



Harnessing the Power of Research

HEALTH SCIENCES SOUTH CAROLINA

2011 REPORT TO STAKEHOLDERS

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INSPIRED by our mission

> **THE MISSION** of Health Sciences South Carolina is to conduct collaborative health sciences research to improve the health status, education, workforce development, and economic well-being of all South Carolinians.

With regard to **Health Status**, we will accomplish this by:

- Translating research results into clinical practice
- Promoting wellness and implementing disease management programs to reduce disparities in health status
- Improving patient safety and clinical effectiveness

With regard to **Education and Workforce Development**, we will accomplish this by:

- Improving the quality of and access to health-related education
- Increasing the number of health-related professionals trained

With regard to **Economic Well-being**, we will accomplish this by:

- Attracting a significant increase in funding to South Carolina for health sciences research
- Attracting nationally prominent scientists to South Carolina, bringing intellectual property to stimulate the state's knowledge-based economy
- Creating and attracting health-related companies to South Carolina that will increase the number of highly skilled jobs



HEALTH SCIENCES SOUTH CAROLINA

We Are Harnessing the Power of Research for a Healthier South Carolina.

SUPPORTING ORGANIZATIONS



AFFILIATES





WE ARE INSPIRED BY THE PROMISE OF A HEALTHIER SOUTH CAROLINA.

HSSC is at a critical moment in its seven-year history. We are developing a new strategic plan through which we will re-dedicate our human and technological resources to the cause of harnessing research to deliver better health care for people in every corner of this state. We will make an even stronger push to disseminate evidence-based practices and clinical discoveries to the front-line providers who have the greatest impact on patient care.



WE ARE BOOSTING THE SPREAD OF INNOVATION THROUGHOUT SOUTH CAROLINA.

HSSC's new strategic plan will involve the creation of three new functional units that will help our organization turn innovative research findings into better patient care and population health. Staff within these focus areas—analytics, evidence-based care and clinical trials, and implementation science—will identify the most effective treatments and health interventions, and then determine how to effectively disseminate them to health care providers throughout South Carolina.



WE ARE POWERING TOWARD A TRANSFORMATION IN THE HEALTH AND WELL-BEING OF SOUTH CAROLINIANS.

We believe our efforts, guided by our strategic plan, will have a transformative effect on the patient experience, with increased safety, better and more cost-efficient care, and improved population health.

LETTER from the President & CEO



HSSC has created an innovative statewide health care environment structured not on intellectual property but on intellectual generosity.

DEAR STAKEHOLDERS,

HEALTH SCIENCES SOUTH CAROLINA is a unique organization established more than seven years ago as a result of the state's initiation of the innovative SmartState™ Program and the vision of our university, hospital, and community leaders. Its mission is to improve and safeguard the health of South Carolinians by harnessing the power of biomedical research.

The fruits of biomedical research and improved public scientific literacy have, for the past century, proven to be among our nation's greatest achievements, eradicating certain diseases, saving countless lives, and profoundly improving the human condition. HSSC, with the opportunity offered by the generosity and partnership of The Duke Endowment, is now meeting a new international challenge: to translate the plethora of new fundamental research discoveries that take place in laboratories across the country into improved delivery and care models and healthier lifestyles that will benefit not only all Carolinians but in fact, all humanity.

The Duke Endowment's past and present investments in HSSC, inclusive of our three research-intensive universities and seven of the state's largest teaching hospital systems, total more than \$32 million. These investments have allowed us to create an innovative statewide health care environment, one structured not as much on intellectual property, but on intellectual generosity. It's an environment that promotes collaboration, communication, and creativity. This alignment of individual institutional missions has allowed HSSC to capitalize on external research opportunities totaling more than \$40 million of additional funding, and has attracted other statewide organizations to form long-standing, committed partnerships with HSSC.

Most notable partners are the South Carolina Hospital Association, the South Carolina Medical Association, the South Carolina Office of Rural Health, the South Carolina Primary Health Care Association, the South Carolina Departments of Health and Human Services and Health and Environmental

Control, BlueCross BlueShield of South Carolina, and Premier Health of North Carolina. These organizations, along with the more than one thousand primary care providers serving the rural and under-insured that are part of the HSSC Regional Extension Center, form the foundation of an alliance that is enriching the quality of South Carolina's growing patient-centered medical enterprise.

HSSC has embarked this year on a new strategic planning process that balances the process of fundamental discovery with research on the validation and implementation of new delivery and care models. This new direction will help us engage additional stakeholders and encourage the creation and development of new products, new jobs, and new industries. You can read more about our new strategic plan on page 38.

