

The Insight Generator: Driving Results in Residential Behavioral Health

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Keywords: Decision support, behavioral health, residential treatment, equity, innovation, impact, precision analytics, data-driven insights

Abstract

Gemma Services, a Philadelphia-area-based nonprofit providing behavioral health and educational services for youth and families, has developed and implemented an AI-powered decision support tool, which they are calling “the Insight Generator,” to improve outcomes for youth participating in psychiatric residential treatment. A similar tool has also been developed and is in the earlier stages of implementation in Gemma’s Outpatient Mental Health Program.

The Insight Generator tool analyzes data on children’s treatment and outcomes. It presents actionable treatment recommendations for staff, supports real-time progress tracking, and drives improvements in service delivery. Gemma conducted a rigorous evaluation of the tool in partnership with a university and confirmed its impact on reducing children’s length of stay in residential care and decreasing the acuity of their symptoms. Additionally, Gemma has found that the program team is more cohesive and aligned in their approach to each child’s care because of this tool. Barriers to implementing the tool in Gemma’s program included the accuracy of children’s self-report assessments and challenges with ongoing staff training and support in using the tool. Gemma has addressed these barriers through regular staff training and adding other data to be analyzed by the tool.

Key Takeaways: data-driven decision support tools such as Gemma’s Insight Generator, designed for equity and usability, can drive significantly improved outcomes and efficiency in complex behavioral healthcare environments for youth.

Residential Treatment faces unique challenges such as high acuity of clients’ symptoms, staff shortages and turnover, and limited tools for translating data into actionable insights. Traditional approaches often fall short in delivering timely, personalized care, resulting in inefficiencies and suboptimal outcomes. To optimize treatment and outcomes, providers need tools that translate data into actionable recommendations, not just dashboards that present facts like mental health diagnoses.

Several years ago, the leadership at Gemma Services saw an opportunity to apply the large amount of data we had collected over the years from youth served by the Residential Treatment Program. In collaboration with data scientists from BCT Partners, Gemma utilized artificial intelligence, machine learning, and precision analytics to transform how we use data and drive better outcomes for the young people we assist.

The Innovative Solution

Gemma’s Insight Generator is programmed to review and analyze thousands of electronic medical record data points – including clinical assessments, incident reports, and service notes – to produce a three-point acuity score. Through precision modeling, the tool then identifies optimal interventions for groupings of clients, with the desired outcome being to achieve community tenure. Gemma’s treatment teams receive monthly reports with client acuity scores and recommendations for tailored intervention strategies. The tool is accessible in real time on all Gemma devices to support ongoing care and essential real-time, “in the moment” decisions.

How the Insight Generator Tool Works:

- It compares clients to hundreds of others in the dataset, creates groups based on clinical presentation, and presents predicted outcomes with recommendations for skill-building, clinical interventions, and team interactions to achieve the best possible outcome.
- It excludes demographic variables to minimize bias but monitors equity in post-analysis outcomes reporting.
- It is utilized by clinical and program staff during supervision, discharge planning, group intervention planning, and to identify areas of need across the program, to identify and design staff trainings, and to match staff strengths to youth-specific needs.

