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Do you see **what I see?**

Understanding that children with neurological disorders perceive the world differently is critical when developing a facility to serve special neurological needs

Like getting down on our knees to listen to a child and see them eye to eye in order to better understand their needs, designers must be observant and able to understand the sensory issues that affect children with neurological disorders so that they can adjust the environment to accommodate the sensory input needed to enhance their treatment.

The Cincinnati Children's Hospital Medical Office Building provides treatment for children with a diversity of neurological disorders such as autism, cerebral palsy, Down syndrome, Asperger syndrome and attention deficit disorders. It also provides other related services within the facility for the convenience of the patient and family.

Designed as a patient/family-centred care facility, the diversity of sensory integration issues among children with neurological challenges was the focus of design decisions for the interior environment. The facility integrates knowledge in sensory variations to aid in the best possible treatment outcome by providing an environment which responds to specific sensory needs but yet allows ample opportunity for discovery.

Although there is a great diversity of treatment areas provided, some of the programmed areas worth mentioning include audiology and speech pathology treatment, physical therapy, treatment areas with specialised equipment to encourage flexion activities, a severe behaviour treatment suite and infant/parent nurturing treatment spaces.

Other key spaces include occupational therapy with areas supporting activities of daily living environments, such as a bedroom and kitchen to teach children aged eight years and older how to use standard home environment, a patient education lending library with educational and therapeutic toys available for check-out, a durable medical equipment department where patients can get fitted for the, repair and purchase of wheelchairs, and interior and exterior playgrounds for gross and fine motor skill therapy.

Interiors are as subdued and as simple as possible, with soft pastel colours and just enough distractions to avoid overstimulation

Many of these spaces include one-way observation rooms adjacent to treatment or via cameras. Additionally, there are spacious conferencing areas with break-out rooms outfitted with videoconferencing capabilities.

Sensory design challenges

Understanding sensory issues and translating them to the construction world to enhance the treatment was part of the fun challenge of this project. For example, hearing in some children with neurological disorders can be hyperacute and cause overstimulation, thereby disruptive to their treatment. Research on design intervention for the treatment of autistic children[1] hypothesises that sound attenuation and spatial sequencing through compartmentalisation is the most effective and influential environment intervention in the treatment of autistic children to help them focus and improve behaviour.

In response to this sensory challenge, specific treatment areas of the facility have been designed with sound-rated walls that extend to structure above, doors with sound seals and acoustic wall-treatment products to help during treatment sessions by reducing echo and sound transmission. Airborne sound transmission for this facility is designed with a sound transmission class (STC) rating of STC 57 in certain treatment areas. Individual speech

Cincinnati Children's Hospital Medical Center's Medical Office Building, Cincinnati, Ohio

therapy rooms were also requested. This individualised compartmentalisation helps the children focus during treatment.

Aggression, explosive behaviour and self injuries avoidance are constant topics and of great importance with neurological disorders. Such behaviour may stem from not knowing how to react to surroundings. Studies show that autistic people exhibit enhanced performance in static information processing, but decreased performance in dynamic information analysis[2], which gives way to some successful treatment programme interventions that have to do with simplifying every activity and every event into small parts[3] in reference to visuo-spatial cognition, which is the ability to understand visual representations and their spatial relationships to create a sense of predictability and routine.

Minimising triggers

In response to this sensory issue, simplification was translated into this facility as much as possible, from the point of entry to the point of treatment, to avoid overstimulation. Therefore, the facility interior is not, as many would have guessed, decorated with bright and vibrant colours. Instead, every effort was made to develop the facility's interior as subdued and as simple as possible along the way to the treatment areas, with soft pastel colours and just enough distractions to avoid the overstimulation that may lead to aggression.

