

The Children's Cancer Hospital Egypt is changing the way pediatric oncology is practiced in Egypt and the Middle East. As a center of excellence with state-of-the-art facilities, clinicians, and protocols, the charity hospital provides free care to patients and is achieving survival rates on par with those in the West.

By Ward Pincus



The futuristic, but also highly functional facility was funded entirely from donations.

A Vision for Pediatric Oncology in Egypt

Since the state-of-the-art, 400,000-square-foot Children's Cancer Hospital Egypt (CCH) opened two years ago, it has joined the Great Pyramids as one of the must-visit destinations for foreign dignitaries coming to Cairo.

Providing free treatment to children newly diagnosed with cancer, the 180-bed hospital with a 300-person outpatient clinic is the only pediatric oncology center of excellence of its kind in the Middle East – a distinction that makes it one of the most high-profile charitable institutions in Egypt and the surrounding region.

Jonathan Bailey Associates, the award-winning healthcare facility design firm, incorporated the latest concepts in acute pediatric oncology care to create a facility that is elegantly childlike in order to inspire hope in children and their families as well as to operate cost-effectively on the technological cutting-edge.

From its design to its construction to its outfitting, the facility – which is funded entirely from donations – was developed and built to the highest Western standards of care by an international team of

experts from the United States, Sweden, Germany, Lebanon, and Egypt.

The building's exterior is futuristic, with extensive use of glass and hand-carved sandstone, yet is shaped to evoke the traditional Nile River sailboat, the felucca. It also features an enormous glass dome that caps the main reception area and bathes it in light. The liberal use of natural light and playful color in the interior, alongside a large and growing collection of paintings, reflect the well-recognized impact of the environment on treatment outcomes.

Complementing the architecture and interior design are world-class clinicians and protocols, as well as state-of-the-art medical equipment from Siemens, including everything considered standard for a pediatric oncology center of excellence. This includes a 40-slice positron emission tomography-computed tomography (PET/CT) scanner; the latest-generation linear accelerators enabling Image-Guided Radiation Therapy (IGRT), Intensity-Modulated Radiation Therapy (IMRT) and Stereotactic Radiation and

Radiosurgery Therapies (SRT/SRS); a 1.5 Tesla (1.5T) open-bore magnetic resonance imaging (MRI) system for whole-body imaging; a fully integrated, cutting-edge forward and inverse treatment planning software platform as well as many other complementary diagnostic and treatment solutions for oncology. The radiology department is equipped with the most advanced conventional and interventional X-ray devices, diagnostic ultrasound, computed tomography (CT), and nuclear-medicine-based gamma cameras. Six state-of-the-art operating theaters, a clinical pharmacy, multi-specialist clinics, and a multidisciplinary laboratory with a cord blood lab, cytogenetics, immunophenotyping, and molecular biology complement the facility. CCH's high-profile status in Egypt is reflected in the dignitaries serving on its Board of Trustees, including Board President Suzanne Mubarak, the First Lady of Egypt, and Board Vice President Dr. Ahmed Fathy Sorour, speaker of the Egyptian Parliament. The hospital's regional prominence was demonstrated



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when it won the United Arab Emirates' Health Foundation Prize, sponsored by the World Health Organization. The award is well deserved: The hospital, which has treated more than 3,330 patients since it opened and expects to serve 2,500 children in 2009 alone, expects to achieve significantly higher survival rates, at a level on par with child cancer survival rates in the West.

Rapid Implementation

The history of the hospital began in 1995 as an idea. It accepted its first donations in 1998 and witnessed ground-breaking in 1999. By March 2004, the electrical-mechanical and interiors phase had begun, and by early 2007, the building was largely complete – with just short of a decade having passed since the first donations were made. Hospital management was eager to begin serving patients, so the auspicious date of July 7, 2007 was selected for the hospital's opening. After the Bill of Quantity was jointly fixed in December 2006, Siemens had only six months left for procurement, shipment, installation, and training until the opening.

“We succeeded with Siemens in squeezing the duration of equipment implementation into one-third of the originally proposed time,” recalls Professor Mohamed Hany Hussein, MD, Chief Executive Officer of CCHE. Siemens' commitment to the project deadline impressed hospital administrators. “For the past three years, we have felt that the relationship between the hospital and Siemens is not one of client and contractor, but rather one between partners,” says Hussein.

