Medical Solutions

The Magazine for Healthcare Leadership

India's Shining Example

Dr. Devi Shetty's Mission to Make World-Class Healthcare Accessible in India

"India is home to many healthcare leaders who are tackling India's challenges with courage and ingenuity."

Hermann Requardt
Member of the Managing Board of Siemens AG and CEO of the Healthcare Sector

Hermann Requardt,
Member of the
Managing Board of
Siemens AG and CEO of
the Healthcare Sector

Dear Reader,

India is facing numerous challenges in healthcare and there is no doubt that the healthcare situation is far from perfect. Despite solid economic growth over the past two decades, around one third of the Indian population continues to live below the poverty line with only limited access to medical care, especially in rural parts of the country. Medical practitioners are struggling to meet the increasing needs in healthcare – with a constantly expanding middle class and a rising prevalence of cardiovascular disease, diabetes, and others.

However, necessity is the mother of invention – and of innovation. India is home to many healthcare leaders who are tackling India's challenges with courage and ingenuity. They are finding new ways to deliver quality healthcare at affordable rates – and on large scales.

Healthcare in rural areas can by all means translate into profitable business, as our customers from Surat in the west (p. 40) and Imphal in the easternmost region of India have shown. These customers have business models that leverage economies of scale – be it in imaging or laboratory diagnostics. Their productivity makes their business both affordable for patients and profitable for the institution. The same is true of Thyrocare, which is, according to its founder and CEO, the largest and fastest lab of its kind in the world – thanks to Siemens laboratory automation. Read how Thyrocare is changing the rules of lab testing in India on page 28.

The customer stories in this issue are initiated to a large extent by individuals, entrepreneurs, and philanthropists who lack the support of a comprehensive public infrastructure. But these centers provide a foundation on which to build a general healthcare system – which would barely be possible without these frontrunners.

Some Indian hospitals are setting new global standards in enabling affordable, high-quality healthcare: Players from emerging markets can gain insight into ways to improve access to affordable healthcare services. Players from developed countries, constantly under cost pressure, may find some inspiration for raising productivity and keeping healthcare costs down without compromising on quality.

Our focus on healthcare in India also demonstrates how low-income countries are putting pressure on established markets. In the era of telemedicine and medical tourism, healthcare is now a global business where prices for services are compared across countries. Indian healthcare providers count on these market mechanisms. Not only are they establishing state-of-the-art clinics in international comparison in India, they are also extending locations to be even closer to customers in the West. The renowned heart surgeon and entrepreneur Dr. Devi Shetty even considers India to be on the way to becoming a healthcare provider to the world (p. 8).

Siemens is a partner to each of these Indian healthcare providers – whether they have entry-level or high-end needs – in developing and producing tailored products and solutions.

I hope you enjoy reading this issue.

Hermann Requardt
Member of the Managing Board of Siemens AG
and CEO of the Healthcare Sector

Contributors

Arush Mayank

Renowned photographer **Arush Mayank** landed in Bangalore for the cover shoot of Dr. Devi Shetty with plenty of ideas. "When we met Dr. Shetty, it was evident that he had very little of what we wanted from him – his time. All my plans for the shoot went down the drain," says Mayank. He then decided to work around the doctor's schedule. He stayed one day longer to follow him wherever he went. "I adopted his business model – going for quantity. I went on a clicking spree," he says. After two days of shooting, with long hours of waiting for Dr. Shetty, Mayank got countless photographs. But more importantly, he left with a "gratifying feeling of meeting a man who has inspired our country and especially our generation," says Mayank.
See page 8

Moritz Gathmann

Russia correspondent **Moritz Gathmann** (left) gets excited every time he visits St. Petersburg. "I always remember the feeling of arriving there the first time during a school exchange at the age of 14. Of course, since 1994 the city has changed a lot – for the better," he says. And he sees Dr. Arkady Stolpner (right) as a good example "of people who make change happen in this huge country: He established medical centers that revolutionized diagnosis and therapy in the field of oncology in St. Petersburg – and then all over the country."
See page 60

Andre Vieria

Internationally acclaimed photographer **Andre Vieria** says that during his assignment at DASA in Rio de Janeiro he was most amazed by "how sophisticated all the technology is." He adds: "For me, luckily someone not very familiar with hospitals, it's incredible to see the human body at work in real time on the computer screens. Sometimes I'd get so fascinated by what I was seeing on the screen that I'd forget to take photos. I guess everyone of us will eventually be inside one of those machines at least once in our lives. It's nice to be able to see them from the control room side, see what they're capable of doing."
See page 72

Sroop Sunar

London-based illustrator **Sunar Sroop** says she always enjoys opportunities to illustrate topics to do with her native country. "This article on Indian healthcare allowed me to explore a current issue surrounding the country today. Being based in the UK, it is ever more important to me that I sustain my ties with India through illustration. India is my inspiration. It drives my focus and dedication, perhaps like many of the young talents featured here," she says.
See page 52 and the geographical icons at the beginning of each India story.

Roman Elsener

Getting to know the Inspira Health Network in Southern New Jersey in just one day and over five different locations was a challenge for U.S. correspondent **Roman Elsener** (right, together with Lynette Newkirk, Inspira's Adminis-trative Director) – but ultimately a rewarding experience. "Together with photographer Skye Parrot, we really got to see how Chet Kaletkowski and his team bring it all together and connect doctors, hospitals, and patients via the sophisticated software that Siemens installed," Roman recalls. "At the same time, we were reminded of the long way to go until healthcare reform in the USA is fully implemented."
See page 78

Swati Prasad

Senior business journalist **Swati Prasad** loved every minute of the four trips she took to Salem, Madurai-Coimbatore, Bangalore and Surat to meet clinicians, entrepreneurs, and philanthropists who are changing India's healthcare arena. "It was interesting to see how the sector is deploying technology to address the country's healthcare chal-lenges. A lot is changing across the length and breadth of India," she says. But the most delightful was Swati's meeting with Dr. Devi Shetty. "He's someone who has taken a holistic view and is determined to change the healthcare scenario through his innova-tive business practices, medical techniques, and insurance programs." The interview was strewn with quotes from Mother Teresa, as he had served as Mother's personal physician. "I took back a lot more than just the interview with Dr. Shetty," says Swati.
See page page 8, 24, 36, 42 and 46

Wiebke Kathmann

When medical writer **Wiebke Kathmann** visited the Ambulatory Healthcare Center Prof. Dr. Uhlenbrock and Partners in Dortmund, Germany, she was excited. "Learning more about the latest advances in low-dose mammography meant a lot to me," she says. Being a woman and knowing that this screen-ing method means quite a bit of radiation exposure over the years, "I was happy to hear that nowadays a comparable image quality can be achieved with up to 30 percent less radiation."
See page 68

Contents

08
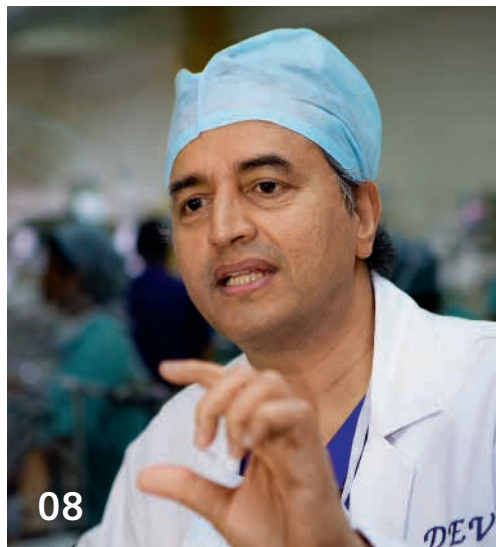
Medical Solutions met with
Dr. Devi Shetty, chairman of Narayana
Health in Bangalore, India.

28
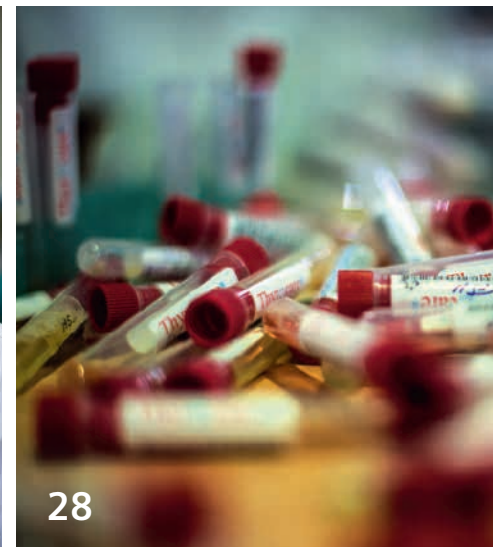
One Mumbai-based lab
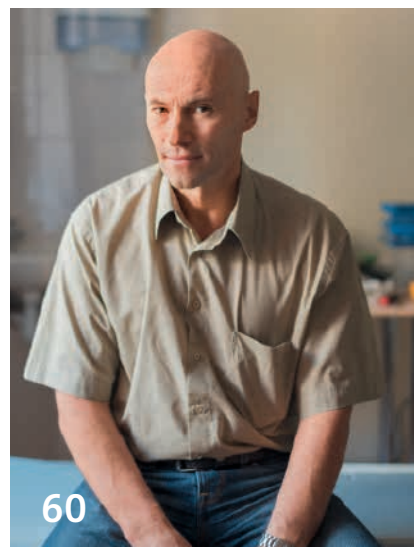alone serves one billion
people – at affordable rates.

Healthcare in India: Trends and Insights

46

SKS Hospital in South India saves time and costs despite a higher investment in a high-end CT scanner.

60

The success story of a Russian revolutionary in diagnostic imaging.

Features

India's Healthcare Visionary

Bangalore
Population
8,425,970

Dr. Devi Shetty, Chairman of Narayana Health, headquartered in Bangalore, India, is on a mission to expand the reach of world-class healthcare facilities to the poorest in India. And he's convinced his model can be replicated the world over.

Text: **Swati Prasad**   Photos: **Arush Mayank**   Illustration: **Kelli Anderson**

Dr. Devi Shetty examining an infant with a congenital heart defect. Several patients wait for hours outside his office at Narayana Health, Bangalore, for his opinion.

Dr. Devi Shetty does everything differently. When most private healthcare chains in India are adding fancier restaurants, multiplexes, and super-luxury wards to their new hospitals, Shetty – Founder and Chairman of Narayana Healthcare (NH) – is doing away with air-conditioning and marble flooring in order to make healthcare more affordable. He can talk about expanding operations, improving profits, and reducing cost in the same breath. Although his business model goes beyond economics: Shetty's hospital chain never turns away a patient due to a lack of funds. Despite this policy, Shetty claims to be more profitable than leading American hospital chains.

"India will become the first country to dissociate healthcare from affluence," says Shetty, in his spacious corner room at Narayana Health City in Bomma-sandra, on the outskirts of Bangalore. "India will prove that a country need not be rich to offer quality healthcare to its citizens," he adds. With 'Om' chants playing in the background, there is peacefulness in his demeanor and conviction in his voice as he spells out his vision for India and the world.

And there is no doubting his conviction. Back in 2001, Shetty founded Narayana Health (earlier known as Narayana Hrudayalaya) because he could not find an employer who understood his vision for making world-class

healthcare affordable to all. From a 300-bed hospital in 2001, NH has grown to a 6,000-bed healthcare conglomerate, with 17 hospitals present in 13 locations across India. Over the next six years, Shetty plans to grow five-fold – into a 30,000-bed healthcare conglomerate. He plans to achieve that by building low-cost, 300-bed, multi-specialty hospitals that take just six months to construct.

Shetty has proved that 'affordable world-class healthcare' is not an oxymoron. "We are a low-cost hospital but our hospital is accredited by the Joint Commission International of the USA," says Shetty. "People always say ours must be an Indian way of doing things (with reference to low costs). There is no Indian way of doing things. There is only one way of doing it and that's the best way of doing it," says Shetty.

Mastering the Volumes

Shetty, who is also known as the Henry Ford of heart surgery, pioneered the low-cost healthcare model by employing an assembly-line approach to surgery where junior doctors complete all the preliminary steps, leaving only the crucial step to be performed by their seniors. This way, the senior surgeons are able to perform more surgeries in a day than their peers in the West.

"Surgeons are like technicians. The more surgeries they perform, the better they get at it," says Shetty. Interns from developed countries come to NH to get a first-hand experience of Shetty's assembly-line approach to surgery. Today, a fair number of surgeons come to NH from countries such as China, England, and the USA for training.

Apart from cardiology, NH offers facilities across various specializations, such as gastroenterology, vascular services, nephrology, urology, neurosurgery, pediatrics, obstetrics, and gynecology, as well as endocrinology, cosmetic surgery and rehabilitation, organ transplants, and oncology.

NH deploys technology to bring down costs. It uses IT expertise to improve management systems. For example, NH's extensive database is on a cloud, saving infrastructure and people costs.

Dr. Devi Shetty: An Unparalleled Clinician

Shetty was **awarded Padma Bhushan in 2012** – the third-highest civilian award conferred by the Indian government.

He is the first surgeon in India to perform **heart surgeries on newborn babies**, using a micro-chip camera to close holes in the heart.

Shetty and his team have performed over **70,000 major heart surgeries** out of which **15,000 were on children,** many of them newborn babies.

Along with the Indian Space Research Organization, NH manages **the world's largest telemedicine program.**

NH has built a **150-bed hospital** in Mysore for **300 million INR** (US\$ 4.6 million) – which is a fifth of the industry's cost.

It also has a centralized supply-chain management system geared to getting the best deals in exchange for high volumes from a select set of suppliers. In fact, 85 percent of its drugs and consumables are purchased by its central buying unit.

Moreover, NH does not go for fancy interiors. This way, its 150-bed hospital in Mysore has managed to reduce the cost of heart surgery to US\$ 800, compared to US\$ 1,000 in Bangalore.

According to Shetty, while there is a market for luxury hospitals, the bulk of the business will come from the poor who can't afford treatment due to a lack of medical insurance and prohibitive cost of healthcare.

He feels it is easier to bring down costs in healthcare, as opposed to manufacturing. "Unlike manufacturing, healthcare is not dependent on

any finite component. It is dependent on human skill. And human skill is replenishable. We can technically reduce the price of any service to any level we want," explains Shetty. With this approach, Shetty aims to reduce the cost of healthcare by as much as 50 percent over the next decade.

Working on the Challenges

Shetty's vision for India is fraught with challenges. For one, India does not have many specialists, due to the lower number of post-graduate medical places. "We have 45,600 undergraduate places in our medical colleges, but only 12,000 post-graduate places. In comparison, the USA has 19,000 undergraduate and 32,000 post-graduate places," he says (more on the challenges medical students

India's Healthcare Challenges

1 Poor health

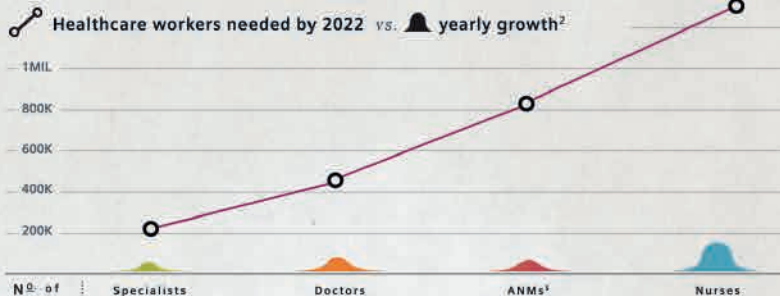India is № 134 (of 187) in the Human Development Index[1] – which ranks countries based on development issues, progress and policies.

121	Honduras
122	Kiribati
123	South Africa
124	Indonesia
125	Vanuatu
126	Kyrgyzstan
127	Tajikistan
128	Vietnam
129	Nicaragua
130	Morocco
131	Guatemala
132	Iraq
133	Cape Verde
134	**India**
135	Ghana
136	Eq. Guinea
137	Congo
138	Lao P.D.R.
139	Cambodia
140	Swaziland
141	Bhutan

2 Shortage of medical professionals

Registered, but not working – A key reason: Most entry-level jobs in healthcare are not as well-paying as corporate jobs.

Doctors (750K total) — 200K not working
Nurses (1.07M total) — 600K

Healthcare workers needed by 2022 vs. yearly growth[2]

1MIL
800K
600K
400K
200K

N⁰. of | Specialists | Doctors | ANMs[5] | Nurses

3 No health insurance

Less than 15% of the population has health insurance – most healthcare is paid out of pocket.[3]

■ = Paid with insurance

14% 21%   79%
            42%   12%
                          47%

India | Brazil | China | Russia | U.S. | U.K.

Population

Number of healthcare workers[4]

■ 10–15 per 10,000 people
■ 35–65 per 10,000 people

Distribution of medical colleges[4]

= 5%

Distribution of India's population — 72% Rural

Distribution of India's doctors — 26% Rural
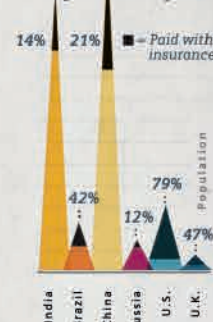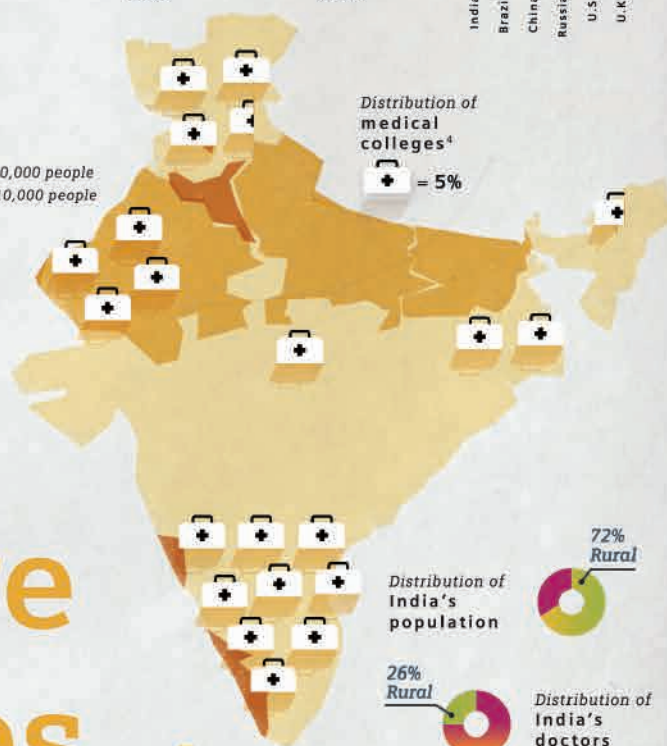
4 Regional disparities

The doctor-nurse density in India is 19 per 10,000 people* (6.5 doctors / 13 nurses). However, the density varies widely from state to state, with the highest density in urban areas and the south.[4]

* The global average is 14.2

[1] From the 2010 Human Development Report by UNDP (http://bit.ly/JPHZ4b)

[2] From The Hindu, May 12, 2013 (http://bit.ly/1gKNSNv)

[3] From DNA India, Sept 20, 2013 (http://bit.ly/1jpVxTi)

[4] From the World Health Organization, 2012

[5] Auxiliary Nurse Midwifes are female health assistants at India's Primary Health Centers

The Pediatric Intensive Care Unit at Narayana Health is well-equipped to manage difficult childhood emergencies.

It's critical to have specialists to improve the healthcare standards. "Among the top ten causes of death are heart disease, cancer, accidents, strokes, Alzheimer's, and psychiatric problems. All these diseases require specialists," Shetty explains.

Two, the medical profession is losing its charm, since it doesn't pay as well as many other industries. "When I was in school, when someone asked us who wants to become a doctor, virtually the entire class would raise their hands. Today, very few hands go up," he says.

Shetty is working on this. "Across the world, outstanding doctors generally come from deprived backgrounds – they have fire in their bellies and can work round the clock to change the rules of the game," he says. If these youngsters find medical education expensive and non-rewarding, there is

a problem, he feels. Therefore, NH has launched a scholarship program – Udayer Pathey (which means 'rising path' in Bengali). Its objective is to help 2,000 students from villages of West Bengal become doctors every year. "We give them scholarships and mentor them," adds Shetty.

The other challenge for India, according to Shetty, is that it needs more nurses, technicians, and administrators. "Behind every skilled doctor you need to have at least two highly-skilled nurses, at least four to five technicians, and good administrators."

But, due to the government's myopic policies, "the nursing profession may soon be extinct in India," says Shetty. "Admission to nursing colleges has come down nearly 50 percent," he adds. The reason? There is no career progression for nurses and technicians. "In the USA, a nurse can become a

nurse practitioner, a nurse anesthetist, a nurse intensivist... or even become a doctor," he says. But not so in India.

Shetty has played a key role in the 'Save the Doctor' campaign, started by the Indian Medical Association (IMA) and the Association of Healthcare Providers India (AHPI). Through this campaign, Shetty hopes to address several issues plaguing the industry. "We want to create an infrastructure to address the issues confronting doctors first, and then we will take up the causes of nurses, technicians, and the like," he says.

"If every country has adequate number of surgeons, radiologists, anesthetists, and cardiac surgeons, believe me, costs will come down by more than 50 percent. It is a question of demand and supply," he says. Shetty is optimistic that the scenario will

Creating Equitable Growth

How can India address the issue of volumes in order to create more supply of doctors, nurses, specialists, and so on?