Similarly, in an attempt to help the sensory spatial definition, the treatment rooms are set up to be as similar in layout as possible, such that the child can get comfortable with a sense of predictability as they enter any of the rooms. The design team, along with owner representatives, evaluated and discussed recommendations which have been applied to this facility to aid in avoiding injury with features, such as impact-resistant drywall, properly located wall protection, and concealing items such as switches, dimmers, outlets, sinks, computers, etc. within specific treatment areas.

Confusion and distraction in children with neurological disorders may be caused by differences in sensing and perceptions. For example, fluorescent lighting has a nearly unnoticeable bounce to the naked normal eye, but for children with sensory challenges, fluorescent lighting has a flickering sensation similar to what could be confused with a strobe – it pulsates and bounces according to the Autism Research Institute[4].

In an effort to enhance the sense of calmness, the facility was outfitted with lighting that provides the flexibility to turn off the fluorescent lights and turn on dimmable incandescent lighting in the treatment areas. LED products were considered the products of choice due to their environmental benefits and their lack of tendency to flicker. However, some limitations on dimming were found on LED products at the time of product research. New LED products may have come to market since then that will function effectively without flickering at the lowest dimmable level.

This facility provides the opportunity for observation into the treatment areas. These rooms are strategically located throughout the facility in areas adjacent to treatment areas or in separate monitoring rooms which allow observation via

Butterflies inset on the rubber flooring are placed along the corridors at main points of decision-making as a wayfinding tool

A multi-activity play structure is located outside, directly accessible to treatment rooms

Project credits:

Architect: DNK Architects
MEP engineer: Dynamix Engineering
Structural engineer: THP Limited
Construction manager: Al Neyer
Graphic design: Kolar Design

cameras. These observation rooms can be utilised by the parents to observe the children's treatment and, in some instances, to conduct research. Some of the features in these rooms include one-way glazing with integral blinds that can be operated by the caregiver on the caregiver side of the window, due to potential privacy issues.

To further aid order and predictability, the facility utilises unique wayfinding techniques, where specific coloured butterflies, inset on the rubber flooring, are strategically placed along the corridors at main points of decision-making as a wayfinding tool.

Outdoor activities

As part of the programme curriculum and viewed as a therapeutic setting for this project, outdoor areas within the urban setting were provided with this building, affording multiple opportunities to bring treatment activities to the outdoors.

A multi-activity play structure is located outside directly accessible to treatment rooms. It was developed collaboratively between DNK Architects landscape architect, Matthew Latham, ASLA, and the product manufacturer's designer, Michael Carlson, CPSI.

Carlson, who has two children with autism, is familiar with the unique design considerations for children with neurological challenges. The structure provides opportunities for sensory play, decision-making, cooperative play, role playing, turn taking, and observation. Semi-enclosed hiding spaces are provided as areas of refuge for children who get overstimulated. Colours are subdued to prevent overstimulation. Other features include climbers for developing upper-body strength, balancing activities for stability, handrails, wheelchair transfer points to facilitate access and a wheelchair-accessible garden.

Another outdoor play area nearby provides swings and sheltered picnic tables to provide space for fine motor skills classes, such as crafts. In a nearby area, sheltered from the weather, is a practice terrain where wheelchair users and others can experiment on a ramp and a variety of paving surface textures. Bike lockers and a fenced-in area with a short bike path were also provided for the physical therapy programme, which often uses bicycles as part of treatment.

This project proved to be a unique learning opportunity related to the diversity of neurological sensory issues, as it applies to the physical environment component to support the treatment of children with neurological challenges. Although the learning opportunities were many, much learning remains to be done to accomplish excellence in design of treatment environments to better serve patients with neurological disabilities as new research on sensory issues develops.

With the onset of Leadership in Energy and Environmental Design (LEED), evidence-based design and current research being conducted on environmental issues related to products and neurological effects, the opportunities for improved design and materials selections in these types of facilities will continue to improve greatly.

> "...the designer must be able to understand the sensory issues"

Eileen D Trimbach, AIA, LEED AP BD&C, EDAC is a designer at DNK Architects, USA

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