Khaled El Noury, MD, Deputy Director General of Operations at CCHE, notes that it was the close cooperation between Siemens and the hospital that enabled the facility to meet the scheduled launch date, particularly the willingness of Siemens to go above and beyond its contract obligations. “If both parties had abided 'only' 100 percent by the terms of the contract agreement, the July 7th opening wouldn't have been realized,” says El Noury.

With its global expertise in turnkey solutions, Siemens was able to deliver the

complex 8,000-item medical equipment solution, even under the tremendous time constraints. Drawing on both its local and international resources and its extensive list of supply partners, Siemens provided a single-window contact to hospital management during the medical equipment supply, installation, testing, training, and commissioning phases. “It has been an enormous challenge for Siemens to set up this hospital in time. An engaged project team as well as orchestrating international competencies in a streamlined virtual organization was one of the key success factors,” says Gunter Barthel, the Siemens business manager in charge of the project.

The workflow-oriented solutions continue to deliver benefits in improved patient care, faster diagnostic and treatment times, and enhanced productivity through more efficient data processing and management. Training, equipment maintenance, and upgrades are all easier and more cost effective because of the *syngo*[®] user interface used on all imaging modalities. Siemens' supply partners on the project included Dräger, Steris Corporation, Hill-Rom, Sirona, and Maquet. Added to the equipment turnkey was a five-year maintenance contract on the equipment, which means that the hospital faces only negligible equipment downtimes and enjoys the latest upgrades to equipment as they become available.

Precision and Efficiency

At the heart of the equipment tender was the need to provide precision and efficiency throughout the diagnosis, treatment, and assessment phases, especially regarding radiation therapy. While these characteristics are important in all oncology activities, in the field of pediatric oncology, they are even more crucial.

“In our practice, we have set a tolerance level of three millimeters across the body, although some centers allow five or even seven millimeters. Since our patients are children with smaller organs, errors can easier affect healthy parts of the organs at risk, and critical organs can be closer to the target volumes. As a result, we



The award-winning healthcare facility architects from Jonathan Bailey Associates designed a playful, family-oriented facility created according to principles of “positive distraction,” which is vital for patients and families in pediatric oncology.

need to have a very high level of accuracy,” explains Mohamed Saad Zaghlol, MD, Chairman of Radiation Oncology at CCHE.

Given the importance of this requirement, the radiation therapy equipment included the ONCOR Expression™, the first linear accelerator in Egypt with a cone beam CT imaging package. “This linac allows us to quickly verify the position of the target and the position of the organs at risk and delineate the complete volumes, rather than having to rely on 2D images with overlaying structures,” says Zaghlol. “ONCOR Expression means we can be sure that the exact volumes are irradiated.” This results in faster treatment times and better patient outcomes.

ONCOR Expression’s leading-edge technologies enable high-quality treatment applications, such as IMRT, IGRT, and SRS/SRT – the last of which can limit the error tolerances to only one millimeter.

IMRT and IGRT Planning

Another component of the equipment package was the KonRad™ Inverse Planning Software, which is ideal for treatment areas where an accurate and highly conformal dose is essential and where organ or healthy tissue sparing is a key requirement, such as with the brain, head and neck, pituitary, and pelvis. “KonRad is an easy, user-friendly IMRT planning system that allows us to design and implement a large number of segments of the

IMRT plan within a short time. Plus, it lets us optimize the dose to the tumor volume whilst sparing the organs at risk – all within a short delivery time,” says Zaghlol. “That’s because it gives better distribution with fewer radiation units than other planning systems. And segments are fewer in number while giving a better distribution. This decreases the time for application, so our patients do not need to stay long on the treatment systems. Because our patients are children, many require anesthesia during treatment, so clearly the length of the treatment session is very important.” The effectiveness of KonRad is enhanced by the LANTIS™ Oncology Information System, a complete electronic medical



Working with CCHE to improve child cancer survival rates in Egypt (from left to right): Mohamed Saad Zaghloul, MD, Chairman of Radiation Oncology; Raef Riad, MD, Consultant in Nuclear Medicine;

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record (EMR) system. Zaghloul explains that, after the physicist and physician have approved the KonRad plan, the agreed-upon treatment is conveyed to the ONCOR linac systems through LANTIS. Having all imaging tools and patient database information available in one workplace, the hospital can deliver a higher level of accurate and efficient patient care.