Figure 1: Use case visualization of the Insight Generator

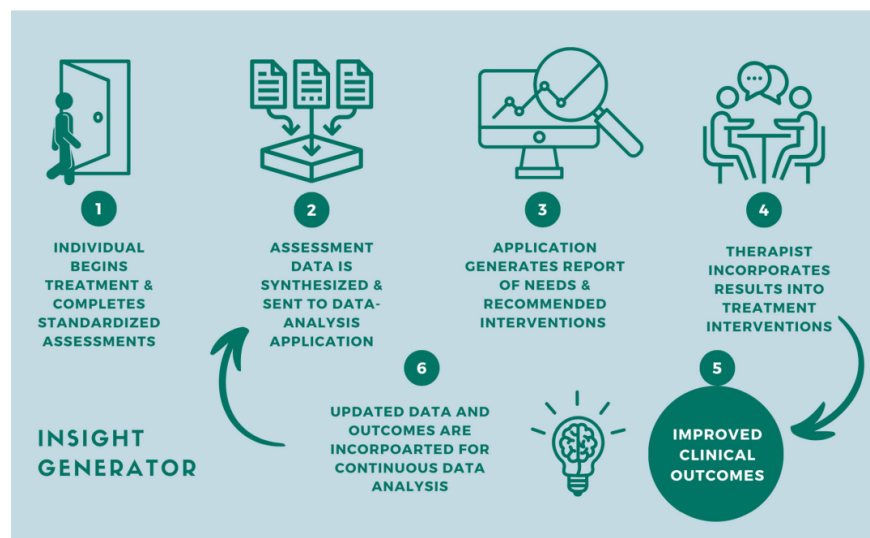


Figure 2: Individualized report page for case conceptualization

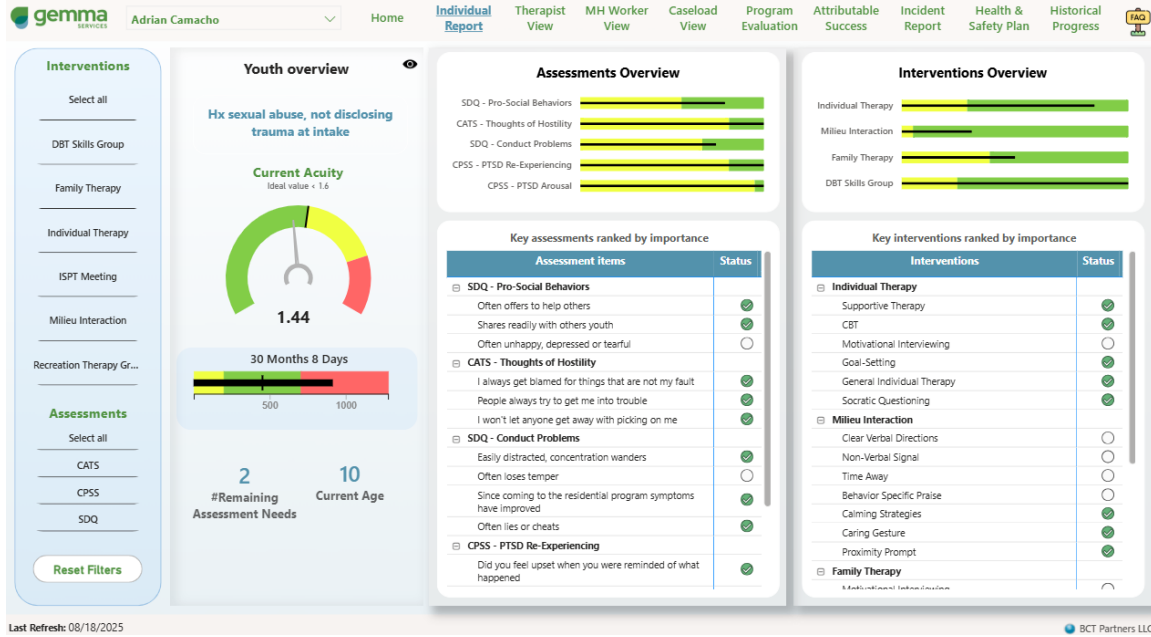
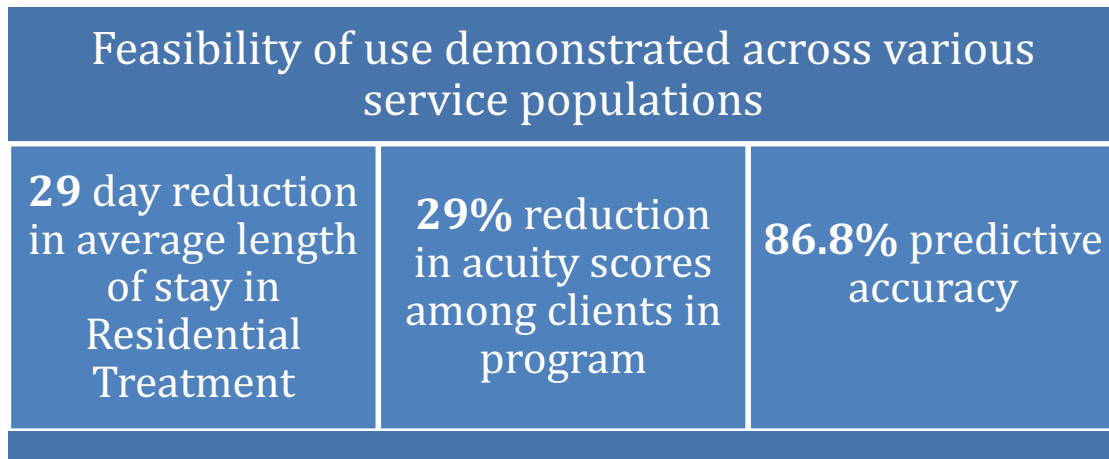