Shetty: The industry has to start lobbying. That's the only way we can change the scenario. Medical diagnostic equipment manufacturers, pharmaceutical companies, and clinicians have to influence the policymakers. Companies like Siemens are not able to sell many radiology systems in India because there aren't that many radiologists. Today, people have the money to buy a magnetic resonance imaging (MRI) scanner, but there is a dearth of radiologists who can interpret the reports. The same applies to pharmaceutical companies. They manufacture so many specialty drugs, but there aren't enough post-graduate doctors in India who can prescribe them.

You mentioned that healthcare creates equitable growth. Can you explain this?

Shetty: Healthcare is a unique industry that creates millions of jobs for millions of households. It is a main driver of the nation's economy and creates highly skilled jobs for a few people. But a large number of jobs require semi-skilled and unskilled people.

If India wants equitable growth, the government must open more medical colleges in regions such as east India. Nearly 150 districts in the east of India are affected by Naxalism (a term used to refer to various militant Communist groups operating in India). The Naxalite problem is not a law-and-order problem. It is an economic problem. You start a medical college in this region and within three to four years, there will be about 5,000 to 8,000 students living in that district. They will change the economy of the entire district.

Globally are there any healthcare models that India can emulate?

Shetty: We have a lot to learn from the USA and Europe. In the USA, a large number of procedures are done by physician assistants. They significantly reduce the volume of work to be done by the surgeons.

The process of healthcare is a lot more streamlined in these countries. For instance, in oncology there is an oncology nurse, who knows all about the drugs and can talk to the patient very confidently. We have not reached that yet.

When you talk of bringing down costs, what's the first step hospitals need to take?

Shetty: In global forums, everyone talks about reducing the cost of healthcare. But no one knows how much they are spending today.

We have invested in technology. Every day at noon, I get an SMS on my cell phone with yesterday's revenue, expenses and EBIDTA (earnings before interest, depreciate, taxation, and amortization) margin. For us, looking at a profit and loss account at the end of the month is like reading a post-mortem report. You cannot do anything about it. Whereas if you monitor it on a daily basis, it works as a diagnostic tool. You can take remedial measures.

While charity is not scalable, good business principles can be scaled up, and can be taken to any level.

"Healthcare is a unique industry that creates millions of jobs."

People from different religions come to the multi-faith temple at Narayana Health to pray for the speedy recovery of patients.

change soon. "We have received a very positive response from the government," he says.

Increasing Medical Cover

Shetty's approach to increasing accessibility of healthcare facilities is two-pronged. On the one hand, he is working on supply – of both hospitals and healthcare professionals. On the other hand, he is working on increasing the penetration of health insurance.

"Ten years ago, we realized that taxpayers' money cannot pay for healthcare," says Shetty. He conceptualized the Karnataka Yeshasvini Health Care Scheme, which became operational in June 2003. Through this scheme, farmers contributed 5 INR (US$ 0.08) per month towards medical insurance. The government agreed to be the reinsurer. Today, the premium has risen to 18 INR (US$ 0.27) per month. "Over the last decade, over 450,000 farmers had a variety of surgeries, including major heart operations," informs Shetty.

Now, Shetty is convincing policymakers to float a scheme through which every mobile phone subscriber in India pays 20 INR (US$ 0.32) over and above the regular bill, in order to create a robust health insurance program. "In India, we have 850,000 mobile phone subscribers who spend at least 150 INR (US$ 2.3) per month just to speak on the phone. If there is a policy that provides them with health insurance for an additional 20 INR (US$ 0.31), I do not think anyone will mind paying that additional money," he says.

The state governments are very open to this suggestion, he adds. "The Indian government will soon become a health insurance provider. Not only a healthcare provider," says Shetty.

Healthcare Provider to the World

The economy of the 20th century was driven by machines. "The healthcare and wellness industry is going to drive the world economy of the 21st century," says Shetty.

Globally, healthcare is a US$ 4.5 trillion industry. It is the second largest industry after food and agro-processing. "Despite its size, it only addresses about 30 percent of the world population. Nearly 70 percent of the world population is nowhere near receiving decent healthcare services. We need a revolution in order to service the entire market," he adds.

According to Shetty, India can address most of the challenges without spending a single cent. "All we have to do is relax the norms for higher medical education," he says.

"India has all it takes to emerge as a major healthcare provider to the world. Indians are born healers. We produce the largest number of doctors, nurses, and medical technicians. We have a very mature pharmaceutical industry," he says.

According to Shetty, the policymakers need to realize that it is not just about healthcare. "It is about creating equitable growth across the society," he adds.

As a first step towards going global, NH is partnering with the Ascension Group in the USA to set up a hospital in the Cayman Islands – close to patients in the USA and Central America. It will be inaugurated on February 2014. "Initially, we expect it to be 30 to 40 percent cheaper than other hospitals in the region. But over a period of time, we plan to make it even more affordable," says Shetty. By expanding overseas, NH is sounding the bell for a healthcare competition on a global scale – and paving the way for world-class healthcare at affordable prices in the future. ■

Swati Prasad is a freelance business journalist based in Delhi. She reports from India for several publications overseas and has worked as a correspondent and editor for *The Economic Times*, *Business Standard*, *The Indian Express*, and *Business Today*.

Imphal
Population
264,986

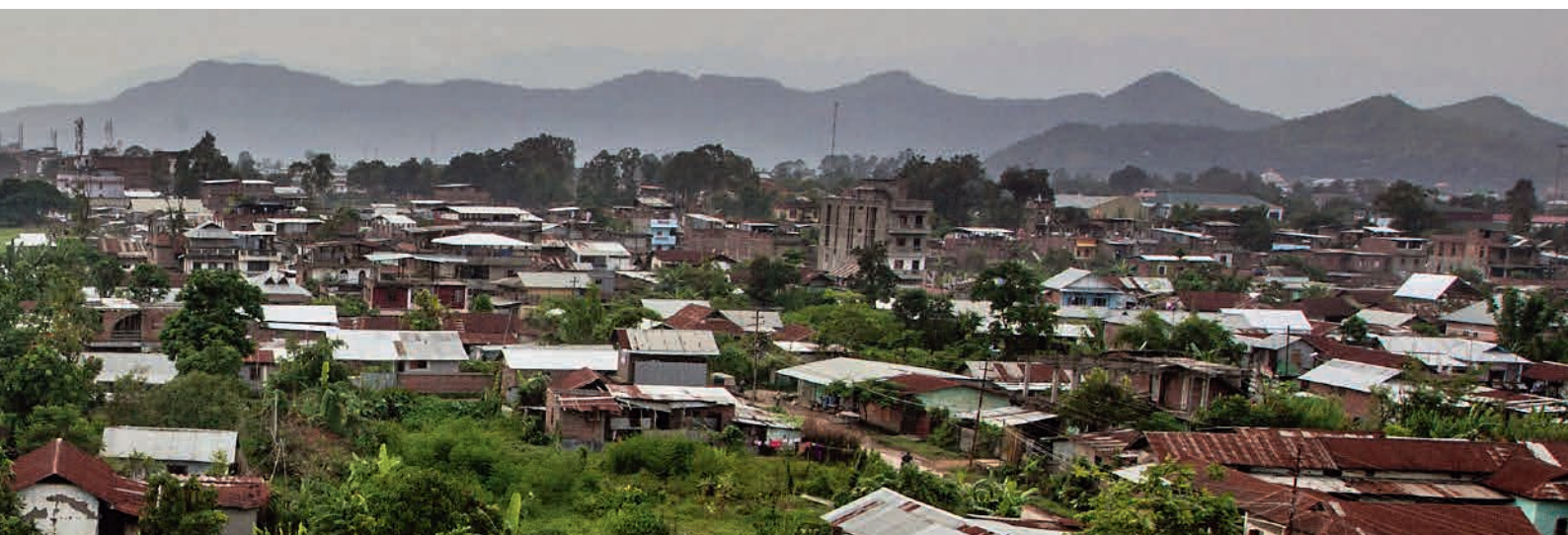# The Road Less Travelled

In the rather inaccessible and turbulent northeast of India, Babina Diagnostics opted for the high-end Siemens StreamLAB Analytical Workcell. With more than one million laboratory tests performed each year, this investment is helping to increase workflow and patient satisfaction.

Text: **Archis Mohan**   Photos: **Atul Looke**

Imphal is the capital of the eastern-most state of India and destination for many who want to get their blood tested at a state-of-the-art laboratory.

K. Lungrei Ekhrol, 60, a farmer, sits watching television in the spacious hall of Babina Diagnostics in Imphal, the capital of Manipur, a state in north-eastern India the size of Slovakia. It's nine in the morning but the hall is already full. Like Ekhrol, all patients are awaiting their turn to have their blood drawn for various clinical diagnostic tests.

Most of the patients started from their homes in the rural countryside at the crack of dawn. They walked several kilometers to reach the nearest paved road before they boarded a bus to get to this sleek four-storey building that houses Babina Diagnostics.

Ekhrol says he would need to return home before sundown. The good news is that everyone in the hall can expect their blood reports by lunchtime. It will leave him, says Ekhrol, ample time to visit his doctor and share the report, do some shopping, and still manage to return home before dusk.

The reason for Ekhrol's calm confidence, although he is quite unaware of it, sits some meters above his head. At the center of a similarly-sized hall on the third floor of the building sits a

gleaming Siemens StreamLAB™ Analytical Workcell, the only one in India.

"StreamLAB is the pride of this laboratory," says Dr. Th. Dhabali Singh, the founder and Managing Director of Babina Diagnostics. Babina acquired

the StreamLAB solution just over two years ago. It is an investment that Singh says he has never regretted.

StreamLAB is an intuitive automation solution that consolidates all tasks in a single workstation that helps streamline workflow. It is fully-automated, ▶

60-year-old Ushokholun with his son Mangpu from Myanmer travelling by moped to give his blood sample at the Babina collection center in the Indian border village of Moreh.

70 percent of diagnostic tests at Babina Diagnostics are of walk-in patients.

loads and unloads the test tubes from one single location, accommodates different tube types, has an efficient tube sharing system and accelerated turnaround times, offers extensive immunoassay menu options, and is compact in size. Its small footprint, and productivity equalling systems twice its size, convinced Singh to include the StreamLAB solution in his armory of diagnostic instruments.

Betting Big on Automation

Singh says he always had a burning ambition to do something for his homeland. He studied at a govern-

ment school, walking several kilometers carrying his own gunny bag, used for sitting on the ground as the classes took place out in the open during winter season. He says it was his father who, despite being a small trader, motivated all his children to study. "He realized the importance of education and loved the medical profession. He kept pushing me to study medicine," says Singh.

To the surprise of most of his friends and relatives, the future entrepreneur returned home to Imphal after his medical studies in faraway Chandigarh. A stint at a hospital in Imphal made him realize that Manipur didn't have the facilities to do even the most basic

of diagnostic tests. Financial assistance from his father-in-law and help from friends, including a microscope rented at INR 175 (US$ 3), helped him start the laboratory in November of 1983. It did well and by 1994 he quit his job as an associate professor in the local government-run medical college. Singh is proud of the fact that he came back to his homeland when his contemporaries were busy making a beeline for the UK and the USA.

With time, Singh realized the need for an automated solution that could reduce turnaround times significantly and be error-free. He had set his heart on acquiring the StreamLAB solution for Babina Diagnostics from the time it was launched. "We had been looking for a complete automation solution for Babina Diagnostics for some time, especially clinical chemistry and immunoassay, of which our sample volumes are considerably high," he says. Good after-sales service from Siemens convinced him further.

He says at times his children and relatives berate him for investing so much money in expensive diagnostic equipment in a place like Manipur, where purchasing power is low. "The investment in StreamLAB was significant, but I was confident it was viable," says Singh.

And indeed: The StreamLAB solution has helped Babina Diagnostics carry out an impressive one million tests a year, most of which are processed between morning and early afternoon so that customers can reach their homes in distant places before the sun sets on the valley. Singh says the laboratory's turnaround times have reduced by 30-35 percent with the introduction of the StreamLAB solution, and errors have been significantly reduced.

Currently, Babina Diagnostics commands a 70 percent share of the diagnostic market in Manipur, processing nearly 1,000 patient samples per day. Singh says approximately 70 percent of diagnostic tests are from walk-in patients. The rest of the samples reach

Babina Diagnostics from its 100 collection centers across Manipur and from major cities across the northeast – such as Agartala in Tripura, Silchar and Guwahati in Assam, and Dimapur and Kohima in Nagaland. Of late, a couple of dozen samples come daily from the border towns of Myanmar, which is 117 kilometers from Imphal.

Minimizing Errors With Automation

Singh named Babina Diagnostics after his daughter, Babina. His daughter, who is also a doctor, helps him run the laboratory. She says mistakes occur primarily due to human error and automation is the only solution for minimizing them. ▶

The destination of many medical travellers: Babina Diagnostic's laboratory.

The lab performs tests on the most common medical conditions in northeastern India, such as endocrine and autoimmune disorders, diabetes, and infectious diseases.

Setting an Example

India's northeastern region is both relatively inaccessible and underdeveloped. Good healthcare services are mostly unavailable. Babina Diagnostics is an exception. For the last 30 years, it has made quality healthcare services accessible to the people of Manipur. It turned to automation to handle its huge volume of samples. The StreamLAB Automation Solution has helped reduce turnaround times, increase employee efficiency, and improve physician and patient satisfaction.

With the advent of the StreamLAB solution, Babina Diagnostics' operations have significantly reduced errors.

The entire process from collecting blood samples to issuing test reports requires minimal human intervention at Babina Diagnostics. The tubes with blood samples collected from the patients on the first floor are barcoded. Bundles of these barcoded tubes are then put into plastic bottles that are pushed into an automated pneumatic sample delivery system that reaches the third floor. There, the tube bundles are brought out of the bottles and put onto the StreamLAB track.

Singh says the StreamLAB solution can accommodate different kinds of tubes that may come from the collection

At the StreamLAB track: Only minimal staff is required to process the 1,000 tests per day.

"Babina Diagnostics changed the market scenario in the region, benefitting both doctors and patients."

Dr. Th. Dhabali Singh, founder and owner of Babina Diagnostics, Imphal, India

centers, does centrifugation to separate plasma or serum from other components of blood like leucocytes for better test results, reads the barcodes to conduct the prescribed tests, and updates the test results in the master server.

The results are then sent by email or the printout is given to the patient waiting in the ground floor hall. The entire procedure doesn't take more

than three to four hours. Patients that walked into the laboratory at 9 a.m. can collect their test report by 1 p.m. There are also times when the laboratory does emergency tests for samples from collection centers and results are communicated immediately, either via fax, the Internet, or by phone.

Babina Diagnostics conducts routine skill development training sessions

for its technicians. The doctor says maintenance is the key to ensuring reliability and efficiency of the lab automation systems. "We have our own quality policy in place that takes care of the maintenance," he says.

Some of the most common medical problems in northeastern India are endocrine disorders, autoimmune disorders, diabetes, infectious diseases, conditions like HIV and hepatitis, and ▶

The barcoded vials are put into plastic bottles on the ground floor and then pushed into an automated pneumatic sample delivery system that reaches the lab automation on the third floor.

cancer. These are also the most commonly performed tests at Babina Diagnostics to detect and diagnose these diseases.

Braving the Odds

The diagnostics market in Manipur is relatively small compared with metropolitan cities in other parts of India. Manipur with a geographical area of 22,347 square kilometers is one of the smaller states in India and, with 2.7 million inhabitants, also one of its least populous. "But most physicians and people in the region trust Babina Diagnostics. The sample load has been increasing by the day," says Singh.

Babina Diagnostics ushered in qualitative changes in healthcare in Manipur, which lacked a diagnostic culture. "In time, physicians and patients began to realize the importance of correct diagnosis and accurate test reports," says Singh. Earlier, people from Manipur sent patient samples to laboratories in Kolkata and Delhi, which are 1,500 and over 2,000 kilometers from Imphal, respectively. "We know the importance of timely diagnosis in the treatment of a disease. Babina Diagnostics changed the market scenario, benefitting both doctors and patients," says Singh.

Singh says his wide network of collection centers and joint venture units have made health services more accessible. Babina Diagnostics is the preeminent diagnostic centre in the region. It was also the first pathological laboratory run by a pathologist in Manipur. "Being a pathologist myself, I was aware of the needs of the treating physicians and the people. It has always been my dream to run a diagnostic laboratory of my own. Fortunately, all my instincts and gambles proved right. There were financial risks involved, but I was confident they would pay off," says Singh.

"The law-and-order situation, the frequent blockades on the highways, the geographical terrain, and the natural calamities such as landslides, as well as the erratic power supply, are problems that we have to encounter as entrepreneurs," he says. Poor power

Patients accept long journeys to have their blood tested, but thanks to the lab's fast turnaround times, they arrive back home on the same day.

supply has meant the laboratory has to rely on diesel generators for power, which is expensive. Blockades of highways lead to total stoppage of samples coming from outside Manipur.

Despite these problems, Singh is optimistic about the future. Manipur's connectivity with the rest of the country and the larger southeastern region of Asia is set to become better with Imphal expected to have a rail link with the rest of India by 2016. There are also plans for an international airport.

The doctor says Imphal could become the center of medical tourism not only for people from other northeastern states, but also from neighboring Myanmar. Babina Diagnostics already has customers from Myanmar, with

two of its collection centers situated in the bordertown of Moreh. In collaboration with pharmaceutical companies, Babina Diagnostics conducts free health camps on a regular basis in Moreh and inside Myanmar.

The investments in instruments and automation have not caused Singh to increase the cost of the tests. Babina Diagnostics has rates that are less expensive than in cities. Singh plans to promote a multispecialty or cancer hospital in Imphal in the future and even a medical college to improve the doctor-patient ratio, which is currently at one doctor for 1,660 patients.

"The potential is huge. I would like to see many more hospitals and diagnostic centers offering premium services

at affordable rates," says Singh. Despite the challenges, Singh is unwavering in his commitment to "give the best to the people of Manipur and the northeast region." ∎

Archis Mohan is a New Delhi-based freelance journalist. He writes on a range of issues for both Indian and foreign print and television media outlets, including *Hindustan Times*, *The Telegraph*, *NDTV* and *Times Now*.

➡ **www.siemens.com/
laboratory-automation**

Coimbatore
Population
1.1 million

A Trailblazer in Orthopedics

Dr. S. Rajasekaran of Ganga Hospital, Coimbatore, has used simple diagnostic tools for research to transform international methodologies in orthopedics. His approach of putting the patient first is now driving him to evolve new healthcare models for India.

Text: **Swati Prasad**   Photos: **Arush Mayank**

Coimbatore is amongst the fastest growing tier-II cities in India, bustling with textile mills, factories, information technology companies, and hospitals. Unlike most small cities in south India, it doesn't boast many tourist spots. Its fame comes from entrepreneurs and from institutions like Ganga Hospital, which has put Coimbatore on the world map of orthopedics.

One of the largest orthopedic hospitals in South Asia, Ganga Hospital is a rare institution that has seen the right blend of clinical and academic activities. Research has played a key role in the success of Ganga Hospital. Dr. S. Rajasekaran, Chairman of the Department of Orthopedic and Spine Surgery, stands firmly at the helm of a success story that was started back in 1978 by Rajasekaran's father, Dr. J. G. Shanmuganathan, an anesthetist.

Today, Rajasekaran and Ganga are known the world over for medical research and new methodologies in orthopedic treatment. When Rajasekaran adopts a methodology,

it impacts on the international community. Moreover, it is also a hospital that never turns away patients, even if they do not have the money for treatment. "We look for donors and ask our surgeons to operate for free," says Rajasekaran.

His research interests relate to spinal tuberculosis, open fractures, genetic studies, back pain and disc degeneration, disc diffusion studies, computer-assisted orthopedic surgery, and diffusion imaging of the spinal cord. Rajasekaran's research has won him numerous awards including the prestigious EuroSpine Open Paper Award for 2008. He is also one of the very few surgeons in the world who has won the prestigious ISSLS Spine Research Awards three times: in 2004, 2010, and 2012.

From Diagnosing to Understanding a Disease

In 1991, Rajasekaran and his brother, Dr. S. Rajasabapathy, a plastic surgeon, returned to India from the UK. Both brothers wanted to convert Ganga

into a specialty hospital for orthopedics and plastic surgery. Back then, Ganga was a polyclinic for obstetrics and gynecology, pediatrics, and neurology.

"Many of our friends and colleagues thought we didn't stand a chance. But we believed there was a niche segment we could address," says Rajasekaran. The belief came from the fact that Coimbatore, as well as India, were growing at a fast pace. "There is one death on Indian roads every four minutes," informs Rajasekaran. With rising road traffic and concomitant accidents, both orthopedics and plastic surgery to his mind held a lot of potential. The rapid growth of Ganga only confirmed this. In 2012, it recorded 154,790 outpatients, 23,518 in-patients, and 13,446 surgeries, up from 111,986 outpatients, 19,317 inpatients and 11,766 surgeries in 2010.

With his return to India, Rajasekaran realized the huge difference in the approaches adopted by orthopedists in India and their peers in the West. While those in the West believed sur-

gery was the answer to every injury, infection, stenosis, or back pain, orthopedics in India were busy attending to trauma and accident cases. Surgeries were not too common in India. And in the West, the results of surgery were unsatisfactory.

Even today, very little is understood about back pain. "A magnetic resonance exam may show some changes in the spine, but the pain maybe coming from somewhere else – the joint, the disc, nerves, muscles – or the problem maybe in the brain. You can also experience pain due to depression, stress ▶

"Previously only meant for diagnosis, today radiology is also being used to understand diseases."