As part of our new strategic plan, we at HSSC will strive to establish our organization as a fully self-sufficient collaborative enterprise that is not duplicated in any other state in this nation. We are grateful for the trust our supporting organizations, affiliates, and partners, especially the board and staff of The Duke Endowment, have placed in us. We look forward to continuing our pursuit of new knowledge and the validation and dissemination of that knowledge with vigor, dedication, and integrity—with an aim to contribute mightily to improving South Carolina's health care research, population health, and health status.

Thank you, as always, for sharing in this pursuit with us.



Jay Moskowitz, PhD

President & CEO, Health Sciences South Carolina

HSSC is embarking on a new strategic plan that balances the process of fundamental discovery with the validation and implementation of new delivery and care models.

LETTER from the Chairman of the Board



James F. Barker, FAIA

President, Clemson University
Chair, Health Sciences South Carolina Board of Directors

DEAR FELLOW SOUTH CAROLINIANS,

IN A STATE THAT NEEDS BETTER HEALTH CARE and a healthier economy, Health Sciences South Carolina (HSSC) is delivering improvements in both. Our state was among the top five in the nation this year for health care quality improvement, according to the U.S. Department of Health and Human Services.

That is in part due to the uniquely successful partnership among the research universities and leading hospital systems that make up Health Sciences South Carolina. It is a collaboration based on respect and a commitment to sharing information, identifying problems, and working toward solutions.

Since its founding in 2004, HSSC has sponsored a range of programs leading to multidisciplinary clinical research, innovations in the delivery of care, and new models of education and training.

In 2006, The Duke Endowment recognized the value of the concept when it awarded its largest grant ever for a health care initiative to HSSC. Five years later, a second major award of \$11.25 million confirmed the foundation's faith in its earlier judgment. The new grant will allow us to continue to

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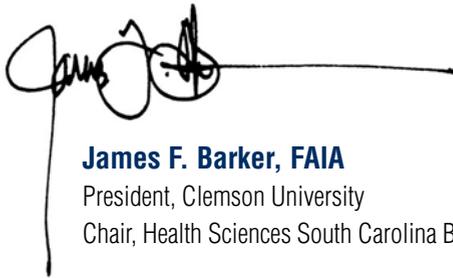
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develop a sophisticated health care information technology and clinical trials network in South Carolina.

With the addition in 2010 of AnMed Health, McLeod Health, and Self Regional Healthcare, the HSSC collaborative has grown even stronger. Their affiliation with HSSC will support research and benefit their patients. Research will be translated into clinical practice more quickly over a wider network. This will improve health care statewide and also bring economic activity to our state.

Good health for the people of South Carolina is the ultimate goal. Prevention of disease and excellent health care are the means to that end. Health Sciences South Carolina and its expanded roster of members play a crucial role, through innovative research, in making good health a priority and a reality.



James F. Barker, FAIA
President, Clemson University
Chair, Health Sciences South Carolina Board of Directors



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HIGHLIGHTING SUPPORTING ORGANIZATIONS

Clemson University

Clemson's partnership with HSSC saw significant growth in 2011, especially in information services, in which both technology hosting solutions and information technology security services expanded to meet growing needs.

Nearly 70 HSSC servers are now deployed and supported in Clemson's data center. About 50 use a virtual server environment, and the number of dedicated Oracle deployed database servers that Clemson Computing and Information Technology (CCIT) manages has grown from one to five. Information security officers from CCIT provided security-related guidance to HSSC staff and implemented technology-based security controls and practices in developing and deploying these HSSC systems. Through its ISO (International Organization for Standardization) function, CCIT participates in all aspects of the HSSC process for systems housed in Clemson's data center and works with local support staff to assure security. Local support staff have been integrated into the support structure of HSSC to facilitate more efficient problem resolution.



Nearly 70 HSSC servers are housed and supported at Clemson University.

Greenville Hospital System University Medical Center

The University of South Carolina School of Medicine—Greenville is on track to open its doors to its inaugural class of 50 students in summer 2012. The expanded medical education program builds on a longtime partnership between the University of South Carolina (USC) and Greenville Hospital System University Medical Center (GHS).

USCSOM—Greenville was awarded preliminary accreditation on October 4 by the Liaison Committee on Medical Education, the

definitive accrediting body for medical schools in the United States. Preliminary accreditation is the first step in the accrediting process, which takes about four years.



Most of the classes at USCSOM—Greenville will take place in the Health Sciences Education Building, a state-of-the-art, 90,000-square-foot education facility that will include interactive, team-focused “smart” classrooms and simulated patient clinical space where doctors in training will learn and practice patient-interaction skills.