Figure 3: Caseload overview, review of selected group acuity, length of stay, and cluster.



Figure 4: Results Snapshot



How is This Tool Unique

Unlike traditional analytic models, our Insight Generator is designed to be transparent, equitable, and easily used in everyday program operations to drive improved outcomes for the youth we serve. It is not a “black box”—staff, families, and youth are involved in the continual refining of the tool through providing feedback. The recommendations that the Insight Generator presents support, but *do not replace* clinical judgment. The tool is regularly evaluated for bias and effectiveness, so we can ensure that it adapts to changing needs.

Financial Model

Gemma was able to develop and continue evaluating the tool thanks to charitable donations, primarily in the form of grants, as well as a commitment of resources by Gemma leadership. Our collaboration with data scientists and other external consultants ensured the tool was developed and refined through a rigorous design and implementation process. This model for developing such a tool is sustainable and adaptable for organizations with similar needs. The costs to develop a tool are unique to each organization, as the cost depends on each organization’s data infrastructure, clinical assessments, and datasets. Gemma’s costs included upgrades to our data infrastructure, consultant fees, and staff training. Long-term sustainability of a tool such as the Insight Generator requires integration into existing workflows and commitment to ongoing evaluation of the tool and process for using it.

Scaling and Implications

Gemma’s Insight Generator is poised to be scalable. Key strategies for success include an organization’s commitment and ability to integrate the tool and its recommendations into daily practice, “buy-in” from staff to adopt the tool, and investment by the organization in ongoing staff training. The model is ready for replication in other residential and community-based behavioral health settings with similar contextual factors to Gemma’s programs. Programs serving different populations and using different

clinical assessments could utilize the same methodology as Gemma did to build their own tool, with consultation from data scientists at BCT Partners.

Decision-support tools like Gemma's Insight Generator could most certainly be developed for providers in other service sectors, such as those serving individuals with Autism Spectrum Disorders, Intellectual Developmental Disabilities, and dual diagnoses, similarly driving significant improvements in outcomes for those client populations. Continuous user feedback, as well as clinical and technical support, are essential for the successful implementation of a decision support tool.

An example of the scalability of the Insight Generator tool is the development of a similar one for Gemma's own Outpatient Mental Health Program. It is in the early stages of use and has been used by program leadership and supervisors to inform training decisions and support clinicians during supervision. Gemma was able to replicate the process we used to develop the Residential Treatment tool to adapt it for this second behavioral health program (Outpatient Mental Health) with different variables, ages, and clinical presentations, thus proving that the tool can be applied in various settings and the process is ready to be scaled beyond Gemma.

Conclusion

In conclusion, after a multi-year process of developing an AI-powered decision support tool, Gemma's residential Insight Generator tool is driving important improvements and delivering measurable results for youth receiving services.

By focusing on client acuity, equity, staff usability, and the presentation of clear, actionable insights, Gemma's project signals that organizations can develop such a tool that empowers staff through targeted treatment recommendations and significantly improves outcomes for youth receiving this level of behavioral health care. Gemma's Insight Generator project exemplifies that the future of high-impact, social innovation in behavioral health services is data-driven, transparent, and person-centered. These tools represent a transformative shift in how data is used in behavioral healthcare, enabling providers to deliver more precise, equitable, and effective treatment. We encourage other organizations to explore similar innovations and collaborations that can expand the reach and impact of data-driven care.