Precision is also a crucial part of the diagnostic and assessment process, according to Raef Riad, MD, Consultant in Nuclear Medicine at CCHE. He says the Siemens Biograph® TruePoint™ PET-CT scanner is very user friendly, and coregistering of CT images with PET images is easy to handle, providing greater clinical accuracy and speed for lesion specification.

For Mohamed Awad Aggag, MD, medical imaging consultant and Director of Medical Imaging at CCHE, the Siemens OpenBore MRI MAGNETOM® Espree 1.5T is

ideal for a pediatric oncology hospital: “It puts our patients at ease because of the wide and short gantry and shorter examination times. It is much more comfortable than a standard MRI. You can use multiple coil combinations to scan a very large field-of-view. It means you can scan 140 centimeters without moving the patient. This, and the shorter scan time are great benefits, since many of our patients are not in good health and it’s not easy to move them.” And from a clinician’s point of view, Aggag says, “The high definition of the image from the first look makes diagnosing and reporting pathology easier.”

The 4D radiation therapy workflow at the hospital is streamlined through the use of the Siemens *syngo* MultiModality Workplace package, which provides seamless integration with the hospital’s HIS (hospital information system), as well as a 4D viewing module, dual timepoint

fusion, localization, reference point management, and simulation tools. The *syngo* easy-to-use interface across all Siemens’ imaging modalities reduces the need to adapt to various tools and enables users to concentrate on their patients.

“We do all of our post-processing with the *syngo* MultiModality Workplace, where information from the CT is reformatted into 3D or even 4D [motion] for navigation,” says Aggag. “It can produce 3D, axial, and coronal images and allows us to compare the volumetry of a tumor before and after therapy.”

Maximizing Building Performance

Siemens Healthcare wasn’t the only Siemens sector involved in the hospital’s development. In a separate, earlier tender, Siemens Industry won the electromechanical and building infrastructure con-



Ayda Youssef, MD, Radiologist; Magdy Hafez, MD, Radiologist.

tract and provided the facility with the latest in infrastructure solutions.

Reda Atta, Head of the CCHE Engineering Department, says that the hospital's design consultant had set very strict guidelines regarding the building infrastructure, "and Siemens met them all." But the story of CCHE does not end with the current hospital complex. Hany Hussein outlines CCHE's next initiatives, which he hopes will be realized with the help of partners such as Siemens. These include plans for a bone marrow transplant program, building a guesthouse for patients' families, constructing two satellite hospitals, and developing a research institute. "In pediatric oncology," he says, "besides treating and healing patients, success in this field comes through researching the biology of the disease."

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Further Information

www.siemens.com/oncology

Summary

Challenge:

- Short lead-time to complete complex and hospital-wide medical equipment delivery and installation ahead of hospital opening
- Clinical requirements for high-precision radiation treatments that accommodate pediatric oncology's small error tolerance
- Efficient treatment and diagnosis sessions to accommodate unique needs of pediatric oncology patients
- Efficient workflow management

Solution:

- Medical equipment turnkey package that provides single point of contact on complex acquisition and implementation process
- Biograph TruePoint PET-CT with hybrid modality integration for clinical accuracy and speed to diagnosis
- ONCOR Linear Accelerator with leading-edge technologies enabling high-quality treatment applications such as IMRT, IGRT, and SRS/SRT
- KonRad Inverse Planning Software, clinically proven to enable accurate tumor irradiation while protecting organs at risk
- syngo MultiModality Workplace to facilitate efficient processing of images from multiple modalities for enhanced clinical workflow and greater efficiency

Result:

- Saving time and money while delivering enhanced clinical and patient outcomes
- Opening day deadline met with first patients admitted
- Leading-edge radiation therapy planning and equipment technology enables hospital to achieve error tolerance limit of three millimeters, and just one millimeter for SRS
- Highly sensitive, clear, and precise assessment and treatment delivery helps hospital achieve a significantly better treatment outcome
- Rapid image acquisition and treatment delivery across nuclear medicine, radiology, and radiation therapy platforms enhance workflow and contribute to increasing treatment numbers