USCSOM—Greenville will bring new opportunities for quality care, research, and advanced education to South Carolina and will enhance collaboration, care coordination, and resource alignment for increased clinical effectiveness.

Medical University of South Carolina

The Medical University of South Carolina (MUSC) welcomed 2011 with the creation of a clinical data warehouse, otherwise known as the MUSC Biomedical Research Bank (Biobank). This repository of plasma, urine, and DNA samples is available to researchers to facilitate new medical discoveries and improve disease diagnosis and treatment.

In March, MUSC spin-off company SimTunes announced that it would offer its patient simulation educational software on the Internet through “SimStore.” SimTunes’ software, developed at MUSC’s Health Care Simulation of South Carolina, enables health care providers to receive better, more standardized simulation technology training, which means better and safer care for patients. Also in March, MUSC spin-off company FirstString Research announced that it had received two patents to further develop and market a new wound-healing technology

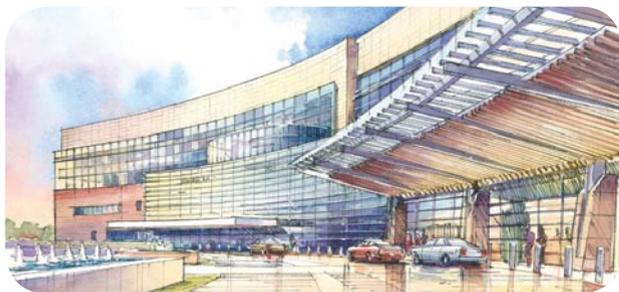
that will decrease scarring and promote faster wound healing.

In October, MUSC opened its drug discovery and bioengineering research complex, which houses several HSSC and SmartState™ Centers of Excellence. The complex houses experts from different disciplines; through this approach, MUSC hopes to quickly move improved treatments and medical devices from the lab to the bedside. Within the complex, investigators from numerous MUSC departments share space with scientists, faculty, and students from Clemson University and the University of South Carolina.

Palmetto Health

In 2011, Palmetto Health continued its role as one of the region's health care leaders. Under the direction of neurologist Souvik Sen, MD, who is the Endowed Chair in Clinical Stroke Research at the Stroke Center of Economic Excellence (part of the SmartState Program), Palmetto Health Richland was certified as a primary stroke center—the first and only hospital in the Midlands to receive this recognition. The certification is The Joint Commission's Gold Seal of Approval™.

In August, Palmetto Health announced that it had received a \$3 million grant from The Duke Endowment to develop a new model of care for patients with chronic health problems. The grant will enable Palmetto Health and the Palmetto Health Quality Collaborative, LLC, a physician-led, clinically integrated health care entity, to begin transitioning from an acute care model to a chronic care model.



In October, the groundbreaking was held for Palmetto Health Baptist Parkridge, a \$99 million, 76-bed, full-service community hospital with 24/7 emergency care in northwest Columbia. The hospital will occupy a 75-acre site and is slated to open in December 2013.

Spartanburg Regional

Spartanburg Regional's Gibbs Cancer Center had several notable achievements in 2011. In March, Spartanburg Regional announced that Christophe Nguyen, MD, FACS, a surgical oncologist at the center, performed South Carolina's first minimally invasive, total port-access, robotic-assisted lung surgery for early lung cancer.

In September, the center opened a \$6 million facility in Cherokee County, giving patients access to the same multidisciplinary care offered at the Spartanburg Regional campus.

The Cancer Center also received recognition from the Quality

Oncology Practice Initiative Certification Program, an affiliate of the American Society of Clinical Oncology. The program recognizes outpatient hematology-oncology practices that meet the highest standards for quality cancer care.

Also in 2011, Spartanburg Regional was recognized with the Gold Performance Achievement Award through participation in the American College of Cardiology National Cardiovascular Data Registry's ACTION Registry®—GWTG. This program establishes a national standard for understanding treatment patterns, clinical outcomes, drug safety, and the overall quality of care provided to heart attack patients.

Spartanburg Regional's Gibbs Cancer Center is part of the MD Anderson Physicians Network and is a National Cancer Institute Community Cancer Center.



University of South Carolina

Research funding at the University of South Carolina grew to a record \$226.9 million in fiscal year 2011. Notable awards include the following from the National Institutes of Health:

- \$2.8 million to identify new preventive or therapeutic strategies to curb the rising prevalence of allergic diseases.
- \$1.7 million to examine cardiac arrhythmias associated with hypertrophic myopathy, a genetic disease of the heart that is a leading cause of sudden death in athletes and young people.
- \$1.4 million to investigate new approaches to improving patients' responses to implanted materials, medical devices, and stem cells.