Dr. S. Rajasekaran, Chairman of the Department of Orthopedic and Spine Surgery, Ganga Medical Centre and Hospital, Coimbatore, India

40 percent of the hospital beds are allotted to the poor, 30 percent to the middle-class, and 30 percent to the upper-class.

or anxiety." And so Rajasekaran decided to get into research. It all started with kyphosis (over-curvature of the thoracic vertebrae) in children even after complete cure of spinal tuberculosis.

Rajasekaran uses computed tomography (CT), magnetic resonance imaging (MRI), and X-ray systems for his research. "Previously only meant for diagnosis, today radiology is also being

nificant role in the research undertaken at Ganga. One important system is the MAGNETOM® Symphony 1.5 Tesla MRI eco system. "In spine, since there is no moving part, excellent clarity is obtained with 1.5 Tesla systems," Rajasekaran says.

The Importance of Research

Research also has a special place at Ganga Hospital. Therefore, in 2002,

the research fund. That enabled us to do the research," he says.

Today, the foundation has grown and has to its credit various activities such as supporting the academic training of the hospital staff, holding scientific meetings and conferences, funding on-going research activities of the orthopedic department, providing funds for Project Helpline (a project to support the surgical correction of physical deformities in poor children), and primary education of under-privileged children. The funds continue to come from Rajasekaran's family, members of the board of directors, and philanthropists.

The department of orthopedics performs

more than 3000

major surgeries per year.

used to understand diseases," he says. "It is used to identify, grade, and stage the disease, to tell whether surgery is required or not, to prognosticate, to plan the treatment ... In fact, at every stage radiology has a role to play." Siemens systems have played a sig-

the hospital founded the Ganga Orthopedics Research and Education Foundation. "The initial corpus for the foundation was by a donation from the family. Subsequently, I kept the fund growing by regularly allotting a major part of my revenues to

The second step was to utilize hospital resources for research. The MRI eco system, for instance, was relatively free after 8.30 pm. "We convinced our consultants to charge less for research," he says. "When you are a high-volume surgeon, professional fatigue sets in after some time," says Rajasekaran. Research not only prevents the onset of this, it also gives medical practitioners a fresh perspective. "You start analyzing. And then, every patient looks interesting."

Putting the Patient First

In the mid-nineties, while planning Ganga Hospital's expansion from a 42- to a 135-bed hospital, Rajasekaran and Rajasabapathy met their architect. The siblings allotted 40 percent beds to the poor, 30 percent to the middle-class, and 30 percent to those who prefer a luxury ward. The architect advised them to reduce beds for the poor. In his view, this would make the project more viable in the eyes of the bankers and increase the possibility of getting a bank loan. But the siblings were adamant about sticking to their ratio. They gave an impressive presentation to the bankers to prove their model could work. "It needed a lot of convincing, but we finally got the loan sanctioned," he adds.

For Ganga Hospital, the patient comes first. The hospital ensures the treatment is affordable for the middle-class and doesn't turn away patients if they can't afford the treatment. The information about Ganga has spread by word of mouth. Ganga Hospital does not have a marketing department. "We have never advertised," says Rajasekaran. But still, 30 percent of Ganga Hospital's turnover comes from patients who do not reside in the region. However, medical tourism to Ganga Hospital is yet to pick up. "That's due to poor accessibility," explains Rajasekaran. Although Coimbatore has an international airport, there are only two international flights to the city.

In the last 15 years, Ganga Hospital has trained

463 doctors

from 42 countries.

But then Rajasekaran's methodologies have spread in many different ways – through his research papers, through conferences, and, most importantly, through training. Ganga Hospital provides fellowships to senior residents from all across India. It has a team of international students coming every year to learn new techniques in spine surgery. Hence, the best practices adopted here percolate through to the national and international community of orthopedics. "In the last 15 years, we have trained 463 doctors from 42 countries," he says. Rajasekaran also receives students from the prestigious Japanese Spine Society.

Towards a Different Healthcare Model

According to Rajasekaran, India is a very different market and the various health delivery models that the government and the private sector are working on should be aware of this fact. "Our models have to be different from the West," says Rajasekaran. Talking about the demographic profile of the country, he says the top two percent of Indian society comprises people who are richer than the rich in the West. For them, the healthcare models are irrelevant. Then, there are the next 500 million who form the middle-class. "Our middle class population is far bigger than the population of the USA. In this segment, affordability has been on the rise," he adds. Then, there are the next 400 million which are below the poverty line. "We need

to share this liability and strategize our policies around this stratum," he adds. According to Rajasekaran, the private sector must focus on the poor. "Once you achieve a critical mass, you can do a lot of good."

As far as Ganga Hospital is concerned, Rajasekaran says it has seen steady progress since 1991. The last expansion at Ganga Hospital happened in 2007. "The scope for expansion is huge," he adds. In his view, expansion must be dovetailed to the needs of the various strata of society. "We need to be aware of the different affordability levels and needs. We need a healthcare delivery strategy that does not compromise on delivery of quality healthcare," he says.

Rajasekaran is now looking at the next big step to get into sub-specialties. In order to take that leap, he is examining whether there is a scope for a 300-bed spine hospital, a 300-bed joint replacement hospital, and a 500-bed accident hospital in Coimbatore. "It may not happen today, but it will happen in the next three to four years," says Rajasekaran. ∎

Ganga Hospital is one of the largest orthopedic institutes in South Asia, with academic research playing a key role.

Read more about Dr. Rajasekaran's research at *Medical Solutions* Online:

➡ **www.siemens.com/ orthopedics-india**

Mumbai
Population
13.8 million

Mastering The Volumes

From its centralized laboratory in suburban Mumbai, India, Thyrocare Technologies processes 100,000 diagnostic tests each night – more than in any other comparable lab worldwide. Made possible by one man's vision coupled with state-of-the-art automation solutions.

Text: **Archis Mohan**   Photos: **Atul Loke**

At midnight, a laboratory the size of a football field situated in the basement of a nondescript three-storied building in a suburb of Mumbai sees frenetic activity. Men and women in white lab coats place bundles of barcoded vials on two serpentine tracks linked to a series of diagnostic machines.

During the day, nearly 25,000 vials with blood and urine samples are flown in from every corner of India. Each sample undergoes an average of four tests on a lab automation solution by Siemens that consists of two tracks of 17 meters and 12 meters in length, with 14 immunoassay analyzers linked to each track.

By the time dawn breaks over the Mumbai coastline, the automation solutions at Thyrocare Technologies have processed nearly 100,000 tests and posted the reports online, almost all without any human intervention.

The man behind Thyrocare is Dr. A Velumani. His entrepreneurial vision, supported by state-of-the-art automation solutions, has made Thyrocare the leader in the Indian diagnostic industry. "Thyrocare is the world's largest single-floor, centralized, fully-automated, IT enabled laboratory," says the 54-year-old CEO and founder. Thyrocare was also the first in India to use barcodes and bidirectional interfacing in diagnostics to eliminate errors.

King of Volumes

In 1995, Thyrocare started as a thyroid function testing laboratory. Today it is the youngest of the four key players in the Indian diagnostic industry. Yet, it commands 60 percent market share.

Thyroid function testing continues to generate 70 percent of Thyrocare's business. The thyroid is a vital butterfly-shaped gland below the Adam's apple that releases a hormone that helps the body use energy, stay warm, and keep all organs working normally. It is estimated that 42 million Indians have thyroid disorders.[1]

There are four pillars to Velumani's business model – large volumes, low costs, speed, and accuracy. "We are a single laboratory for a billion people. We are faster than any local laboratory that serves its local population. We are the fastest on earth," boasts Velumani.

He has modeled his business on the newspaper industry. Every morning, Thyrocare's franchisees collect blood samples from 20,000 collection points in hospitals, nursing homes, and laboratories across the country. Each patient sample is collected in Thyrocare pre-barcoded empty vials. The barcode identifies each patient specifically during collection, ruling out the majority of pre-analytical errors. After entering the data related to the barcodes in the webserver, the Thyrocare franchisee aggregates all the vials, and packs them in a temperature-controlled transportation system for air-cargo delivery to Mumbai. So while the patient data typically reaches Thyrocare in couple of minutes, the consignment of vials takes a couple of hours by airplane.

Most consignments reach the city by ten in the evening and are collected by Thyrocare employees, who deliver them to the centralized laboratory within a couple of hours. All samples are in the laboratory by two in the morning. These samples are subsequently loaded onto the two lab tracks with the immunoassay instruments that read the barcodes, conduct the tests, and post the reports online by six in the morning.

Laboratory workers across the length and breadth of India punch in a password on the laboratory's website to download and dispatch the reports to customers. Thyrocare boasts a turnaround time of less than 20 hours from the time the sample was collected.

The immunoassay analyzers offer more than 275 assays for screening, diagnosis, prognosis, and monitoring of most diseases.

"Siemens rules my floor and I am proud of it," says Velumani of the decade long association. Siemens has accompanied Velumani at every step and turn of Thyrocare's meteoric rise.

From Rags to Riches

Velumani hails from a very poor family from Appanaickenpatti Pudur, a small village 28 kilometers from Coimbatore in Tamil Nadu. At the age of 16, Velumani enrolled at a college in Coimbatore to study chemistry. He even worked as a domestic servant in a rich man's house to ensure that his graduation dream would come true.
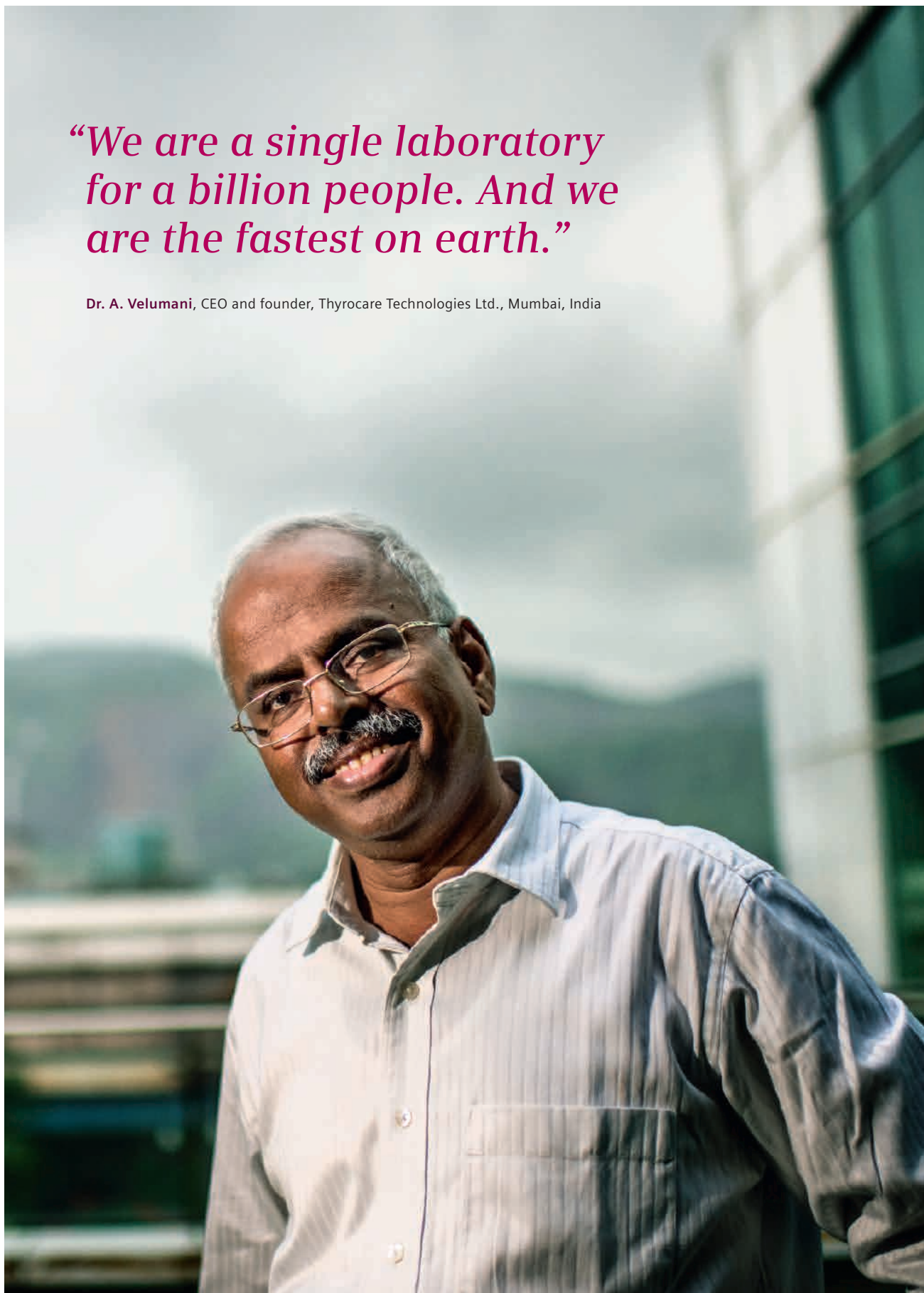
At 23, Velumani arrived in Mumbai and was lucky enough to find a government job as a lab researcher at the Bhabha ▶

Thyrocare's headquarter houses a laboratory the size of a football field in the basement.

"We are a single laboratory for a billion people. And we are the fastest on earth."

Dr. A. Velumani, CEO and founder, Thyrocare Technologies Ltd., Mumbai, India

Once the sample cooling boxes arrive at Thyrocare from Mumbai airport, the lab staff assembles the vials in specific tube trays.

Few staff resources are required to monitor the automated testing process. All procedures can be reviewed in a centralized IT system.

Thyrocare: Key Facts

Thyrocare is the **_biggest_** centralized single-floor laboratory in the world

It has **20,000 collection points** across India

It collects **_25,000 blood samples_** from 1,000 towns daily

It performs **100,000 tests** every night

It maintains **_90 days'_** stock of reagents

It has **650 business partners** and **500 employees**

Its turnaround time is less than **_20 hours,_** including transport time

Annual turnover (2012-13): INR **1,800 million** (US$ 27 million)

Total business value: INR **_20,000 million_** (US$ 300 million)

Network vast enough to process **500,000 tests** a day

Its **_manpower cost_** is **_7%_** of turnover – the lowest in the industry

Atomic Research Center (BARC). It was the first of many lucky turns that eventually led Velumani to become an entrepreneur. At the age of 37, Velumani found his job becoming more routine and monotonous. He quit his cozy government job and started the "romance with risk" stage of his entrepreneurial journey.

In 1995, he set up his first laboratory in a small garage – while studying for his Master's degree followed by a doctorate in order to hone his skills.

Velumani rented 150 square feet of space in a garage, hired an underutilized testing machine, and started offering thyroid-function testing for one-fourth of the existing market price, on the assumption that as volumes increased the reagent costs would decrease. He offered nearly 60 percent profit to his franchisees while his competition offered only 15 percent.

By the turn of the century, Thyrocare was testing 4,000 samples a day. The boom in the aviation industry helped Thyrocare transport samples from across India at low cost, while the growth in the IT and telecoms industry enabled uploading of test reports which could be downloaded the next morning even in the most remote corners of India.

Advantage Automation

With time, the number of vials Thyrocare received every day continued to increase – as did the number of systems on the lab floor. By 2011, the test volume was so high that Thyrocare installed an automated lab solution with scalable tracks to connect its analyzers together into a single consolidated workstation.

Automation significantly decreased costs. It reduced the turnaround time by three hours, made the workforce more productive while reducing the overall need for manpower as well as the quantity of consumables such as number of vials and quantity of reagents. At present, Thyrocare has 650 associates across India who collect and send samples to Mumbai.

Velumani pegged the cost of thyroid testing to the lowest in the market. Volumes went up and the cost of reagents came down since he bought in bulk. He brought the cost of the thyroid func-

See India's Largest Lab in Action

How does Thyrocare handle this impressive sample throughput? What challenges faced the enterprise? CEO Dr. A Velumani shares more insights into his business model in our documentary film.

www.siemens.com/thyrocare-india

To watch the video, scan the QR codes using the reader app on your smartphone or paste the URL into your browser.

tion test down by 75 percent and claims he has not increased the price once in 18 years.

"My reagent costs are low because Siemens gives me the best possible rate," he says.

Velumani's vision is to provide the entire gamut of diagnostic tests at an affordable cost. He wants to provide body profiling of 125 tests for as little as US\$ 50. "Health insurance in India is in its infancy and people pay from their pockets. That's why affordable preventive healthcare is crucial," says Velumani.

Thyrocare estimates that increased volumes would require it to scale up its current level of automation. According to M. Chandrasekhar, General Manager (Infrastructure), in 2014 Thyrocare will become the first laboratory in the world to install a truly unified high-end Siemens automation system which will have two customized tracks of 75 meters each, with each track having 32 immunoassay analyzers attached to it. It could potentially do one million tests a day.

Velumani says his dream is to have 12 single-floor, fully-automated laboratories across the globe, each servicing areas within a three-hour flying time. In addition to Mumbai, these hubs could be in Bahrain, Johannes-

burg, Nigeria, Brazil, New York, Los Angeles, Paris, Moscow, Jakarta, Hong Kong, and Shanghai.

Asked if that weren't a rather ambitious dream, he replies, "I don't dream. I never dreamt I would be an entrepreneur one day. In fact, the only thing that hasn't changed in my life in the last 35 years is my wife, Sumathi."

And what about competition? Velumani says it is impossible to replicate his model. "There are many entry-level barriers, for example the cost of air-cargo," he says. "Without volumes, this rate is not possible. And without this rate, this volume is not possible. Checkmate." ■

→ **www.siemens.com/ laboratory-automation**

[1] Unnikrishnan AG, Menon UV. Thyroid disorders in India: An epidemiological perspective. Indian J Endocr Metab [serial online] 2011 [cited 2013 Oct 22];15:78-81. Available from: http://www.ijem.in/text.asp?2011/15/6/78/83329

On the Quality Highway

PSG Hospitals, a medical college and hospital in Coimbatore, turned around its radiology department when it invested heavily in state-of-the-art radiological equipment, including technology to offer high-quality imaging to its patients.

Text: **Swati Prasad**   Photos: **Arush Mayank**

In 2009, when Dr. Kamal K. Sen came to the Nilgiris on a holiday, he instantly fell in love with the blue hills of south India. Back then, he was a senior radiologist in the Indian army. His postings took him to different parts of the country. But Sen, who was 52 years of age then, saw Nilgiris as his new abode. A job offer from PSG Hospitals, Coimbatore – a city in the foothills of the Nilgiris – helped him inch closer to his dream.

Yet his new job was anything but a bed of roses. He was heading a sick department. "It was crippled with problems relating to equipment, manpower, quality," says Kamal K. Sen, Head of Department of Radiology at PSG Hospitals, a teaching affiliate of PSG Institute of Medical Science and Research.

Sen had to understand the problems, build a team, train people, and make them more conscious of quality, errors, delays, and mistakes. "I had to change both equipment and attitudes," says Sen.

The management of PSG Hospitals was supportive. This 900 bed, multi-specialty hospital is run by PSG & Sons' Charities, a trust created in 1926 by four brothers who voluntarily divided their inheritance into five parts, keeping one-fifth aside for charity.

Today, the radiology department of PSG Hospitals generates the maximum revenue for PSG. The pride of this department is the latest robotics-run X-ray machine – a Siemens Ysio®. "This is the second installation of Ysio in India," says Sen.

"We are a not-for-profit hospital. But if there is need for a particular piece of equipment, we believe in purchasing it. Even if it is costly," says Vimal Kumar Govindan, Medical Director, PSG Hospitals.

The Merits of DR

When Sen joined PSG, the hospital had four analog X-ray and four portable X-ray machines. "We also had a computed radiography (CR) system which was defunct most of the time," says Sen.

As a first step towards a turnaround, Sen planned to switch to digital radiography (DR) and studied all DR systems. "The hospital needed a robust machine with the latest specifications and software. I did not want to purchase a system that would be obsolete in five years," says Sen. Another priority was good after-sales services.

Low radiation dose and instantaneous exam results are the most striking benefits of the new DR system.

"Digital radiography has transformed radiology."

Dr. Kamal K. Sen, Head of Department of Radiology, PSG Hospitals, Coimbatore, India

"Ysio met these requirements," says Sen. However, its cost was prohibitive. Even hospitals in the towns did not have Ysio.

But the PSG management supported Sen as it preferred to go for something that was foolproof.

PSG runs Ysio 24 hours a day. "It is a workhorse," says Govindan. It boasts many advantages. One, the radiation dose is very low. Two, the results are instantaneous. Even before the patient gets up from the trolley, radiologists have the images. "And, we do not need to go for repeat X-rays," Govindan adds.

With the installation in 2010, PSG has done away with delays, mix-ups, and repeats.

"The image quality is unmatched," says Dr. B. K Dinakar Rai, Professor and Head of Department of Orthopedics. The wireless detector has made a huge difference. "The patient is not inconvenienced. For instance, in poly-trauma cases, the patient does not have to be shifted or rolled," Rai adds.

Moreover, the radiation is 30 to 40 percent lower than with analog. Both the patient and the radiographer benefit from lower radiation. "Our life has become very comfortable. We can zoom in on the area of investigation," Rai adds.

"Superior imaging also enables us to take faster decisions," says Dr. Prakash Mohanasundaram, Assistant Professor, Emergency Medicine. "The system is a boon under any situation – be it trauma, stomach ailments, or even respiratory problems," Mohanasundaram adds. Sen concurs: "Even a tiny lesion in the thorax can be picked up."

