one area of healthcare in the delivery of Applied Behavior Analysis (ABA) services for individuals with autism spectrum disorders (ASD). The prevalence of ASD diagnosis has increased in the previous 20 years from 1 in 150 to 1 in 44 children (Centers for Disease Control and Prevention, 2021). As a result, stakeholders (patients, parents, payors, and providers) are increasingly aware of the variability in cost, treatment duration, and patient outcomes. For example, the average annual cost of treatment is estimated to range anywhere between $17,227 to $130,182 (Autism Speaks, 2022; Eldevik et al., 2009); and individuals diagnosed with autism and their families might receive ABA for between 5 to 40 hours per week for a duration ranging between 18 months to five years (Larsson, 2012). Such variability in cost and duration of treatment following an ASD diagnosis adds significant uncertainty to all involved (De Groot & Thurik, 2015; Han et al., 2012; Meyer et al., 2021).

Compounding this uncertainty around increasing amounts of ABA service delivery is a lack of standardization for ABA dosage as a function of patient presentation at intake and throughout the duration of services. At the time of writing, the process of determining optimal dosage of ABA for each patient is seemingly subjective. Past research suggests a patient's age, symptom severity, historical treatment duration, personal/family needs, current abilities, and the overall goals of therapy should play a role in how many hours per week of ABA an individual might need (e.g., APBA, 2020; Granpeesheh et al., 2009). However, no known quantitative methodology with robust empirical support allows clinicians to translate those variables into a precise recommendation of the optimal number hours of ABA. Thus, a tool that provides reliable and precise predictions based on patient data and published best-practice evidence would help decrease the subjectivity and uncertainty around ABA treatment.

In addition to decreased subjectivity and reduced uncertainty around ABA treatment, board certified behavior analysts (BCBAs) arguably have an ethical obligation to improve in this area. The Behavior Analyst Certification Board (BACB) Ethics Code for Behavior Analysts includes several guidelines that speak directly to this topic (BACB, 2020). For example, Guideline 2.08 requires discussing the scope of treatment with a client before starting services; Guideline 3.01 requires BCBAs to identify and act upon opportunities that lead to avoidable harm or wasteful allocation of resources; and, Guideline 3.12

requires BCBAs to advocate for appropriate services. Here, leveraging a reliable, precise, and evidence-based method to recommend ABA dosage allows the BCBA to accurately communicate the scope of likely treatment; why they believe benefits will be maximized while avoiding wasteful allocation of resources; and to know that the amount and level of behavioral services they are recommending is data-based.

Past researchers have sought to improve predictability and aid BCBAs in their ethical obligations by quantitatively modeling the relationship between the hours that patients contact ABA and the resulting outcomes. For example, Linstead and colleagues (2017a) modeled the relationship between treatment intensity and mastered learning objectives for 726 children aged 1.5-12 years who received community-based behavioral intervention services. Linear regression and neural network models led to r2 values of .35 and .60, respectively. Similarly, in a separate study by Linstead et al. (2017b), they used linear regression to model the relationship between treatment intensity/duration and goals mastered within specific skill domains for 1,468 individuals with ASD. Across goal domains, r2 values ranged between .50 (social goals) and .67 (motor goals). As a final example, Ostrovsky and colleagues (2022) used a series of t-tests, effect size measures, and Pearson correlations to quantify the relationship between changes in standardized assessment scores as a function of hours of ABA and modality of supervision. For the 178 individuals included in the study, they observed that clinically significant improvements in function were independent of the hours of ABA received.

Though broader limitations to this (and other) past studies are described in more detail below, the variance accounted for by these models was likely impacted by several factors. First, the overall sample sizes in these studies were relatively small2. Second, as noted by the authors of several studies, models have often been built without accounting for the heterogeneity that comprises the broad spectrum that is ASD and that was unlikely to be fully captured in the studied samples. A final limitation to past work in this realm (noted by Ostrovsky et al., 2022) is the assumption of a linear relationship between hours per week of ABA and progress made. Dose-response curves in other areas of behavioral healthcare are often decidedly nonlinear (e.g., Dews, 1955; Levy et al., 2020; Zoladz & Diamond, 2009). Thus, modeling approaches that more flexibly account for nonlinear relationships may perform better (e.g., the neural network outperforming linear regression in Linstead et al., 2017a).

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Overview of Data Elements Collected

At a broad level, RethinkFirst collects data relevant to business and clinical operations related to applied behavior analysis (ABA) therapy. The resulting extensive database involves hundreds of tables and tens of thousands of unique data fields. Currently, the RethinkFirst database contains data from 322,000+ patients with autism spectrum disorders and related developmental disabilities; from 97,000,000+ hours of ABA therapy; and containing 700,000,000 data points on patient progress from ABA therapy.

The Medical Necessity Assessment currently captures the following clinical information:

- Patient demographics (e.g., date of birth),
- Patient disease/disorder related information (e.g., diagnostic assessment results, criterion-referenced assessment results, norm-referenced assessment results),
- Idiosyncratic symptom presentation,
- Specific behaviors targeted for change via ABA therapy and their corresponding developmental domain (e.g., social interaction, communication, restricted/repetitive behavior),
- Comorbid medical and behavioral conditions/concerns,
- History of contact with ABA therapy,
- Patient outcomes (e.g., goals mastered, change in assessment scores)

Operationally, these data include information such as:

- Amount of ABA-related hours requested (e.g., 97153+97154-97158)
- Rate and timing of skills and behavior assessments,
- Structure and content of individual ABA therapy sessions (i.e., greater detail on ABA "dose" than hours contacted),
- Treatment decision-variability among providers (e.g., goal definitions and pairing, time in treatment),
- Coordination of care,
- Customer selected quality measures (e.g., structure, process, outcome measures)
- Individual-level and organization-level provider performance comparisons/benchmarking,
- Individual-level and organizational-level performance variability

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