Also in 2011, five USC faculty were elected fellows of the American Association for the Advancement of Science: S. Michael Angel, Rosemarie Booze, Lukasz Lebioda, Mary Anne Fitzpatrick, and Prakash Nagarkatti. These five USC faculty members were among 539 people elected because of their distinguished efforts to advance science or its applications.



In October, Prakash Nagarkatti, PhD, became USC's vice president for research. Nagarkatti previously served as associate dean of the USC School of Medicine, overseeing all research-related activities. Nagarkatti's own research on cancer and autoimmune diseases has been funded by the National Science Foundation and the Environmental Protection Agency.

HIGHLIGHTING AFFILIATES

HSSC's three affiliates, AnMed Health in Anderson, McLeod Health in Florence, and Self Regional Healthcare in Greenwood, continued to deliver outstanding care to their patients and power a healthier South Carolina in 2011. Here are some highlights:

McLeod receives prestigious quality award from American Hospital Association

McLeod Health's relentless pursuit of quality improvements and service excellence for patients and their families has been recognized by the American Hospital Association with the 2010 Quest for Quality Prize.

A committee of health care quality and patient safety experts from across the nation selected McLeod for this honor, given to just one hospital in the United States each year. Past recipients include Duke University Hospital, Cedars-Sinai Medical Center in Los Angeles, Johns Hopkins Hospital in Baltimore, and New York-Presbyterian Hospital in New York City. McLeod is the

first hospital in South Carolina to receive this distinction.

McLeod was chosen for the award thanks to its commitment to create a patient care experience that is safe, timely, patient-centered, effective, efficient, and equitable.

"When patients come to McLeod, we want them to expect the safest care possible," said Donna Isgett, senior vice president of quality and safety. "Patients should know that the science, the evidence-based care, we deliver is second to none.... The service we give to our patients means we treat them like genuine human beings."

S.C. State Senator Hugh Leatherman, who represents Florence, honored McLeod's achievement with a Senate Resolution.

McLeod expands Heart and Vascular Institute

A soothing environment with warm colors and cherry wood now welcomes and comforts cardiac patients and visitors to the new Heart and Vascular Institute at McLeod Health.

Previously, cardiac services were located in different areas throughout the McLeod campus, creating navigational challenges for patients. Now all services, including diagnostic testing, treatment, and surgery, are located in one central area.

The current phase of development within the Heart and Vascular Institute includes (1) renovations to the cardiovascular intensive care unit, which cares for both cardiac and vascular surgical patients, (2) relocation of the cardiovascular day hospital, and (3) a new area for general ultrasound services, echocardiography, and EKG. Future development at the institute will include the addition of a vascular hybrid surgical suite that will combine X-ray imaging and surgery capabilities.



State Senator Hugh Leatherman and Rob Colones, President and CEO of McLeod Health, during the ceremony honoring McLeod for its receipt of the Quest for Quality Award.

Self Regional dedicates new Cancer Center

In April, Self Regional's new \$25 million Cancer Center opened. The project includes roughly 40,000 square feet of new construction and renovation and puts Self's medical oncology, radiation oncology, and chemotherapy services in a single location, offering patients more convenience and increased comfort. The new center also includes an outdoor healing garden with plants, flowers, and fountains that provide a soothing and relaxing environment. When weather permits, some cancer patients have the option of receiving infusion treatments in the garden.



Self Regional's new \$25 million Cancer Center offers patients more convenience and comfort.

One of the most important features of the new Cancer Center is the convenience and easier access it offers our patients," said Jim Pfeiffer, Self Regional president and CEO. "Self Regional puts patients first, and we believe it is vital they not only receive quality care, but that they do so in comfortable and friendly surroundings.

Self earns S.C. Governor's Quality Award

Self Regional earned the 2011 South Carolina Governor's Quality Award, the state's highest award for quality. The award recognizes organizations for their progress toward achieving the standards for the Malcolm Baldrige National Quality Award, the only formal recognition of performance excellence given by the President of the United States to both public and private organizations in the business, health care, education, and nonprofit sectors. The S.C. Governor's Quality Award is presented under the auspices of the South Carolina Quality Forum, an affiliate of the South Carolina Chamber of Commerce.

AnMed Health reaps many accolades in 2011

In September, AnMed Health was named one of the nation's top performers on key quality measures by The Joint Commission, the leading accreditor of U.S. health care organizations. AnMed Health was recognized based on data reported about evidence-based clinical processes that improve care for conditions including heart attack, heart failure, pneumonia, and surgical care.