But Sen did not want to depend on one DR machine. If the system broke ▶

"Ysio is a workhorse."

Vimal Kumar Govindan, Medical Director, PSG Hospitals, Coimbatore, India

down, the radiology department would have had to go back to the dark room. "My priority was to plan the workflow with the new system, stabilize it, and then purchase another DR machine," he says. Therefore, this year, PSG Hospitals added the Multix Fusion.

Today, the Multix Fusion is shut down at five in the evening, while Ysio works round the clock. The workflow has become a lot smoother. "Digital radiography has transformed radiology," says Sen. It has given rise to tele-radiology. "It is now possible for the patient to get a second opinion

from a doctor in the USA, the images can be sent by email, and the doctor receives them instantaneously," says Sen.

Digital radiography has clearly raised the prestige of the hospital. "Academics and medical professionals from even cities like Mumbai come to PSG to see Ysio. It is a landmark for us," says Sen.

A Multi-Tasking Department

The radiographers at PSG can operate all the machines, be it X-ray, CT, or MR.

The hassle-free and time-saving power flow in DR has led to the use of fewer technicians at day and night, leading to better utilization of manpower.

The patient turnaround time has been reduced too – the same attendant often goes to get the next patient. "Our skilled manpower costs have reduced drastically. So have our film costs, since we take fewer prints now," says Sen.

PSG Hospitals has retained the analog X-ray machines as well as the CR machines for training its allied health scientists and undergraduate radiology students: "When these young radiographers go out to work in other hospitals, they may have to work on an analog or a CR system. Not every hospital in India has DR," says Sen.

The radiology department of PSG Hospitals has a staff of 16. But Sen runs it with just five or six. "The remainder of the team focuses on training with CT scan and MRI," he says. The result: Employees do not feel they are stagnating in their job since they are able to work on all the machines. Besides, the hospital never faces a shortage of manpower. "In radiology, there is an acute shortage of professionals all across the country. For us, our training programs ensure that we are never short-staffed," adds Sen.

The Benefits of Digital Radiography in Coimbatore

When switching to digital, there was no way but forward for PSG Hospitals. See what has changed for staff and referring physicians.

www.siemens.com/ysio-india

To watch the video, scan the QR codes using the reader app on your smartphone or paste the URL into your browser.

New Plans on the Drawing Board

Coimbatore has grown considerably over the last ten to 15 years. With a burgeoning population, there are more cars on the city's roads. The caseload for hospitals too has increased. "In the early nineties, much of the 100-acre campus of PSG Hospitals had sunflower fields," Govindan reminisces.

Increased traffic has given rise to accidents. And lifestyle changes have led to higher incidences of diabetes and hypertension, which in turn have given rise to a plethora of ailments, such as heart disease and strokes. "For a tier-II city, the facilities of Coimbatore are excellent," says Sen. Coimbatore is drawing patients from Kerala, Andhra, Nilgiris, and even from Singapore and the Middle East.

PSG has outlined an expansion plan to meet the growing needs of its medical college and hospital. "We are expanding by another 700,000 square feet, with the addition of 600 to 700 beds," says Govindan. By 2015, PSG should be a 1,500-bed hospital. Construction is likely to begin by the end of this year.

PSG is also starting an oncology department within the next year. "We would like a separate oncology wing," explains Govindan. "Since we are a teaching hospital, it is important to be in oncology," he adds.

The new wing would have its own radiology set-up. Once oncology starts, PSG is also likely to go in for PET-CT equipment, and perhaps also nuclear medicine.

According to Sen, various training programs play a crucial role in the expansion plans of the hospital: "When I started attacking the problems within the radiology department, I had to attack from all sides, including training."

Also on the drawing board is a liver transplantation department, which should come up in the last quarter of 2013. "We would be the first hospital in the region to offer liver transplants," says Govindan.

For Sen, the move to Coimbatore has been a favorable one. "If you look at the tier-II cities, Coimbatore is the best. It has a good climate, good hospitals, and the people here are very friendly, aware, and quality conscious," he says.

However, Govindan is of the view that Coimbatore can do with better connectivity: "Even though we have an international airport, there are only two international flights from Coimbatore." But when hospitals like PSG are on the quality highway, can connectivity to Coimbatore be far behind? ■

→ **www.siemens.com/ysio**

Ysio: Around the Clock Efficiency

Up until 2009, the radiology department of PSG Hospitals had four analog X-ray units, four portable units, and a defunct computed radiography system. Due to these outdated machines, the department had to maintain an inventory for chemicals, maintain a dark room for developing and processing films, and a store-room to keep these films. As a result, the department needed more manpower. It was also facing several quality issues.

PSG hospitals leapfrogged to digital radiography (DR). It purchased the fully-automated version of Ysio® – one of the most advanced DR systems within the healthcare industry. This led to an increase in image quality. With the PACS network, end images are readily available for diagnosis in the different referral departments. The expenditure on films has dropped. The digital system helps to avoid errors, and has done away with repeat X-rays, and mix-ups. It has brought about speed, accuracy, and reduced costs, while the surplus staff is engaged in training medical students. In 2013, the department purchased another DR X-ray machine – the Multix Fusion – which runs until five in the evening, while Ysio works round the clock.

With the two DR machines, the radiology department of PSG Hospitals has become more efficient. Patients and doctors benefit from superior imaging. Operating costs have reduced, and due to the hospital's training programs, the radiology department does not face any shortage of manpower. It also generates the maximum revenue for PSG Hospitals, which is now focusing on its expansion plans.

PSG Hospitals is a 900-bed, multispecialty, and teaching facility.
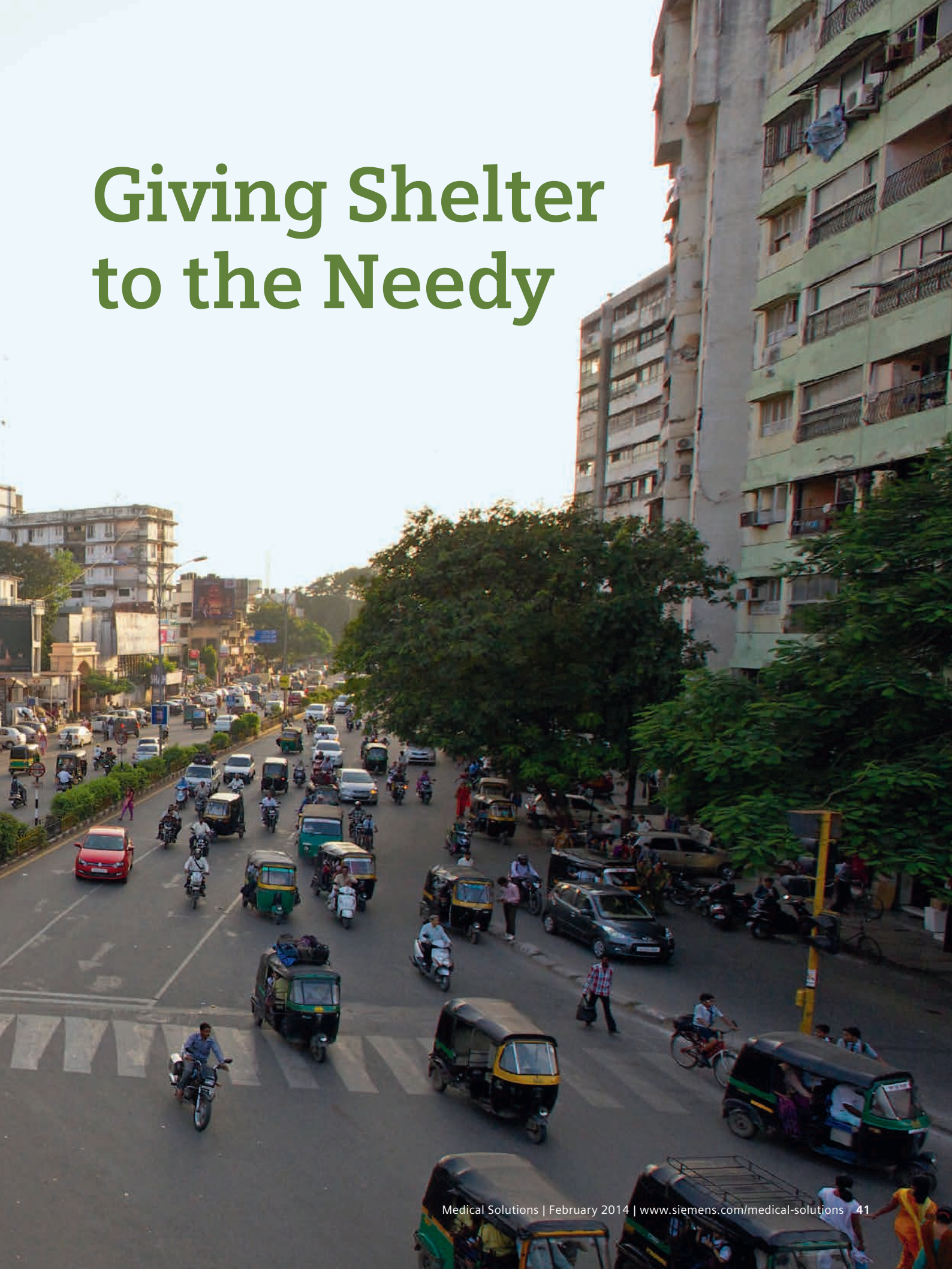
Surat
Population
4.5 million

Giving Shelter
to the Needy

The Aatmajyoti MRI Center in West India provides magnetic resonance imaging (MRI) scans at less than half the market price, while the poor are examined for free. Interestingly, this center is not only viable, but also financially supports the adjoining charitable dialysis center.

Text: **Swati Prasad**   Photos: **Arush Mayank**

Aatmajyoti MRI Center is run by Surat Manav Seva Sangh, a charitable trust popularly known as Chhanyado, which means 'to give shelter'.

Surat – known for its diamond industry the world over – is quite a dazzling city. The second largest in the state of Gujarat in West India, it has clean, broad roads, plenty of shopping malls and high rises. But what's even more impressive is its history, and the fact that it knows how to spring back from crises – such as in 1994, after the outbreak of plague, and after the August 2006 floods.

In one corner of the Government Medical College and New Civil Hospital campus is the Aatmajyoti MRI Center, run by Surat Manav Seva Sangh, a charitable trust popularly known as Chhanyado, which means 'to give shelter' in Gujarati.

Surat has eight other MRI centers with 1.5 Tesla systems. But the Aatmajyoti MRI Center is different. Take the case of Peer Mohammed Hussain Miyan, a man in his sixties. He walks into the office of Bharat Shah, President of Surat Manav Seva Sangh. Miyan can't afford the fee of INR 2,500 (approximately US$ 40) for his daughter-in-law Yasmeen's magnetic resonance imaging (MRI) scan. Yasmeen, 28, is suffering from acute backache and is unable to walk. Private centers charge INR 6,000 (approximately US$ 96) or more for a similar MRI investigation. Miyan and his son Mohammed Arif

Ghulam Abbas Sheikh embroider sarees and together make only INR 6,500 (US$ 104) per month. For them, even INR 2,500 is a huge sum.

It's a Friday. Within a minute, Bharat Shah has asked Miyan to bring Yasmeen on Monday for the exam. The scan would be done for free. Miyan and Sheikh go back home happy.

"Even after 65 years of independence, 40 percent of India lives hand to mouth. How are they supposed to afford a INR 6,000 MRI scan?" questions Bharat Shah, who is a practising chartered accountant and also started a real estate firm before he decided to work for the poor.

The trust provides free MRI scans to patients who are below poverty line (BPL), to patients over 70 years of age, those who are economically poor, and through the New Civil Hospital Surat, prisoners, patients who work in the police department, and patients whose medical cases are of special academic interest to the Government Medical College.

Need for Affordable MRI Scans

BPL is an economic benchmark and poverty threshold used by the Indian government to identify the poor in

need of government aid. Each state in India has its own criteria to identify the poor.

According to the Planning Commission of India, those who earn below INR 816 (US$ 13) per capita per month in rural areas and INR 1,000 (US$ 16) per capita per month in cities fall into this category[1]. Although the Planning Commission says only 22 percent of Indians live below the poverty line, the definition has often been criticized[2]. "With rising inflation, a family with a monthly income of INR 10,000 (approximately US$ 160) finds it difficult to make ends meet," says Bharat Shah. Miyan's is one such household, although it isn't a BPL family. Thus, many non-BPL patients are getting additional benefit from this center.

Moreover, income-based poverty lines consider the bare minimum income to provide for food. They do not account for essentials such as healthcare and education. Since 85 percent of the Indian population does not have medical insurance, many middle-class Indians get dragged into poverty as they often sell their assets to meet medical expenses[3]. Or, they choose not to get treated.

Chhanyado was born from this need. Set up in 1998, Chhanyado started out by feeding the poor who came to the

New Civil Hospital for treatment. The trust then started a medical store that sold subsidised medicines and opened a dormitory for relatives and carers of patients. The 800-bed New Civil Hospital takes patients from a radius of 250 to 300 kilometers around Surat. Most patients belong to poor and middle-class families living in Gujarat and neighboring Maharashtra.

In 2007, the medical superintendent of the New Civil Hospital, Dr. Mahesh Kumar Vadel, spoke to Bharat Shah about setting up an MRI facility within the hospital campus. Since the Government Medical College was offering a postgraduate course in radiology, it was imperative that the hospital have all radiology equipment, including an MRI system.

"The government gave us land for the MRI center," says Bharat Shah. The needs of the medical college and Shah's desire to do more for the needy took the form of the Aatmajyoti MRI Center in 2008. The next step was to study the market and look at various MRI systems.

Bharat Shah realized that players who were charging INR 6,000 or more for an MRI investigation were factoring in capital expenditure and operating costs, while keeping aside a sizeable sum as profits. So there was scope to offer an MRI scan at a lesser price, if return on capital employed and profits were not the key concerns.

The trust installed a Siemens MAGNETOM® ESSENZA. For Siemens, this was the first order of the 1.5 Tesla system from Asia. For Surat, this was the first 1.5-Tesla MRI system.

Surat Manav Seva Sangh signed a memorandum of understanding (MoU) with the Gujarat government, which stated that the MRI center would operate at subsidized rates and would perform free scans for certain categories of patients.

As per the MoU, the trust can charge up to INR 3,000 (US$ 48) per scan. But Bharat Shah pegged the rate at INR 2,500. "I calculated that if we get 22 patients a day, out of which four to five get their MRI scan done for free, a charge of INR 2,500 for the remaining scans was enough for us to cover our recurring expenses such as salaries and electricity," says Bharat Shah. For patients of the New Civil Hospital, the center charges INR 2,100 (US$ 33.68); for children the charge is INR 1,800 (US$ 29).

Charity Begets More Charity

The Aatmajyoti MRI Center performed a lot better than Bharat Shah's estimates. First, doctors – both in and around Surat – referred patients to the center due to the excellent image quality of the MAGNETOM ESSENZA. Second, since Aatmajyoti charged less than 50 percent of the market rate, poor and middle-class patients preferred it to other centers for MRI scans.

Understandably, the center is always full of patients. Each day 45 to 50 patients come to Chhanyado for an MRI scan. "The ESSENZA is running from seven in the morning to midnight," says Bharat Shah. Fortunately, the system has not seen many downtimes in the last five years. "We are very happy with the service. The repairs get done at night," says Bharat Shah.

This, according to Bharat Shah, probably has something to do with the blessings of the poor. "People come ▶

"Even after 65 years of independence, 40 percent of India lives hand to mouth. How are they supposed to afford a INR 6,000 MRI scan?"

Bharat Shah, President of Surat Manav Seva Sangh, Surat, India

Per day, around 50 patients come to the center for an MRI scan (above) and around 40 for dialysis (below).

here expecting they will get a scan done for INR 2,500. If our system does not work, they have to fork out more than twice that amount somewhere else. Their blessings ensure our MRI system does not shut down," he says.

Since its inception in May 2008, the Aatmajyoti MRI Center has performed 65,366 MRI scans, out of which 6,802 have been for free (figures up to September 30, 2013). Vinay Shah, MD, radiologist at the center explains: "We do around 30 to 40 percent brain MRI scans, 30 percent spine scans, 10 to 15 percent knee and shoulder scans; the remaining are scans of ankles, wrist, abdomen, pelvis, and so on."

"The Aatmajyoti MRI Center is achieving more than breakeven on operating costs," says Vinay Shah. From the surplus of the MRI center, the trust has started a dialysis center.

"The total cost of a dialysis session is around INR 1,050 (US$ 17). We provide it here for only INR 350 (US$ 5.6), along with the dialyzer, blood tube, and the disposable kit," says Vinay Shah. The center performs 40 dialyses per day, of which nearly 25 are done free of charge.

Sadiqbhai M. Shaikh, a 42-year-old driver who has been on dialysis for the last 18 months says: "For someone like me, this center is a blessing. At this subsidized rate, I can afford dialysis, return to my job, and earn a living."

The center does around 12,500 dialyses annually. "The dialysis center faces a shortfall of INR 11 million (US$ 176,421) each year. Of this, nearly INR 4 to 5 million (US$ 64,159 to 80,214) comes from the Aatmajyoti MRI Center. This is a big contribution," says Vinay Shah. The remaining is met through donations.

Spreading More Good

Since the beginning, the trust has seen no shortage of philanthropists. The walls of the MRI center are adorned with photographs of donors. Often patients look for donors they might know. That's because donors get coupons for the donations they make. For instance, if someone has made a donation of INR 500,000 (approximately US$ 7,960) towards the MRI center, the donor will get 50 coupons worth INR 500 (US$ 8) each with a validity of ten years. The

Superior Scans for Less Than Half the Market Rate

A magnetic resonance imaging (MRI) investigations in India costs INR 6,000 (US$ 96) or more at private MRI centers, a sum that is prohibitive for the poor and the lower middle-class. Since 85 percent of Indians do not have medical insurance, a majority of the economically weaker sections avoid going for an MRI scan. Often, they sell off their assets to organize funds for medical treat-ment. Surat Manav Seva Sangh, a charitable trust in Surat, Gujarat, invested in a MAGNETOM® ESSENZA 1.5-Tesla system which provided MRI scans at less than half the market rate in West India. The very poor and certain other categories of patients can get their scan done for free. This way, high-end MRI investigations are within the reach of the very poor and the middle-class.

donor can give these coupons to the needy. Chhanyado has extended the coupon scheme to the medical store, the laboratory, as well as the dialysis center – with each unit having different coupons.

But more than the rich philanthropists, Shah appreciates donors who come from economically weak backgrounds, such as a 15-year-old boy from Amroli, a city near Surat, who had lost his mother a few years back. When his school principal announced the school would collect money for Chhanyado, the boy took up a job at a restaurant to earn INR 200 (US$ 3.2), which he donated to the trust. The boy wanted to be part of the good work he had personally experienced when his mother was admitted to the New Civil Hospital.

Bharat Shah tells a similar story of an old lady – a daily wage earner – who came from Bardoli, a city 33 kilometers away from Surat. She handed Bharat Shah a bag with lots of loose change. She wanted Bharat Shah to use the money to sponsor one day's meal at the hospital. Eighteen months back, when her husband was admitted to the New Civil Hospital, she ate there every day. After that, the couple saved some of their meager earnings to give back to Chhanyado.

Bharat Shah now wants to step up the activities of the trust. Chhanyado is setting up a polyclinic in the Parvat Patiya area of Surat, which will offer all services at a concessional rate. It also has plans to set up a cardiac center, for which it is seeking government aid.

Besides this, Bharat Shah is awaiting Gujarat government's approval for more land at the New Civil Hospital to set up another MRI system. He wants to invest in a 3-Tesla MRI system, so that patients don't have to seek an appointment four to five days in advance due to the heavy rush at the center.

Bharat Shah is looking forward to more support from the government in the area of healthcare. He feels India must follow the Canadian model. In Canada, healthcare is delivered through a publicly funded healthcare system, which is mostly free at the point of use and has most services provided by private entities. "To begin with, all government hospitals in India at least should have the latest medical equipment. If not that, at least every state in India must have a Chhanyado," says Bharat Shah. ■

→ **www.siemens.com/ magnetom-essenza**

[1] http://planningcommission.nic.in/news/ pre_pov2307.pdf. Last accessed January 23, 2014

[2] http://indiatoday.intoday.in/story/poverty-line-planning-commission-tendulkar-methodology-congress/1/296149.html. Last accessed January 23, 2014

[3] http://www.dnaindia.com/health/1891509/ report-health-insurance-in-india-still-remains-an-untapped-market. Last accessed January 23, 2014
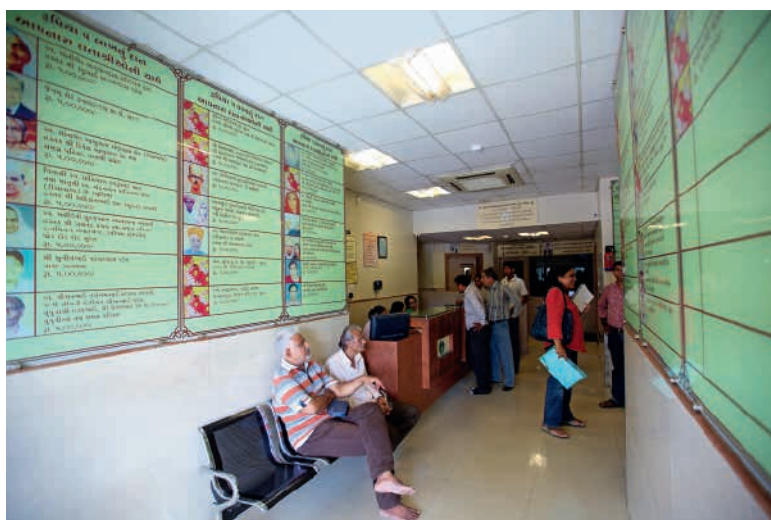
The walls of the MRI center are adorned with photographs of donors. They get coupons for medical services in return which they can give to the needy.

Pioneering CT in Salem

Salem
Population
831,038

In 2004 and 2009, Dr. V. Suresh Kumaran went against the grain when he invested in high-end computed tomography (CT) machines for his hospital, in the southern Indian city of Salem. His calculated risk is now paying off as the regional healthcare situation experiences widespread change.

Text: **Swati Prasad**   Photos: **Arush Mayank**

Its 128-slice CT scanner made SKS hospital the undisputed regional leader in the field of CT imaging in Salem.

Salem – an arid city surrounded by hills – used to be better known for its mangoes and steel. Today, this relatively small city in Tamil Nadu is still famous for its mangoes and steel plants; however, a lot has changed, too. There is more traffic on its streets; there are malls, jewelry shops, luxury hotels, gymnasiums, and clubs. And then there are its modern healthcare facilities. One such facility is SKS Hospital in Alagapuram, Salem – established in 1987.

This 150-bed multi-specialty hospital is crowded throughout the day. It boasts state-of-the-art infrastructure and equipment, including a hemodialysis and transplant center; as well as intensive care units, equipped with defibrillators and multi-parameter monitors.

The hospital's radiology department is located at one end of the hospital. Speaking to the patients there, you quickly realize that their ailments are far from simple. Take the case of Vasantha Mary Rosalina, 54. She is extremely frail and complains of chest pain. Rosalina had a heart attack in 2009. She is too frail to go for an invasive angiogram. After visiting another hospital in Salem, she was referred to SKS Hospital for a cardiac CT by her cardiologist conducted with a 128-slice CT scanner from Siemens, the procedure will be less risky and painful for Rosalina.

And then there are cancer patients with advanced metastases – such as Mallika (34) and Govindraj (24). They have been referred here for CT scans in order to diagnose the primary

lesions of the cancerous masses in their abdomens.

"At the end of the day, it is all about the patients and what we can do for them," says Dr. V. Suresh Kumaran (40), Managing Director of SKS Hospital. The hospital – which was founded by his father, Dr. P. Vishwanathan – purchased a 4-slice CT back in 2004, when Salem was only considered a market for third-party remanufactured single-slice spiral CTs. Once again, in 2009, the hospital went beyond convention, when it opted for a 128-slice CT machine: This at a time when even bigger cities such as Coimbatore had 64-slice CT machines. "When I meet patients at social functions or in the hospital, and they thank me for saving their lives, I know that my gamble has paid off," says Suresh.

The Second Leap of Faith

Suresh grew up in the UK and Brunei. He did his MBBS at PSG Medical College in Coimbatore (see article on page 36), before travelling to the USA to do an MBA in Hospital Administration. He returned to India in 2002 and joined his father's hospital. It was his 'global' mindset that made him think big and invest in high-end technology for Salem – a city with a population of under 5 million (termed a tier-II city in India): "In 2004, when we purchased the 4-slice CT, it was the most expensive in Salem," says Suresh. It also proved to be enough of an incentive to attract his MBBS classmate, radiologist Dr. Vijay Sadasivam, to SKS Hospital. He now heads its 24-hour radiology department. Previously, Vijay worked at the KG Hospital in Coimbatore, the second largest city in Chennai.

The 4-slice CT scanner changed the landscape of imaging in Salem. Firstly, citizens of the city no longer had to travel elsewhere for a good CT scan. Secondly, the 4-slice CT enabled SKS Hospital to offer new modalities, such as CT angiograms. It took a while to educate the doctors in and around Salem about the new CT machine and its capabilities; however, it didn't take long for them to realize the huge benefits the 4-slice CT machine offered over single slice CTs. As a consequence, referrals went up: "We were able to establish a trend in the quality of work in the region. And this helped us build a good case load," Suresh recalls.

In 2009, when SKS Hospital decided to upgrade from a 4-slice CT to one with 64 slices, Suresh went to Mumbai to watch a machine demonstration at Siemens. He took Vijay along with him. There the duo heard about a 128-slice CT during a subsequent confer-

Before the hospital invested in a new high-end CT, people from Salem had to travel to cities up to 200 km away.

ence: "I saw the clear advantages of a 128-slice CT over a 64-slice machine. What bothered me was the financial viability of such an expensive machine in a small town like Salem," says Suresh.

Fortunately, Siemens could offer a financial package that made the 128-slice CT a little more affordable for the hospital. "I decided to take a second leap of faith. With hindsight, it turned out to be a very good decision for both SKS Hospital, and for Salem," says Suresh. The new machine has made SKS Hospital a clear and undisputed regional leader in the field of CT imaging. To date, it remains the best CT scanner in Salem. The city now has more than 14 CT scanner units, but none of them come close to the quality that SKS Hospital delivers.

Changing Salem's Healthcare Landscape

Before SKS Hospital bought the 128-slice CT, patients in Salem had to travel to places as far afield as Coimbatore (a distance of 170 km) and Bengaluru (200 km), for their neurological CTs and CT angiograms. "From a technology accessibility point of view, the 128-slice machine has made a huge difference," says Suresh.

The machine is capable of doing full body scans – from head to toe – in a matter of seconds. In terms of both prestige and medical advantages, SKS Hospital has benefitted substantially from its technologically advanced CT equipment. "Before we purchased the 4-slice CT, physicians only used CT machines for brain modalities. Now, it has become acceptable to scan the abdomen, chest – in fact, any part of the body – with the CT machine," says Suresh. This has led to various benefits for a number of hospital departments.

The first clear beneficiary is cardiology. Cardiac CTs are both painless and non-invasive. "The machine does away with the need for an interventional screening, especially in patients who have just been through a coronary artery bypass graft (CABG), or those who are frail and can't bear an interventional study in a cath lab," says Suresh.   ▶

"We were able to establish a trend in the quality of work in the region. And this helped us build a good case load."

Dr. Suresh Kumaran, Managing Director, SKS Hospital, Salem, India

"Radiology as a practice has changed because of machines like the 128-Slice CT."

Dr. Vijay Sadasivam,
Head of Radiology, SKS Hospital, Salem, India

How a CT System Broke the Vicious Circle

Quality healthcare services remain a dream in most small cities of India due to a shortage of physicians and lack of high-end diagnostic facilities. Medical practitioners prefer the bigger cities and metros since they offer better opportunities and remuneration. As a result, patients have to travel hundreds of kilometers for diagnosis and treatment. SKS Hospital in Salem (a tier-II city) broke this vicious circle by investing in a high-end 128-slice CT system. The machine has increased the caseload of the hospital and reduced costs. Scans such as Cardiac CT, Neuro DSA, and various other CT angiograms are possible on the 128-slice CT system. As a result, there are many opportunities for healthcare professionals in Salem in specializations such as oncology, cardiology, neurology, urology, and pediatrics.

Dr. P. Kannan, consultant cardiologist at SKS Hospital, spells out some other benefits to his discipline. "It is particularly useful for diagnosing peripheral arterial disease, pulmonary stenosis and pulmonary arteriovenous fistula," he explains. Additionally, cardiac CTs can also help check for coronary artery disease (CAD) in diabetics, elderly patients and those who have just been through stenting or CABG.

The CT equipment has also been a big boon for pediatrics and neonatology. Babies and young children are very restless, and it's often not advisable to sedate them for examinations: "This machine can capture an image in a very short span of time. As a result, the radiation is less harmful for children," says Suresh.

Urology has also seen considerable benefits from the 128-slice CT. The machine has proved to be a definitive diagnostic tool for renal diseases. "With the help of this machine, we are able to diagnose even small stones in the kidney," Suresh adds.

The new machine has also proved to be an asset for the hospital's oncology department. Often, patients come to physicians with complaints arising from secondary cancers. According

to surgical oncologist, Dr. G. M. Chandrashekharan, ultrasounds were not very effective in detecting primary lesions. The 128-slice CT has changed all that: "We don't miss a finding with this machine. As a result, there are no surprises on the operating table," he says. "The CT reports are more reliable. We can see even small lesions, which couldn't be seen earlier." Ultimately, it is the cancer patients themselves who are benefitting: "We can inform patients whether they are operable or not. If they are, we can plan the operation better. In fact, the surgical approach in oncology has changed due to this machine," Chandrashekharan adds.

The machine has also helped neurologists, thanks to its neuro-digital subtraction angiography (Neuro DSA): A postprocessing application, which allows the removal of bone structures from the CT angiography datasets; thereby, improving visualization of the cerebral vasculature. This feature has led to numerous patient referrals from neurologists and neurosurgeons in and around Salem. A benefit of a neuro DSA is that it does away with the need for interventional procedures in a cath lab. Dr. V. Senthil Kumar is a pediatric and neurophysician at SKS Hospital: "In terms of costs too, a neuro DSA on

the 128-slice CT works out cheaper than a regular DSA," he points out. "Thanks to this machine, neurological problems are diagnosed faster and the treatment is rendered faster. As a result, patients are cured much faster." In stroke patients, the machine can also be of great benefit in tracking the progress of a stroke.

Beyond the departmental and disciplinary benefits, this scanner provides solutions to more practical concerns. For instance, in obese patients, the layers of fat can often pose challenges to a physician in making correct diagnoses. This can apply both to physical examinations and those conducted on an ultrasound machine. In the case of the 128-slice CT, larger patients are not an issue: "In obese patients, the diagnosis is both fast and accurate," says Suresh.

Working on an Even Better Future

In 2009, skeptics advised Suresh against buying the 128-slice CT machine, but today, they have been proved wrong: "Medically, the machine has made a vast difference to Salem. People in the 100 kilometer radius around Salem have benefited from this superior technology," Suresh points out. "This was the seventh such machine purchased in India. And it was bought by SKS Hospital," he adds, with a note of pride.

Increased referrals to the hospital have resulted in higher patient numbers in the radiology department. "With the 4-slice CT machine, we were doing 400 – 450 cases a month. Today, we are doing 700 to 750 cases a month," says Suresh. This upward trend has also reduced the time anticipated by SKS Hospital to break even on its investment. The hospital now hopes it can repay its loan for purchasing the 128-slice CT machine early.

Although the current CT was more expensive than the 64-slice CT machine that SKS had originally set out to buy, its running costs have actually turned out to be far lower than those of the 4-slice machine, which the hospital acquired back in 2004. "We are able to perform scans a lot faster. As a result, we can do more cases in a day. Since

it is a faster machine, our contrast material costs have come down, too," Suresh explains. These savings meant that the price of scans at the hospital could remain the same – despite the size of its investment in the new scanner, and the substantial improvements to image quality. According to Suresh, it was only last year that the hospital had to look again at its prices – and only then, because of inflation.

SKS Hospital is undergoing renovation work so that it can offer comfortable 'deluxe' rooms to patients who are looking for a more comfortable stay. Suresh now wants to take his dream of providing better healthcare to Salem a step further. "If you look at the healthcare landscape of Salem, the city needs better cardiac and cancer care hospitals," he says. Today, most cancer and heart patients have to step out of Salem to cities like Bangalore and Chennai for treatment.

The SKS hospital building stands on agricultural land that belonged to Suresh and his family. There is a small gate opposite the main door of the hospital that leads to Suresh's house, which is surrounded by huge gardens. A large part of this garden will soon make way for a 100-bed critical care block – including a cardiac care center. Construction is set to begin within the next six months: "The construction of the critical care wing should

be complete by mid-2015," Suresh says. Next on the list is a cancer-care facility, which Suresh plans to commission within the next three to five years. But how easy is it to attract well-qualified medical professional to Salem? "Over the last five years, one of the biggest changes I have seen in Salem is that more and more specialists and super-specialists are willing to settle down here because the towns are getting more saturated," Suresh replies.

South India is producing a greater number of medical graduates and postgraduate medical specialists than any other state in the country. And Salem has become a hotbed of opportunities for young medical practitioners, thanks to risk-taking entrepreneurs like Suresh, who could foresee the benefits of investing in high-quality imaging equipment. ■

➡ **www.siemens.com/CT**

The outcomes achieved by the Siemens customers described herein were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that others will achieve the same results.
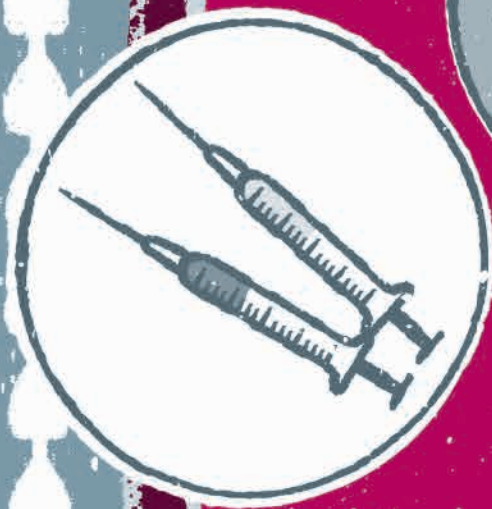
See the Advantages of Change at SKS Hospital

Patients and doctors alike benefit from the change of CT systems in Salem. In this video, both have their say.

www.siemens.com/ct-salem

To watch the video, scan the QR codes using the reader app on your smartphone or paste the URL into your browser.

Smart, Ambitious, Dedicated
India's Young Doctors

Medical Solutions meets India's next generation of medical professionals as they take on the challenge of working in an emerging country, which not only has the second biggest population in the world but also a vast array of health issues.

Text: **Natacha Butler**   Illustrations: **Sroop Sunar**

A career in medicine is a dream for many young Indians, but a lack of educational opportunities mean few can achieve their goal. India's health system suffers from a severe shortage of medical places in colleges.

In a country of 1.2 billion there are fewer than 50,000 undergraduate Bachelor of Medicine, Bachelor of Science (MBBS) course places. The MBBS degree is typically four and a half years and includes courses in fields such as microbiology and pathology. Once completed, graduates spend at least a year doing an internship in a hospital to gain clinical experience – after which they can become a licensed doctor. Each year, hundreds of thousands of students are forced to compete for the relatively small number of coveted MBBS places.

Most young hopefuls spend years preparing for the tough entrance exam, with their families often making huge financial sacrifices to pay for extra tuition. Only the very highest exam scorers will make the grade, denying a huge number of India's brightest students the opportunity of a medical career. For graduates wishing to specialize, the situation is even worse. There are only 12,000 postgraduate places, that is around a third of those available in the United States. All this means that India desperately lacks the medical specialists it needs to tackle the nation's vast health problems from tuberculosis to heart disease.

India will not be able to lower its maternal and infant mortality rates, which are some of the worst in the world, without more obstetricians, pediatricians, and generalists working not just in the cities but also in rural areas. As a further result, India suffers a severe shortage of working health professionals. There are just six physicians for every 10,000 persons. That's a third less than Brazil, also a developing nation, and five times less than Germany. "India needs to increase postgraduate places," says Dr. Devi Shetty, one of the world's most famous cardiologists and founder of Narayana Health (see interview on page 8).

Dr. Shetty says India has the skills, talent, and potential to be one of the world's leading healthcare providers but says policy-making and long-term vision are lacking. India's government has been slow to realize the urgency of the situation, but it has pledged to double the number of university medical places to meet a target of 80,000 undergraduate and 45,000 postgraduate places by 2021. The government also says it will improve access to a medical education in states where it barely exists. Most of the country's 335 medical colleges are based in the south and west of the country with states in central India missing out.

With competition so fierce and opportunities sparse, only the most driven can attain their goal of working in medicine. *Medical Solutions* spoke to six talented Indians at the start of their careers. Doctors, medical students, and researchers they are smart, ambitious, dedicated, and all intent on making a difference. ▶

Suja Pillai Allepy,
Kerala

PhD, Cancer Molecular Pathology, Griffith University, Australia

Doctorate, Medicine from the University of Calicut, India

Bachelor's, Science from the University of Kerala, India

Medical researcher Suja Pillai is driven by a quest to discover.

From the beginning, Suja Pillai wanted to work in the field of cancer research to help others. "It's such a nasty disease, so maybe if I discover something new it can really make an impact and help someone," says Pillai. For her PhD at Griffith University in Australia, Pillai is researching pheochromocytoma and paraganglioma, hereditary cancers of the adrenal gland. "My project is about investigating the role of mutations in these cancers using next generation sequencers, because these diseases are all the result of gene mutation," she explains.

The gene-sequencing machine is used to understand unknown mutations in human cancers and other chronic diseases. Supervisor Dr. Robert Smith says the cancers Pillai is studying are relatively rare, each with around eight cases per million people. He says Pillai's research is important because she will be able to determine whether particular mutations predispose to more aggressive forms of the disease and whether some mutations occur together. "We hope to be able to identify cancers that are more likely to recur and to identify potential targets for advanced therapies in these individuals," explains Dr. Smith.

As a schoolgirl in the southern Indian state of Kerala, Pillai was so determined to study science. She studied six hours a day to get into university. The hard work paid off. With a bachelor's in science and a doctorate in medicine, she was a prime candidate for a PhD at Griffith. "The quest to discover more is what drives me, because research is the only area where you don't have a full stop," says Pillai, who says her dream is to build a research center for clinical trials on patients with endocrine cancers in Australia and India.

Abishek Santhakumar, 27,
Chennai, Tamil Nadu

Bachelor's, Biotechnology at SRM University Chennai, India

Master's, Medical Laboratory Science, RMIT University, Melbourne, Australia

PhD, Hematology, Griffith University, Australia

Santhakumar enjoys the hands-on experience that studying in Australia offers.

When he was considering what to research for his PhD in Hematology, 27-year-old Abishek Santhakumar thought of his mother. "My mum is a cardiovascular disease patient, so she has been on aspirin for more than ten years, every few months she has to increase the dosage as she's developing resistance to the drug, but this increased dosage could rupture the gastric lining and lead to malabsorption or haemorragic stroke," explains Santhakumar. "I thought it could be good to find an anti-thrombotic drug that was natural and gentler than aspirin."

Santhakumar looked at natural antioxidant compounds, which could deliver similar effects to aspirin, focusing on their anti-platelet and anti-thrombotic activity. "My project focused on a new variety of the plum fruit developed in Queensland that has eight times more antioxidant content than any other plum," he says. Using a sample of patients, he compared the effects of drinking the new plum's juice with a normal prune juice and a placebo.

He found the new plum alleviated many thrombotic markers. His supervisor Dr. Indu Singh says the new plum has "potential to be used not only as a therapeutic agent but also as a preventive dietary habit." She says such research is essential in trying to find anti-platelet therapies, which could offer an alternative or complement to low-dose aspirin.

Medical research has long been a goal for Santhakumar. Born in Chennai to parents who both work in medicine, he always wanted to work in the same field. "I was fascinated by medicine when I was young and used to visit my dad's hospital all the time," says Santhakumar. After his Bachelor's in Biotechnology at SRM University Chennai he headed to Australia to study.

He first went to Melbourne for a Master's in Medical Laboratory Science, where he excelled as one of the top scorers in his year. It was an achievement that won him the coveted PhD spot at Griffith. "The difference with studying in Australia compared to India is I get a lot more hands-on experience here, which I like," says Santhakumar.

"The goal is to gain as much experience here as possible, so I can take what I've learned to India. Because I do want to return one day and give back to my mother country."

Photos: Private

Dr. Ravikant Singh, 32,
Patna, Bihar

MD Public Health, Seth GS Medical College, Mumbai, India

MBBS, Seth GS Medical College, Mumbai, India

Dr. Ravikant Singh always knew he wanted to work in the field and not in a clinic.

When India's monsoon hit the northern state of Uttarkhand early this year it took everyone by surprise, even more unexpected than the timing was the devastating amount of rain that fell. Villages were swept away, buildings turned to rubble and hundreds of thousands of people were affected by a natural disaster, which left nearly 6,000 people dead. One of the first responders on the ground was Dr. Ravikant Singh. "We were there from the very first day with relief workers even before many emergency teams arrived."

Singh is the founder of Doctors For You, an NGO providing medical care to vulnerable communities during crises and disasters. "In the last six years, we have responded to most major disasters in India from floods in Andhra Pradesh and Karnataka in 2009 to ethnic violence in Assam last year," explains Dr. Singh.

"We don't just do relief work but also work on the before and after to train people in preparedness, response and rehabilitation." Doctors For You is the culmination of a dream Singh had as a medical student to work in the field. "Since I was a child, I was interested in social work and public health and wanted to do something good for the wider community. I didn't want to just sit in a clinic." Singh found his calling during his first year as a public health postgraduate student in Mumbai.

"It was during the July monsoon and in Mumbai there was a big outbreak of dengue and malaria. Bloodbanks were facing a low supply of platelets, which dengue patients need. Because I was a regular platelet donor I realized it's a simple procedure, but many doctors and members of the public were unaware of this, which is why there were so few donors," says Dr. Singh.

"So I started a campaign among my fellow students, and in a few weeks the number of platelet donors had doubled, and I saw how you could help lives". Doctors For You works in six states including Delhi and Assam but Dr. Singh's aim is to spread the organization's reach. "It's like the saying," says Dr. Singh, "prevention is better than cure."

Siddharth Chand, 20,
New Delhi

University College of Medical Sciences, University of Delhi, India

Chand's dream is to work with children.

When he was just four years old, Siddharth Chand suffered from acute rheumatic fever. The illness meant months of weekly visits to the doctor for treatment.

Chand believes it was this unexpectedly early introduction to the world of medicine which left its mark. "I think seeing doctors all the time when I was so young probably had an impact on me, because ever since I was a kid, I have always wanted to be a doctor," says Chand. Sixteen years on and Chand is on the way to realizing his dream. A second year student at Delhi's University College of Medical Sciences, he hopes to work in public health one day. "Working in public health would be a way for me to give back to my country," says Chand. Competition for medical degrees is extremely tough in India, so Chand knew he had to be one of the best to get a college place. "I started preparing for the entrance exam two years before and took special coaching from a coaching institute," says Chand.

Chand may be at the start of his career, but he already has an eye on the future. "I'd like to do an MD in Pediatrics because I love working with children," says Chand. "The joy of working with that age group can't be matched by other areas."

For Chand, one of the biggest challenges ahead will be getting a coveted postgraduate place, so he plans to start studying for the grueling entrance exam two years in advance but he says the hard work will be worth it.

"The best thing about being a doctor would be to make a difference in someone's life," says Chand.

Photos: Doctor For You, Private
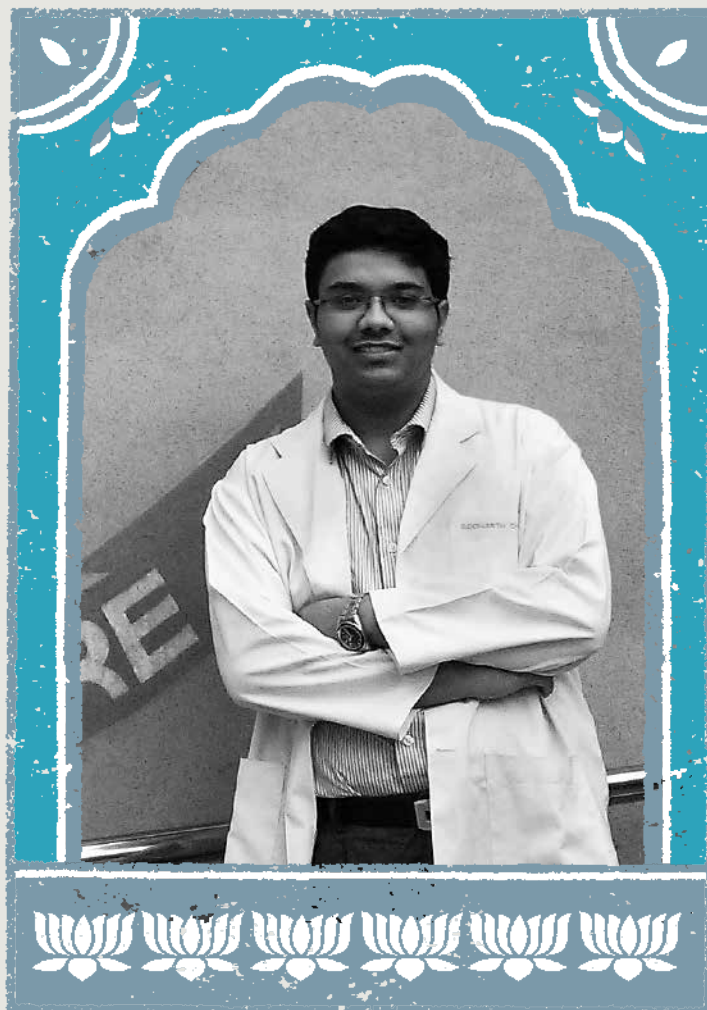
Dr. Pranab Chatterjee, 28,
Kolkata, West Bengal

MBBS Medical College, West Bengal University, India

MD Preventive Medicine, University College of Medical Sciences, University of Delhi, India

For Dr. Chatterjee, prevention is better than cure.

One of the biggest problems with India's health-care system according to Dr. Pranab Chatterjee is that it focuses on curative medicine, which is expensive and drains resources. "I believe the country could gain on every level if we took a preventive approach to health rather than a curative one," explains the 28-year-old, who is a Preventive Medicine postgraduate in Delhi. "In the West, the biggest issues are non-communicable diseases like cancers and diabetes, but in India infectious diseases are big. We've just come near to getting rid of polio, but we still haven't been able to wipe out tuberculosis." Dr. Chatterjee's medical journey began with an MBBS in West Bengal. Getting on to the course was cut-throat but Chatterjee studied hard. Of nearly 80,000 students who were competing for just 900 spots across the state, he came an impressive eighth.

Dr. Chatterjee also sees preventive medicine as the best stepping-stone to his goal of a career in public health. "It may not be as glamorous as private healthcare, but public health would give me a window to reach millions of people – not just one or two." It's his desire to "have a positive impact on society" which fuels his career.

For his thesis, Dr. Chatterjee is studying the psychological and physical health problems suffered by young, homeless men in Delhi, who are some of the capital's most marginalized people.

"This is a population in flux, they work menial jobs like rickshaw driving, they are very hard-working, but they're also very sick and have the hardest life you can imagine. I collect data from them but also attend to them as a physician." Dr. Chatterjee's supervisor, Dr. Pragti Chhabra says it is important to research such a large but mostly neglected section of society, as they increasingly make up a significant population in India's main cities. "The research would help us in identifying the specific problems of this group and address their needs, so that they are mainstreamed and can contribute to society," says Dr. Chhabra.

Rajat Choudhari, 20,
Akola, Maharashtra

MBBS Christian Medical College, Vellore, India

Choudhari says patient compliance is one of the biggest challenges facing Indian doctors.

In the second year of his medical degree at Christian Medical College (CMC), Rajat Choudhari discovered a passion for virology while researching ways of diagnosing dengue. "There are many ways of diagnosing the virus, but doctors are not sure which is the most effective method," says Choudhari.

Dengue is the most common mosquito-borne disease in India, affecting hundreds of thousands of people each year. It causes high fever, headaches, rashes, and body pain. The most widely used dengue test is the ELISA method, but it is not ideal for a low-income country such as India, as it is expensive and requires sophisticated equipment. Choudhari's project focused on comparing four test kits that are cheaper and less labor-intensive than the ELISA test.

Finding a cost-effective method to diagnose dengue would be a significant step in treating patients and saving lives. "The Indian government is particularly interested in dengue control and prevention, and vaccine trials are underway, so early diagnosis of the condition is crucial," says Choudhari's supervisor Dr. Shubhanker Mitra. The son of a doctor in the southwestern town of Akola, Choudhari always wanted to follow in his father's footsteps. "I was inspired by my dad. His hospital is next to my home, so I grew up around medicine," he says. "I've seen how my father helps people and does something good to change their lives." Choudhari's father was even with him when he learnt he had won a place on the MBBS course at CMC. "When I saw the result it was an amazing feeling, that feeling of achievement everyone wants once."

After completing his degree, Choudhari plans to do a postgraduate in medicine and perhaps work in the field of infectious diseases. For him, there are many challenges facing India's future doctors. "Patient compliance is a big problem, as many patients don't follow up or discontinue treatment. Providing the best care at low cost is also a challenge," he says.

Natacha Butler is a broadcast and print journalist based in New Delhi, India. Over the past four years she has covered a range of issues from India's battle with tuberculosis, the Delhi gang-rape, child-trafficking to the push to eradicate polio for media including *BBC World Service Radio, France 24 Television* and *The Wall Street Journal*. Before moving to India she was a news anchor and reporter for *France 24 Television* in Paris.

The Russian Revolutionary in Diagnostic Imaging

Ten years ago, Dr. Arkady Stolpner opened the first privately owned magnetic resonance imaging center in Russia. Today, his centers perform 20 percent of MRI exams all over the country. And for ten years now, Arkady Stolpner has placed his trust in Siemens equipment.

Text: **Moritz Gathmann**   Photos: **Fabian Weiß**

Driving his car through the pine woods north of St. Petersburg in sunny June weather, Dr. Arkady Stolpner asks his assistant by phone to purchase a ticket for a flight to Kazakhstan next week – the next diagnostic center will be opened there, and Stolpner is taking care of it himself. At the sign "Gamma Knife Center" Stolpner turns right – and we're at the core of Stolpner's empire. It is an empire that helped change Russian healthcare.

LDC Centre in St. Petersburg is just one of 77 diagnostic centers within Dr. Stolpner's imaging "empire".

Stolpner, now in his mid-fifties and a dynamic, friendly man, is a very good example of a Russian self-made man: He began working as a doctor in the eighties, but when Gorbachev's perestroika made it possible, Stolpner founded the first Russian hospital for traditional Chinese medicine. The turbulences of the nineties put a quick end to the experiment, but by 2003 the times had changed again. It was Sergey Berezin, an old friend and well-known doctor, who proposed to Stolpner to open private magnetic resonance imaging (MRI) diagnostic centers. "Back then, in order to get an MRI diagnosis in one of the state-owned clinics of St. Petersburg, you had to wait four months," says Stolpner, while sitting in his office in the Gamma-Knife Center, nowadays a diagnostic and treatment facility with 50 beds, radiation oncology, surgery, and chemotherapy departments.

Instinct and Trust

"At that time, the state-owned clinics were totally underequipped, and there were no private diagnostic centers with MRI," explains Stolpner, "but everybody told us that it would

never work out because of the costs." Stolpner, however, trusted his instinct and founded the Diagnostic Treatment Centre of the International Institute of Biological Systems (DTC IIBS). And his basic assumption – that there is demand for high-class medical diagnostics that is not being met by the state-dominated medical institutions – proved right. The center bought its first Siemens MRI system and welcomed their first patient in August 2003. In December 2004, Stolpner opened a second center in the nearby town of Tver, and a third center in 2005 in the Siberian city Krasnoyarsk, which is 5,500 kilometers away. "We understood: If we can manage a center that far away, we can do it anywhere in the country," says Stolpner. Because service is a big issue when you have long distances to go for technicians and spare parts, DTC IIBS trained its own service engineers from the very beginning.

Today, DTC IIBS has 77 diagnostic centers in Russia and also in several neighboring republics such as Ukraine and Armenia, most of them equipped with Siemens ecoline MRI and computed tomography (CT) scanners. ecoline ▶

"Everybody told us that it would never work out because of the costs."

Dr. Arkady Stolpner,
Founder of the Diagnostic Treatment
Centre of the International Institute of
Biological Systems (DTC IIBS), Russia

1.2 million MRI exams per year prove Stolpner's success – and his doubters wrong.

systems are pre-owned Siemens systems refurbished for their customers worldwide during a complete process of cleaning, disinfection, whole surface painting, customized configurations, performance updates, and the latest hardware and software applications. The refurbishment of Siemens ecoline systems is a comprehensive process that starts with a professional inspection of the system before de-installation at the last customer site and leads, finally, to the start of a completely new life-cycle under expert supervision provided by Siemens.

Stolpner has a "strategic partnership with Siemens," as he puts it. Just this year, he ordered 12 MRI and three CT ecoline systems. "In the field of visualization equipment, Siemens is simply the best," says Stolpner while we're walking through the light-flooded corridor that connects the old part of the clinic with the newly-built PET (positron emission tomography) center. Here, the clinic offers a Siemens BiographCT scanner that helps to localize tumors. It is the long-term perspective, the combination of quality and sustainability that

unites Siemens and Stolpner. "Our relationship has developed over the years to a stage where we trust each other totally," he says.

Stolpner's doctors scan 3,600 patients a day, and with 1.2 million MRI exams per year his centers account for 20 percent of all such exams in Russia. But the core of it is still the clinic in the woods north of St. Petersburg. Upon receiving reports, especially from young doctors from the regions, his most experienced doctors in the consulting center make around 340 assessments a day. If needed, patients are invited for treatment to St. Petersburg. Here, 2,500 patients are treated annually.

Radiosurgical Pioneer

Stolpner is proud to be equipped with high-end equipment for radiosurgery and radiation oncology. Several years ago, radiosurgery was not practiced in Russia – simply because there was no equipment. In 2008, DTC IIBS was the second center in Russia equipped with a Gamma Knife. Nowadays, his clinic offers an Accuray CyberKnife®

and – most recently – a True Beam system by Varian.

But Stolpner still sees room for development. He estimates that 100 diagnostic centers should be the limit in Russia, but there are still neighboring countries he could expand to. "In the near future, we plan to open a Gamma Knife center in Novosibirsk to make treatment more convenient for the patients from Siberia," explains Stolpner.

Times are changing, however. Over the last few years, according to Stolpner, the competition has become stronger: "There are other private clinics that offer diagnostics, and the state has been investing a lot in medical equipment since 2008." Yet Stolpner understood from the very beginning: Equipment alone is not enough. An important reason for his success is that DTC IIBS trains doctors how to work with the equipment – over 300 since 2003. Before starting to work with the high-tech equipment that they never saw during their education at state universities, the new employees from the regions come to the St. Petersburg clinic for several months of intensive

Russian Health: Facts & Figures

Total expenditure on health per capita
in US$ (2011): **1,316**

Total expenditure on health
as % of GDP (2011) **6.2**

State expenditure on health (2011):

RUB 413 billion

(US$ 12.73 billion)

State expenditure on health
as % of GDP (2011): **3.7**

Medical insurance market (2011)
Compulsory insurance:

RUB 604 billion

(US$ 18.61 billion)

Private insurance:

RUB 95 billion

(US$ 2.93 billion)

Market for private medicine (2012):

RUB 500-540 billion

(US$ 15.41-16.64 billion)

courses certified by the Russian Ministry of Education.

One of them, the 29-year-old neuro-surgeon Alexander Kuzmin from the Siberian city Tyumen, has just finished the MRI of a young patient. He has been working at Stolpner's center since 2010. "We have the newest equipment and the newest methods of treatment here," says Kuzmin. This is why he didn't hesitate when he got a proposal from Stolpner while he was just finishing university. Like Kuzmin, most of Stolpner's doctors are between 25 and 40. "Our doctors, especially in the regions, are much sought after by our competitors," says Stolpner. "But they usually stay with us. And we value loyalty."

Another reason for Stolpner's success is the cooperation with the state that is of high importance in a system where healthcare is still dominated by the government. Most citizens still use the mandatory health insurance, although that insurance only gives access to state-owned clinics. That is why 9.5 percent of Stolpner's patients have an additional private health insurance, but 90 percent have to pay themselves. "In the regions, we find mutually beneficial agreements with the authorities," he explains. In the case of St. Petersburg that means that the city pays for the treatment in Stolpner's clinic for certain categories of citizens who cannot afford it themselves.

But Stolpner is hoping to be included in the state health program run by the Ministry of Health. That would make it possible for "normal" people without additional private insurance to be treated at his centers. "The state is investing a lot in its own clinics, but we are convinced that we can work better – and more efficiently," says Stolpner. ∎

Moritz Gathmann has been working in Russia since 2008 as a correspondent for various German magazines and newspapers. His articles have appeared in *Der Spiegel, Süddeutsche Zeitung, Frankfurter Allgemeine Zeitung,* among others.

➜ **www.siemens.com/ecoline**

Timing is Everything

Spurred on by the health reform in the United States, the Kaweah Delta Medical Center in California has launched a powerful new IT tool to support its initiatives for improving care.

Text: **Peter Jaret**   Illustration: **Byron Meiring**   Photos: **Ye Rin Mok**

Kaweah Delta Medical Center resides in the heart of California's sprawling Central Valley, the most productive agricultural region in the United States. Fields of corn and other produce, vineyards, orchards, cattle ranches, and dairy farms stretch for miles in all directions. "I tell people that there are more cows in the county than people, which happens to be true," says Dave Gravender, the medical center's Chief Information Officer. So it's only appropriate that when Kaweah Delta created a new team dedicated to ensuring optimal healthcare delivery, they dubbed them "the wranglers" – a term used to describe ranch hands who herd cattle on horseback.

Saddling Up the Wranglers

The story of the wranglers began almost three years ago with a brainstorm. At the time, Kaweah Delta was already using the Soarian® workflow engine to track its clinical processes. Gravender's idea was to use the engine in a novel way – not only to monitor clinical metrics but also to send out reminders or alerts to the medical staff when something that was supposed to happen didn't.

"The new value-based purchasing regulations that are part of healthcare reform tie Medicare payments to per-

formance on specific core measures," explains Gravender. "I realized that Siemens is placed to make a big difference here, by helping its clients become top performers."

Gravender likens the idea of reminders and alerts to seat belt warnings in cars. "Most days I click on my seatbelt once I'm out of the driveway. But sometimes I get distracted and forget. After about 20 or 30 seconds, the seatbelt warning goes off to remind me. That's what we wanted to create for our medical staff."

In 2011, Gravender and teams from Kaweah Delta began working closely with Siemens consultants to develop the new tool, mapping out alerts based on core measures identified by the Centers for Medicare & Medicaid Services (CMS) as part of its Value-Based Purchasing (VBP) program. They needed better visibility to VBP performance metrics. In addition, they wanted to leverage the Soarian workflow engine to support initiatives for improving clinical quality and patient satisfaction.

The effort focused on four conditions: acute myocardial infarction, pneumonia, heart failure, and surgical care improvement program. The first objective was to recognize key indicators – specific prescription drugs or lab test results, for instance – that signal when

a patient has one of these targeted conditions. The second objective was to send out reminders or alerts if a key step in the clinical process has been neglected or delayed. The project team developed workflows that addressed the specific requirements of these objectives.

Individualized Design

Right from the start, the project proved more challenging than expected. "The fact is, we're talking about clinical processes in medicine that are far more complex than buckling a seatbelt," Gravender explains. One challenge was taking Soarian workflows, which include several that address VBP performance measures, and tweaking them to fit Kaweah Delta's unique ways of delivering quality care. Every medical center uses its own formulary of prescription drugs, for example, and follows its own clinical procedures. These characteristics had to be designed into the system, with physicians participating in all the design groups.

But by far the biggest challenge was determining exactly when the reminders and alerts should fire – and who should get them. "Most of the time the medical team does exactly what it's supposed to do," explains Mark Garfield, MD, Kaweah Delta's Chief Medical Officer. "What we wanted was a fail-

safe system that would alert our staff if something fell through the cracks. But if you send the alert too soon, there are a lot of unnecessary alerts and people start to ignore them. If you fire the alerts too late, there may not be enough time to get something done in the time frame required."
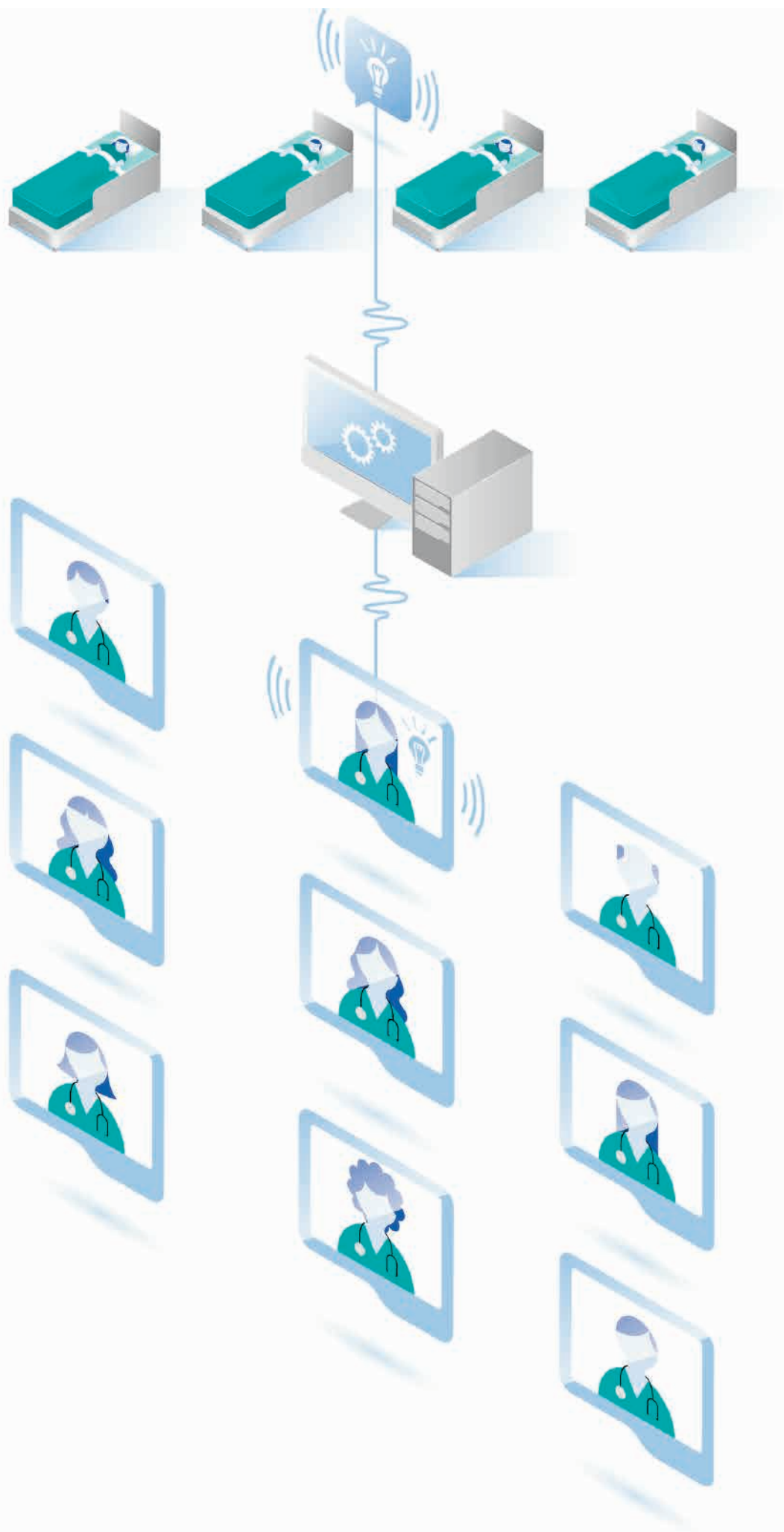
Deciding who should receive the alerts also posed a challenge. "We started with the physician and the bedside nurse, which seemed to make sense," recalls Gravender. "But that didn't work very well for us. No one works 24/7. Some of our medical staff may only come into the hospital every other day. It doesn't help to send an alert about something that needs to be done within 24 hours to a physician or nurse who isn't coming in for a day or two."

Instead, the medical center decided to create a dedicated team of nurse practitioners who would receive the reminders and alerts and make sure they reached the right person in a timely fashion. "In a very real sense, the nurse practitioners wrangle the herd along to make sure that what needs to be done gets done," says Gravender. "So along the way they became known as 'the wranglers.'"

The Wranglers in Action

The nurse practitioners on the wranglers team ended up playing a key role in designing and testing the new system – fine-tuning it so that the reminders and alerts triggered when they would be most useful. "In some cases we had to go through different designs to tweak it to fit our environment," says Christi Robertson, the project lead.

A day in the life of any hospital is hectic. "Things come at you from all directions," explains Rhonda McMillan, ISS Director of Applications. "Any system that can make the job easier is great. But we had to make sure the alerts and reminders were meaningful and that they didn't get in the way rather than help." More often than not, the tweaking process involved reducing the number of reminders and alerts to only those that were necessary to improve outcome.

"The alert prompts us to investigate the patient chart and identifies missing items," says wrangler Mary Staton. Sometimes the nurse practitioners on the team, who have prescribing authority, can respond directly. Or they may need to alert a physician or bedside nurse.

Earlier this year, the reminders and alerts for acute myocardial infarction and surgical care improvement went live. The tools for pneumonia and heart failure should be up and running within the year.

Already, the wranglers say, the system has triggered alerts for core measures that might otherwise have been overlooked or delayed. That almost certainly has improved patient care and outcomes. In practice, the system promises to help Kaweah Delta speed recovery, reduce the risk of complications, and lower rates of readmission. "After three years of hard work on this," says Staton, "believe me, that puts a smile on my face."

> ## *"Siemens is placed to make a big difference by helping its clients become top performers."*
>
> **David Gravender**, Chief Information Officer, Kaweah Delta Medical Center, USA

> *"We're convinced the new alert system will help us meet the challenge of value-based purchasing."*
>
> **Dr. Mark Garfield**, Chief Medical Officer, Kaweah Delta Medical Center, USA

Dollars and Good Sense

The new tool also promises to help improve Kaweah Delta's financial health. Starting in 2012, CMS began penalizing medical centers that fall short on a selected list of core measures and rewarding those that perform especially well. "For the current year under Value Based Purchasing, we have about US$ 1.25 million that could potentially be withheld and another US$ 1.25 million we could receive, or a total of US$ 2.5 million," says Kaweah's CMO Garfield. "That's a significant part of our bottom line. We're convinced the new alert system will help us meet the challenge of value-based purchasing."

Once the workflow reminders for pneumonia and heart failure patients are launched, Garfield hopes to move on to other health concerns. "I think there's a great potential here for many medical conditions where we have identified clinical processes of care that clearly improve outcomes," he says. One condition he hopes to address in the future is diabetes, which affects many of the medical center's patient population.

Working with Siemens, Kaweah's team is also getting ready to launch a reporting system that will allow them to see how well the workflow reminders and alerts are working in real time. "The goal is immediate feedback," says Gravender. "How are we doing? What alerts are being ignored because they aren't relevant? Which ones are being acted on? How can we do better?"

The enthusiasm at Kaweah Delta is palpable. So is the urgency. "For those of us in healthcare IT, it's the best of times and the worst of times," says Gravender. "IT can provide solutions to many of the problems in healthcare today. But it's hard work. And it takes more time than people realize to get it right. Working with Siemens, we're blazing a trail that will make it easier for everyone else. When I say blazing a trail, I mean using a machete to cut a path through the jungle. But the pay-off will be huge. We're learning lessons along the way that will help everyone."

The result will be better clinical processes, decision making, and documentation. With more accessible patient information, Kaweah Delta can improve performance on core measures – increasing reimbursement dollars and saving millions each year. "But in the end it's about the patient," says Gravender. "The goal is to develop tools that help us ensure that patients get the very best care we can give them." ∎

Peter Jaret is a freelance writer based in Petaluma, California. He is a frequent contributor to *The New York Times, Health, Reader's Digest,* and numerous other publications.

➡ **www.siemens.com/soarian**

A Winning Team
for Low Dose Digital Mammography

With Siemens as technical partner, clinician Professor Detlev Uhlenbrock, MD – who heads an Ambulatory Healthcare Center in Dortmund, Germany – found a way of reducing radiation dose in digital mammography by up to 30 percent, while still preserving image quality. *Medical Solutions* talked to both partners about this successful cooperation, which led to the creation of the MAMMOMAT Inspiration PRIME Edition.

Text: **Wiebke Kathmann, PhD**   Photos: **Wolfram Schroll**

The MAMMOMAT® Inspiration has served radiologists and other clinicians involved in breast health and mammography screening in hospitals and clinics all over the world. With concern growing about radiation dose, especially in the screening of healthy women, there was, however, some room for improvement. Professor Uhlenbrock challenged the convention that an anti-scatter grid was an absolute necessity for obtaining high contrast images in digital mammography: "There had to be a way without a grid," he said during an interview looking back over his successful partnership with Siemens. "Even if we had to live with images with slightly less contrast, any resulting radiation dose reductions would make it worth the effort."

With Thomas Mertelmeier, PhD, Head of Technology& Concepts at Siemens' X-ray Product (XP) business unit, he found a partner who was just as eager as he was to find a solution.

Taking Out the Grid

It all started in 2008, at the Ambulatory Healthcare Center in Dortmund. Uhlenbrock acquired a couple of experimental images without the grid: "We looked at the alterations and were impressed that the quality of the images was preserved quite well," he recalls. After these first measurements, the ball was again in the court of Siemens R&D. It was time for the Siemens physicists to generate an algorithm that corrected any image changes resulting from removal of the grid.

Working on a Software-based Scatter-correction

Developing the algorithm and testing it on phantoms took place at the Erlangen headquarters. Differing breast volumes and shapes had to be taken into account, which was achieved using acrylic glass plates of differing thickness during the measurements. The contrast-to-noise ratio needed to be calculated in order to determine the level by which radiation could be reduced – without lowering image quality, compared with those images produced with the grid. This meant repeatedly modifying the algorithm until it could fully compensate for the effects of the grid on image contrast.

"As expected from the theoretical analysis, the images taken of the phantom at reduced dose using the software-based scatter-correction came out with just as good contrast as with the grid," recalls Andreas Fieselmann, ▶

Images taken with PRIME technology had the same image quality as those taken using grid-technology – but with up to 30 percent less radiation.

Mammography expert Uhlenbrock teamed up with Siemens to find ways of further reducing radiation dose in mammography.

PhD, engineer in Mertelmeier's team at Siemens. Uhlenbrock agrees: "No difference in image quality was detectable."

According to Uhlenbrock, both partners had originally thought that taking out the grid would not be possible. In this regard as well, reality surpassed their expectations: Potential dose savings during phantom measurements were in the region of ten up to 30 percent – an encouraging result when it came to filing for a clinical study.

Even at this stage, it had become clear that women with smaller breasts would benefit most from the new software-based anti-scatter solution, or PRIME (Progressive Reconstruction Intelligently Minimizing Exposure) technology.

Clinical Study – Putting to the Test on Women

Planning for a clinical trial began in 2008. The objective was to prove that PRIME technology was not inferior to grid-technology; that the same image quality was possible using lower radiation dose. 75 women aged between 50 and 72 were enrolled. This covered the 50-69 age range, when women in Germany are invited for mammography screening every two years (see sidebar "The German Mammography Screening Program"). Participants were all diagnostic patients, called back after conspicuous features had been found during earlier mammograms. They were asked to give their written consent for two additional mammography exposures – one with the grid, one without – in addition to the medically indicated digital mammography

images on two planes. Both sets of images were taken with the same compression to ensure that they were directly comparable.

"The whole process of getting the go-ahead from the authorities – Ethics Committee, Federal Office for Radiation Protection (BfS) and Patient Insurance – was laborious," Uhlenbrock recalls. "However, everyone was open to this new anti-scatter solution, and by the fall of 2011, all the necessary approvals from various authorities were in place."

With Uhlenbrock acting as a guarantor for the German mammography screening program, the recruitment process was very fast: "Around five million women are invited to breast-screenings every year; around 54 percent of these attend. This means that the German mammography screening program sees

The German Mammography Screening Program

Germany was a late bloomer when it came to mammography screening programs. The national scheme was established in 2002, with all women aged between 50 and 69 receiving an invitation every other year. The cost of screening is covered by the individual's health insurance. By 2008, 94 mammography screening units had been established: Each one was led by one or two executive directors/program guarantors, and covered an area home to between 800,000 and 1,000,000 people.

The true innovation in the German program is the function of a program guarantor. This individual covers all steps – from the first mammography, conferences, and recall imaging, to biopsies and therapy planning, if necessary. This feature not only ensures high quality standards; it also shortens waiting times for women and strengthens their trust, with one physician attending them throughout the entire process. The reliability of diagnostic clarification is very high on this program – partly because the teams receive regular training.

The issue of radiation dose still remains. The exposure of healthy women to radiation every other year has sparked a hot debate, which in turn has inspired clinicians and technologists to find solutions. The close partnership between the Ambulatory Health Care Center Prof. Dr. Uhlenbrock and Partners in Dortmund and the R&D Department at Siemens was a further step to tackle this challenge.

---

about 2.6 million women per year," he says, alluding to the huge potential for sourcing participants.

PRIME Technology: Surpassing All Expectations

When the image acquisition phase ended four months later, the evaluation of the images began: "The results of the study[1] clearly surpassed our expectations, even though they had been pretty high following the phantom measurements," Uhlenbrock notes. "But the results from the clinical setting were even better – especially with regard to their consistency."

Statistical analysis clearly showed that images taken with PRIME technology had the same image quality as those taken using grid-technology – but used up to 30 percent less radiation. They were non-inferior in all seven of the criteria examined. "This proves that with the right algorithm, one can eliminate all the drawbacks that gridless acquisition has on contrast," Uhlenbrock concludes.

Even though establishing the new technology as standard routine might take years, Uhlenbrock is going to use the PRIME technology from now on.

"In two of our facilities, we are now changing to the software-based technology. This means we can offer women reduced-radiation mammographies. Their reactions are extremely positive when I tell them that I can now cut up to 30 percent of the usual dose. For me, the MAMMOMAT Inspiration PRIME Edition is the new standard in low-dose mammography." ∎

Medical writer **Wiebke Kathmann** is a frequent contributor to German-language medical magazines aimed at physicians. She holds a Master's degree in biology and a PhD in theoretical medicine, and worked as an editor for many years prior to becoming a freelancer in 1999. She is based in Munich, Germany.

➔ **www.siemens.com/ Prime-proof**

Management Summary

The challenge Uhlenbrock and Mertelmeier accepted was to minimize radiation dose while performing mammography scans on healthy women. It wasn't just a technical challenge: Coming up with a solution also meant challenging the long-held belief that grids were essential in suppressing scatter in digital mammography. Additionally, they had to find an alternative means of filtering out the scatter.

The solution they found was removing the grid and replacing it with a software-based scatter-correction that used PRIME (Progressive Reconstruction Intelligently Minimizing Exposure) technology.

The results were impressive:
• Same image quality as with the grid
• Up to 30 percent lower radiation dose
• Improved healthcare solution for women
• Creation of a marketable product, as a result of the close collaboration between customer and Siemens

---

[1] The results of the study were published in Physics of Medical Imaging, accessible under the link above: Fieselmann, A., Fischer, D., Hilal, G., Dennerlein, F., Mertelmeier, T., and Uhlenbrock, D., "Full-field digital mammography with grid-less acquisition and software-based scatter correction: investigation of dose saving and image quality," In: Proceedings of SPIE Medical Imaging 2013: Physics of Medical Imaging, Lake Buena Vista, FL, USA, vol. 8668, pp. 86685Y, (2013), doi:10.1117/12.2007490

Forging a Unified Healthcare Culture

CDPI is one of the most prestigious imaging clinics in Brazil and now part of DASA, Latin America's largest diagnostics corporation.

With more than 200 million exams per year, DASA in Brazil is the largest diagnostic company in Latin America. DASA Chairman Dr. Romeu Domingues explains why it is crucial to invest in innovation, in new technologies, and in being a pioneer.

Text: **Reinaldo José Lopes**   Photos: **André Viera and Siemens**

Rio de Janeiro radiologist Romeu Domingues, MD, joined the ranks of DASA, Latin America's largest diagnostics corporation in 2011 after years of successful work at CDPI, one of the most prestigious imaging clinics in Brazil and now part of DASA. As Chairman of the corporation's Board of Directors, Domingues says his aim is to forge a unified culture for DASA's manifold brands, based on innovation, high quality service, and productivity. He explains how DASA's partnership with Siemens is helping his company to achieve those goals and fulfill its social commitment in a country with growing needs for high quality and high productivity in medical services.

How would you describe your first few years with DASA and your vision for the company?

Domingues: DASA is a relatively young corporation. It became public in 2004, only ten years ago, and it underwent a strong phase of mergers and acquisitions making it the largest Latin American company in the field of medical diagnostics , and the fourth largest in the world. We have 20,000 employees plus 2,000 doctors.

CDPI joined DASA in January 2011 as a member of a group of imaging diagnostics companies from Rio de Janeiro. Now we manage 26 different brands. ▶

The greatest challenge is creating a new, unified culture of doing things inside DASA. We've been doing this for two and a half years now and we realize it's not easy. You need at least five years to accomplish this. We need, for example, to integrate our IT systems – right now we have more than 20 different IT systems, and that generates a lot of inefficiency.

Nowadays, about 65 percent of DASA's revenue comes from clinical analyses in vitro, and 35 percent from imaging exams. Those medical service businesses are very different from one another, and the challenge is how to get the most out of both. Clinical analyses are very much based on logistics, production, and supply. With factory-like efficiency, the laboratories at DASA use fully-automated systems to speed the delivery of test results and gain productivity. While lab tests are run on patient samples, imaging exams, on the other hand, are performed on people. You need motivated doctors and well-trained radiologists.

We also needed new systems. Especially in our units in São Paulo, our machines were quite outdated; some of them had been in use for more than ten years. And we had to improve our call-center system. This was important, because the healthcare market in Brazil is customer-driven. Patients choose which lab to frequent and the lab report belongs to the patient. Call-center operators help patients schedule exams and learn about test procedures.

"We cannot afford not to invest in innovation, in new technologies, in being a pioneer."

Romeu Domingues, MD, President of the Administrative Council, DASA, Brazil

Healthcare Challenges in Brazil

In the past few decades, Brazil's demographic profile has changed substantially with a major impact on how the largest Latin American country deals with its healthcare challenges.

From 1980 to 2010, for example, average life expectancy for Brazilians increased from 62.5 years to almost 74 years. Today, about 7.5 percent of Brazilians (about 15 million people) are 65 years old or older, and demographers from IBGE, Brazil's official statistics bureau, predict that number will quadruple by 2060, with senior citizens making up around a quarter of the country's population.

At the same time, a period of relatively robust economic growth has boosted formal employment and income, creating what Brazilian economists call "the new middle class" or "class C". This ascendant group, corresponding to over 20 million people with monthly household incomes of up to US$ 2,000, now has easier access to private services such as health insurance. As a result, in the past ten years, the number of Brazilians who use private healthcare (either as individuals or employees), has risen considerably from 30 million to nearly 50 million people.

These demographic changes are part of DASA's success story and are creating both challenges and opportunities for the company, says DASA Chairman Romeu Domingues, MD. One of the relevant factors is the sheer scale of the demand for clinical exams. "In the past few years, we have been increasing our head count and are investing in order to deal with such a huge demand," he says. When it comes to imaging exams, the increase in demand has also led DASA to invest in its call-center system. "For imaging, you need an extremely efficient call-center so that everything works smoothly, from the doctor's request to the right preparation by the patient; otherwise you lose precious time and money."

This just gives a glimpse of how complex DASA is. Many of the biggest labs in the world don't offer imaging exams, they only do clinical analyses – and vice versa.

How hard is it to deal with so many different brands and the different kinds of clients they serve?

Domingues: One of DASA's interesting facts is that we're dealing with four different market segments. Private patients account for 74 percent of our revenue – including both payments in cash and from patients with insurance plans. Ten percent comes from our "lab to lab" or "B to B" work: Small labs that send their more complex exams to us. In that area we have a client portfolio of about 5,000 small-to-medium labs throughout Brazil.

Next, we have the private hospitals, around 80 of them, for which we perform exams. All of this calls for testing systems that deliver high quality, high throughput, flexibility, scalable automation, and cost efficiency. And, finally, seven percent of our revenue comes from the public health system, from SUS [Sistema Único de Saude, Brazil's nationwide free health system], and it's a pity that it is only seven percent. When we manage to get a public contract, it's very gratifying because we can offer the same exam with the same quality for a patient that lives in a fancy neighborhood as for one who lives in a poor community.

Why is it important for you to work with the public sector?

Domingues: The profit margins we manage to get in the public health system are smaller. On the other hand, there's our sense of social responsibility, and it helps us to generate an economy of scale. After all, we're now the largest diagnostic lab in Latin America. We do more than 200 million exams per year, which is more than three times the number of our closest competitor.

So, in that sense, scale is very important when you're going to automate a central lab like the one we have in Rio, where we do five million fully-automated exams per month. When you're going to negotiate with a supplier to buy software or to arrange maintenance, scale matters. If we didn't have that scale, we wouldn't be able to work with the public sector without losing money, and the same goes for our "lab to lab" work.

In the social responsibility front, we are very proud of a project called Imagem Solidária [Solidary Imaging] that is working beautifully. We established a clinic for low-income patients in the Jesuit school I went to in Rio. We have magnetic resonance imaging (MRI), ultrasound systems, and mammography-producing exams with quality that is undistinguishable from the quality we offer to the patients from fancy private practices. ▶

DASA at a Glance

Number of doctors: **2,045**

(as of December 31, 2012)

Geographical spread:

521 units in **12** Brazilian states

and in the Federal District

Exams per year:

200 million (in 2012)

Number of brands: **26**

Market share in Brazil: **13%**

Company value:

R$ 3.6 billion

(US$ 1.59 billion)[1]

Total profits in 2012:

R$ 84.7 million

(US$ 37.47 million) [1]

Main Imaging equipment:

CT: *70*   MRI: *105*   Ultrasound: *392*

Labs: *26*   including *9* central labs

Papers published in international journals per year: *30*

[1] as of Nov. 11, 2013

This year, Siemens in São Paulo also organized an effort, together with some of its other partners, including Hospital do Coração and Hospital Sírio-Libanês, to offer a number of free examinations – more than 100 MRIs and about 100 computed tomography scans, in DASA's case – to public hospitals in São Paulo State. We agreed to participate through the Siemens initiative and the effort was pretty successful.

DASA has a strong interest in research and innovation. What are the benefits of that approach for your company?

Domingues: We can't afford not to invest in innovation, in new technologies, in being a pioneer. If I need to negotiate a raise in reimbursement with an insurance company, I usually barely manage to compensate for last year's inflation. So, how does our business stay afloat in the long run? Only with innovation, with a focus on being a pioneer, because that brings higher aggregated value and greater prestige to our portfolio.

In sum, that's the approach we have to pursue, and it's great to see that, in the medical imaging field for example, in the past five years probably half of the Brazilian scientific output has come from our group. And if you go to the RSNA (Radiological Society of North America) meeting in Chicago, half of the papers presented by Brazilians are by our group. Why? Because we have residents, we have fellows, a good team of medical physicists, and a partnership research agreement with Siemens. That means: As soon as new work-in-progress software is available, they let us know. We test it and then publish the results. Once every two years I visit Siemens headquarters with three or four colleagues to get to know what the most important innovations are. We can't afford to lose this pioneer spirit.

We didn't have a similar engagement in research in our laboratory branch, but we're also managing to change that. In 2011, for example, we presented 11 papers during the AACC (American Association for Clinical Chemistry) meeting. That number shot up to 53 last year. In terms of our commitment

DASA runs a fully automated laboratory equipped by Siemens.

to innovation, both areas need to go hand in hand.

In what sense do you think your partnership with Siemens has boosted your performance when it comes to offering innovative exams?

Domingues: I think I can assess more clearly what impact Siemens had in our work when I look at the MRI field, which is my specialty. In that area, in the past ten years, Siemens really leapt ahead in technology, with several important innovations.

It was the first company to bring full-body MRI to the market, with the possibility of connecting several coils at the same time. It was the first to devise a 70-centimeter, Open Bore magnet. The first to have MR/PET. It was clearly a huge investment in research that has paid off in terms of market share.

DASA operates on such a big scale that you also need to aim for the highest possible productivity. Is your collaboration with Siemens an asset in raising productivity levels too?

Domingues: One thing we realized right away was Siemens' increasing concern with high productivity when it started manufacturing MRI equipment where you could use several coils at the same time, for example. Not so long ago, if you had to scan a patient's lumbar spine and then his hip, you needed to reposition the coils. Nowadays, you don't need to touch the patient. It may not sound like much, but that kind of thing results in much higher productivity.

Ten years ago, Siemens put an end to pre-scan – before, we needed to spend a few seconds before starting a sequence. If you save up to ten seconds here, ten seconds there, at the

end of the day that's a lot of time and money you save. So we discovered that, besides technical quality, we could be a lot more productive.

Another good productivity example in São Paulo is DASA's Public Laboratory. With its Siemens solutions, DASA has reduced turnaround time and error rates. The need to split samples into multiple test tubes for analysis dropped from 100 percent to 62 percent after the introduction of the ADVIA LabCell System, and 22 percent of the staff were reallocated to other activities. A good balance between productivity and quality is absolutely possible.

Reinaldo José Lopes is a science writer at *Folha de S. Paulo*, Brazil's largest daily newspaper. He lives in São Carlos.

➡ **www.siemens.com/dasa**

Bye Bye, Paper Files!

Endless miles of filing cabinets are now a thing of the past at Southern New Jersey's Inspira Health Network. Together with regional partners, the provider relies on IT solutions to implement the healthcare reform in its corner of the USA.

Text: **Roman Elsener**   Photos: **Skye Parrot**

"We were very intentional in selecting our name. It's Inspira Health Network – because a network is more than just a group of hospitals," says Chet Kaletkowski, President and CEO of Inspira, a healthcare provider spanning a multitude of hospitals and participating physicians in southern New Jersey with a common goal: To bring America's healthcare system up to speed.

Kaletkowski is a firm believer that reform is needed. "We all know that the amount of money we spend on healthcare in the United States is not sustainable. What is coming now is very comprehensive and there are still a lot of unknowns, but we have to anticipate what the reform will entail for us as a provider," says the executive whose friends describe him as a people person: Somebody who can bring it all together.

New Models of Care

"With the reform coming, I think it's recognized that the payers in government organizations are looking to health systems to be proactive in delivering new models of care – that's the key. They want to see organizations manage care a lot better," says Kaletkowski, knowing this is not an easy task. "I grew up in New Jersey and I am the third generation in my family to be involved with healthcare. There was a sort of self-deprecating feeling when I came to South Jersey that we're not good enough. We're not Philadelphia, we're not New York, we're not North Jersey. I asked, 'Why?'"

Gradually, Kaletkowski is changing that mindset of his fellow Southern New Jerseyans, connecting hospitals, physicians, and increasingly patients, ▶

Nowadays, patient information can be recorded on computer screens with a simple scan of a wristband for integrated healthcare.

over a service area of more than 1,000 square miles in the USA's most densely populated state. He has a clear vision for improving the quality and efficiency of care. "The first thing you do is connect with your physician in some way. So how do you provide continuity with a patient that starts in an office setting, moves to a hospital, then to a nursing home, or some other setting, and back to the doctor? The commonality there is the information that follows that patient. And to me it's the electronic health record [EHR] that's crucial," he says.

A lot of the doctors in the southern part of New Jersey are independent, organized in small groups. Kaletkowski is convinced that IT can play an important role as a connector and integrator. "We show them the value that the electronic health record brings to their patients and ask them to become part of the network. Then we subsidize them for the software, they have to buy the hardware, and they are linked to the hospital," explains the CEO.

Meaningful Use

Kaletkowski and his team worked with the Siemens MobileMD® product and were able to develop a health information exchange for their service area. The state of New Jersey, realizing that the rest of the southern part of the state was not moving quickly enough, turned to Kaletkowski. "You seem to be ahead of the game,' they told us," he recalls, "and asked if we wanted to work with some of our other hospitals and create a five-county region that can plug into the other four regions of the state." Inspira also got letters of endorsement from other systems residing in the southern part of the state, promising that they would work together with the new network and provide information. "So we have a robust data warehouse, if you will," laughs Kaletkowski. It's called NJSHINE, a collaborative, nonprofit, healthcare organization with Inspira, Shore Medical Center, and Cape Regional Medical Center as its primary partners.

Health information exchanges are being set up all over the country due to the reform efforts. "The goal is that, should I go to California tomorrow and – God forbid – have an accident, someone can pull up my complete record, based on the database residing in the State of New Jersey or wherever I am from," says Kaletkowski. Inspira has met the criteria set by the government for "Meaningful Use Stage 1," which asserts that they have accomplished the implementation of certain EHR measures. They attested to the government and received reimbursement or compensation for being able to meet those measures. Now the bar is raised for Stage 2, a new set of measures and higher thresholds to meet, coming up for Inspira in 2014: advanced clinical functions, physician documentation, and new methods such as ePrescribing.

IT is Key

Kaletkowski made sure he has the man with the right IT plan at Inspira. "I brought Tom Pacek here as the Chief

Information Officer. He has an IT strategy that he updates every year and that marries nicely with our vision," says Kaletkowski. Pacek has been in the healthcare industry for over 30 years, specializing in IT. "The goal is that everybody who is connected to the exchange knows the value of it, and can utilize it to its full potential," says Pacek, who is happy with the progress so far. "We've made significant advances since 2008. We went to Soarian® in August of 2008 for clinicals, and in 2009 on to Soarian Financials. We've been adding modules ever since," says the CIO.

The physicians, and especially their office staff, were mostly excited about the electronic information, because it also comes with some of the demographic and insurance information. The office staff is now able to see the information and have it at their fingertips. "This saved them a lot of time on the phone," says Pacek. The next phase was to roll out the clinical portal. According to the Inspira CIO, physicians find great value in that, too. "As the doctors get more and more comfortable with it, we'll let them use a lot of secure functionality, like referring from one doctor to another so they can share electronic information from their record to another physician through the secure messaging component of the portal," Pacek explains.

Next, Inspira is rolling out the patient health record, hoping to get the population engaged with the exchange. "Thanks to the secure messaging capabilities, patients will be able to communicate with the hospital and with their doctors in a very secure fashion, specific to their needs," the IT specialist explains. Patients could even question a result and attach it to the message with a comment.

A Culture Change

Kaletkowski and Pacek agree that the workflow in a physician's office is rapidly changing and the doctors have to learn how to work in this new electronic world. Not all the doctors are happy with the changes, especially older, computer-averse physicians. "We've had some of them threatening that they're going to retire because they don't want the technology. My

answer to that is, 'Okay, then maybe it's time,' because this is a new world," says Pacek.

Delivering patient care nowadays is supported by the computer system. In healthcare, you need to be able to interact with the computer system and the rich information, protocols, connections, and programs it offers. Pacek points out another advantage of the constantly updated information at hand for the physicians: "They need to know of new treatments and pharmaceuticals that have been very successful in treating patients, and

that these evidence-based methods are available to them." In his view, the computer should make the doctor aware of new products: "Based on the diagnosis you have and the tests you've been running, maybe you want to recommend this particular test or this particular drug." Pacek imagines a pop-up window for this, and he adds: "They can't necessarily teach you all that at medical school, so it's an augmentation to what they currently know. It's to provide physicians with the most complete information available to treat the patient." ▶

"Siemens provided the content and the workflows that I thought were so necessary to make things happen."

Chet Kaletkowski, President and CEO, Inspira Health Network, South Jersey, USA

Clinical images need to be taken only once since every member of the health network can access data in the patient's EHR.

Some of them, however, are still not comfortable with that. "It's a culture change for them and a mindset change. They're not used to being on the computer and taking messages from patients. They're going to need some guidance from us," says Pacek. "Hopefully, we're able to provide that service to the physician to say, 'Hey, here's how you might want to do that.'"

David Shields, a gastroenterologist with an office a few steps from the Inspira Medical Center Vineland, is among the doctors who came to embrace healthcare IT early on, and who is now part of the Inspira network. "Twenty years ago, my last year in residency, I was at the University of Pennsylvania and they were starting to use electronic order entry already back then," says the doctor. "I was pretty good with computers, so for me it wasn't a big struggle going forward. The biggest thing you have to do is learn to type!" He is looking forward to linking up to different practices and the hospital and to get to see what his colleagues are recommending for patients. "I think a lot of what we spend in healthcare is wasted on redundancy," Dr. Shields says. "Ten doctors may see the patient, ten

doctors may order a CAT scan – you don't need ten, you need one."

Informed Decision-Making for Patients

And then there are the patients – many of whom would benefit from improved diet and exercise. Not only do hospitals and doctors need to be more aware of quality and cost-effectiveness, patients can help

"It's a culture change and a mindset change for physicians."

Tom Pacek, Chief Information Officer, Inspira Health Network, South Jersey, USA

themselves substantially to lower their healthcare bill by paying attention to their lifestyle and by keeping track of their health record. "I think it's important that patients get their own file of what they've had done so that they understand and make informed decisions," says Dr. Shields and adds, "This is your body. You should know every medication you're taking and why you're taking it. If you have an exam done, you need to know what the results are."

Inspira President Chet Kaletkowski agrees with Dr. Shields. "When patients realize that they have some impact on how their care is delivered, they understand why EHRs are so important. I don't think the average consumer realizes that yet," says the captain of the Inspira ship. In an environment where people try to take care of their health, hospital stays – the cause of a large amount of the costs – can be reduced greatly. "A typical stay in the hospital when I started many years ago was ten days. Now we're down to four days," says Kaletkowski.

Post-Discharge Care

But it's how the patients are cared for after they are released from hospital that makes Inspira special. As Inspira's Administrative Director of Case Management Lynette Newkirk, RN, BSN, ACM explains: "We try to make sure that our patients have a safe discharge plan

> ## "Patients need to get their own file so that they understand and can make informed decisions."
>
> **David Shields**, gastroenterologist,
> member of the Inspira network, South Jersey, USA

and that they're able to stay well at home and don't get readmitted unnecessarily." A lot of the patients in Inspira's service area are financially challenged – they can't afford a scale, but with heart failure patients, just a pound too much could put them over the edge and bring them back into the hospital. "So we have a program where we actually provide scales to these patients," says Newkirk. Some low-income elderly patients can't always afford a healthy diet. "So we partnered with the Food Bank of Southern New Jersey, trained these folks about the appropriate type of meals for patients with heart failure or chronic obstructive pulmonary disease (COPD). Now, we distribute boxes of appropriately stacked food and connect them with the local food pantries in the area," explains the care manager, who looks back on 37 years of experience.

"We also have a Program for All-Inclusive Care for the Elderly (a Medicare and Medicaid program). Our version is known as LIFE – Living Independently for the Elderly. It's wonderful what we can do for these people," says Chet Kaletkowski. "These elderly people are now functional. They're socialized because they come to our LIFE center and are making new friends. They get picked up by bus and brought to the

center. And all of a sudden these people say, 'I'm looking forward to it.'" For the Inspira president and his dedicated team, a lot of their new care programs have been made possible thanks to IT solutions. "Siemens is a really great partner for us in bringing this whole community together," says Kaletkowski. "What they have provided is the content and the workflows that I thought were so necessary to make things happen." ∎

Roman Elsener is the Head U.S. Correspondent for the Swiss News Agency SDA in New York. He has worked as an editor, reporter, and producer for various European media. He has produced stories for *Neue Zürcher Zeitung, NZZ am Sonntag, Swiss Television SRF, German TV ZDF, Spiegel Online, Handels-Zeitung* and many more.

➡ **www.siemens.com/soarian**

Quality Under a Single Network

Inspira Health Network is southern New Jersey's leading network of healthcare providers, expanding its services across an area of more than 1,000 square miles and bringing together expert physicians from more than 40 locations. The Network is a partner in the Health Information Exchange NJSHINE to facilitate the transfer of healthcare information electronically.

The Inspira partners signed on for Siemens Soarian more than five years ago. Siemens supplied the applications, support, implementation, strategic consulting services, and healthcare computing center hosting services.

As a result, Inspira has met "Meaningful Use Stage 1", as defined by the U.S. government to implement the healthcare reform, by accomplishing the implementation of electronic health record (EHR) measures. Now the bar is raised for Stage 2 in 2014, a new set of measures with higher thresholds.

Digital Highlights

Our *Medical Solutions* online magazine offers even more best practice examples from customers around the world. Just scan the QR codes with your mobile device or follow the URLs to browse through interviews, image galleries, and documentary films at any time you want.

Cardiac Care in a Russian Remote Area

The Russian region of Yaroslavl is investing over 150 million euros in modernizing its healthcare system. One major focus in this initiative is the area's provincial hospitals, where outdated medical equipment is being replaced. Initial successes are already visible: Mortality from cardiovascular disease has declined by nine percent.

➡ **www.siemens.com/access-cardiac-care-russia**

New Treatment Platform for Cardiac Resynchronization Therapy

As more and more people live longer, more patients are likely to suffer from heart failure. With MediGuide Technology, physicians can navigate devices through a diseased heart by means of magnetic tracking. Continuous fluoroscopy of the patient is no longer necessary. So, considerable radiation is saved – without compromising on the outcome.

→ www.siemens.com/mediguide

A Voice for Europe's Arrhythmia Patients

The European Heart Rhythm Association (EHRA) – a branch of the European Society of Cardiology – advocates infrastructure improvements and education through government policy. Professor Angelo Auricchio was, until recently, the Association's president. He took time out to talk to Medical Solutions Online about EHRA's work.

➜ **www.siemens.com/interview-ehra**

Scanning like Clockwork in South India

The KGS Scan Centre in the South Indian city of Madurai performs over 100 MRI scans per day at its two sites. Patients come here from 50 neighboring communities. Behind this achievement is its owner's focus on imaging quality and his innovative workflow strategies.

→ www.siemens.com/workflow-mri

An Unavoidable Future Trend

Despite a history of nearly 30 years in China, minimally-invasive interventional radiology is still underutilized in the country's Eastern province of Henan. Professor Han Xinwei, MD, believes that the majority of diseases such as cancer and heart disease should be diagnosed and treated using minimally-invasive technologies. Read how he manages to drive the transition from conventional surgery to minimally-invasive treatment in China.

→ www.siemens.com/minimally-invasive-procedures
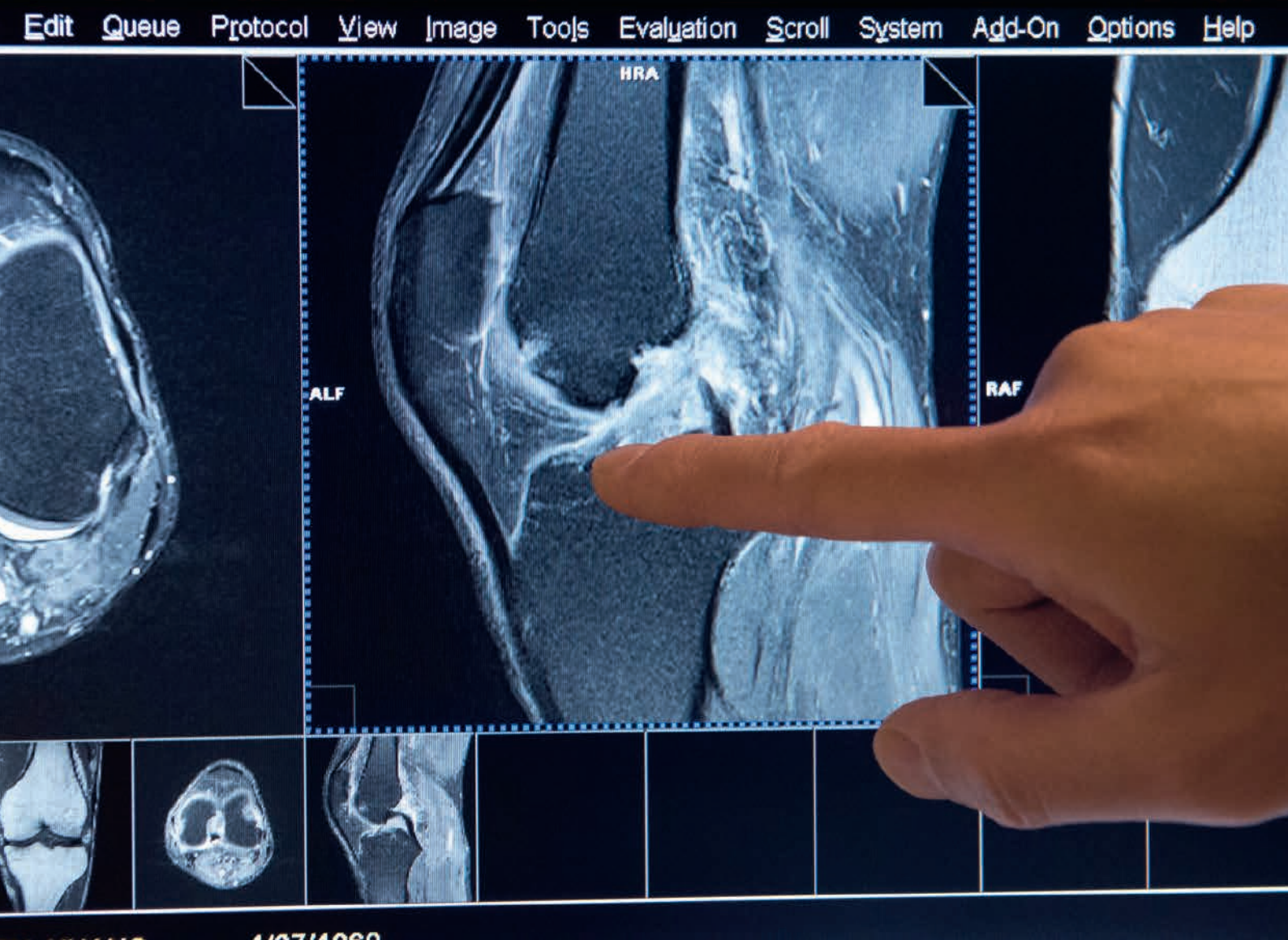
Additions that Count

When buying a new magnetic resonance system is out of reach, adding advanced coils can improve workflows significantly. By purchasing two 15-channel knee coils, William Osler Health System in Ontario, Canada, increased patient through-put by a third. Medical Solutions took a closer look.

➡ **www.siemens.com/knee-coil-canada**

The Benefits of Electronic Health Records

Smaller community hospitals generally do not have the personnel or the resources of their larger counterparts. So, implementing system-wide electronic health record technology can present some challenges in the process. Yet, with the help of Siemens, Arkansas Heart Hospital launched its Soarian health information system in record time.

Watch a video on the hospital's experiences.

➡ **www.siemens.com/electronic-health-records**

Non-Stop Traffic in the Hospital Lab

Two years ago, Hans Günter Wahl systematically switched to automated diagnostics in his medical laboratory in Lüdenscheid, Germany, with the goal of improving productivity without sacrificing quality. *Medical Solutions* **made a short documentary film about what effects this had on day-to-day work and further development.**

→ **www.siemens.com/lab-automation**

Medical Solutions Publication Family

There is a *Medical Solutions* for everyone. Feel free to decide when and how you want to enjoy best practice examples from leading healthcare professionals around the world.

Medical Solutions Online
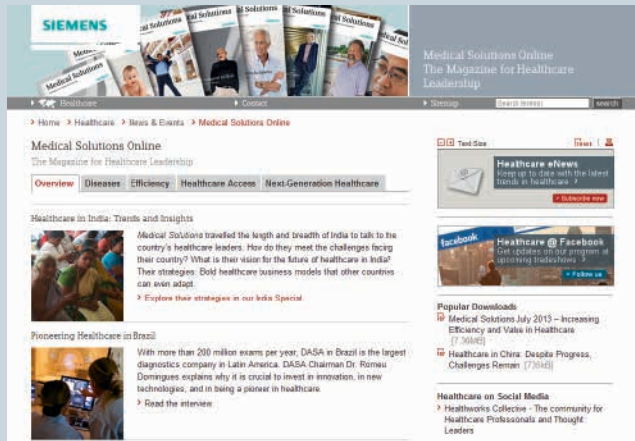
➜ **www.siemens.com/ medical-solutions**

Medical Solutions Tablet App

iOS		Android	

➜ **www.siemens.com/publications-app**

Siemens Healthcare Specialty Publications

Our specialty publications offer best practices and background information for a variety of clinical fields.

SOMATOM Sessions
Everything from the world of computed tomography.

AXIOM Innovations
Everything from the world of interventional radiology, cardiology, and surgery.

MAGNETOM Flash
Everything from the world of magnetic resonance imaging.

Imaging Life
Everything from the world of molecular imaging innovations.

Heartbeat
Everything from the world of sustainable cardiovascular care.

For current and past issues and to order the magazines, please visit **www.siemens.com/ healthcare-magazine**

We remind our readers that when printed,
X-ray films never disclose all the information
content of the original. Artifacts in CT, MR,
ultrasound, and DSA images are recognizable
by their typical features and are generally
distinguishable from existing pathology. As
referenced below, healthcare practitioners
are expected to utilize their own learning,
training, and expertise in evaluating images.

Medical Solutions on the Internet:
www.siemens.com/medical-solutions

www.siemens.com/medical-solutions