Also in September, AnMed Health became one of only 94 hospitals nationwide to be recognized by the American College of Cardiology Foundation for its success in implementing a higher standard of care for heart attack patients as outlined by the American College of Cardiology/American Heart Association clinical guidelines and recommendations.

In July, AnMed Health was named one of the nation's 100 Most Wired hospitals and health care systems by *Hospitals & Health Networks* magazine. (HSSC supporting organizations Greenville Hospital System University Medical Center and Palmetto Health were also recognized.) AnMed Health uses information technology as an integral part of providing care. For example, medical records have been electronic since 2000, and the organization has 100 percent physician compliance with its computerized physician order entry system, which routes all physician orders directly to caregivers and departments, avoiding handwriting and legibility issues. Also, nurses use barcode scanning technology to ensure each patient receives the correct medicine with the proper dose and timing.

In April, AnMed Health again earned The Joint Commission's Gold Seal of Approval™ for certification as a Primary Stroke Center, a designation it has held since 2006.



AnMed Health, Self Regional recognized for high organ donation rates

The U.S. Department of Health and Human Services recognized six South Carolina hospitals, including HSSC affiliates AnMed Health and Self Regional, for their success in increasing the number of organs available for transplantation.

AnMed Health received a Silver 1 Medal for achieving a 75 percent conversion rate (three out of four medically eligible donors became donors) and a rate of 3.75 organs transplanted per donor. Only 219 hospitals across the nation had this distinction. Self received a Bronze Medal for achieving a 75 percent or greater conversion rate.



Self recognized with 2011 S.C. Governor's Quality Award.

HSSC Announces Duke Grant

HSSC lands \$11.25 million grant from The Duke Endowment

ON OCTOBER 19, 2011, leaders from HSSC, The Duke Endowment, and the state gathered in Columbia to announce significant news for the future of health care in South Carolina. HSSC had been selected to receive a major grant from The Duke Endowment totaling \$11.25 million. This funding will allow HSSC to continue driving health care innovation in the Palmetto State while boosting the economy and creating healthier citizens.

“This research grant will help us continue to improve health, health care, and health research in South Carolina,” said HSSC President and CEO Jay Moskowitz. “HSSC, through the support of The Duke Endowment, can translate research discoveries into improved delivery and care models and healthier lifestyles that will benefit not only South Carolinians, but all humanity.”



The grant is the second that The Duke Endowment has awarded to HSSC. In 2006, HSSC received \$21 million from the foundation, the largest grant for a health care initiative in the foundation's history.



Neil Williams, Chairman of the Board of Trustees, The Duke Endowment

“From the beginning, trustees of The Duke Endowment were impressed with Health Sciences South Carolina's vision and commitment from its partner organizations to share knowledge and to work together,” said Neil Williams, chairman of the Endowment's trustees. “Through this new investment, we believe South Carolina has a chance to bolster leading-edge programs and impact pressing health issues. It will help HSSC continue its vital role in making good health possible in South Carolina.”

The Duke Endowment funding will enable HSSC to build on its existing infrastructure and move in a new strategic direction focused both on research and on translating that research into better clinical care across the state.

For example, the grant will support HSSC in its efforts to continue to build and implement a health care information technology and clinical trials network in South Carolina. The central feature of this effort is a statewide clinical data warehouse (see page 26), which will compile real-time clinical data from across HSSC's collaborative hospitals. The statewide IT and clinical trials network will not only make research more efficient, but also allow medical teams to use clinical data to make evidence-based decisions, resulting in better patient care. In addition, it will help South Carolina attract clinical trials, which can benefit patients and bring economic activity to the state.

While the grant will help HSSC foster research and translate that research into better health care, it also can strengthen South Carolina's economy, leading to the development of new products, new jobs, and new industries. Additionally, with the support of the grant, HSSC can play a role in containing and reducing health care costs in South Carolina.

“In 2004, HSSC set out to develop a health care model that was unique in the United States and, through it, to improve the health of all South Carolinians. Through HSSC’s ongoing initiatives and the support of The Duke Endowment, we are realizing the promise of new treatments, methodologies, tools, and discoveries. We believe that this grant, ultimately, will translate into healthier citizens in every part of South Carolina.”

– Jay Moskowitz, PhD
HSSC President and CEO

“We are extremely grateful for the recent grant announcement by The Duke Endowment to HSSC. Improving on medical infrastructure such as a statewide clinical data warehouse will both improve the health care for our citizens and generate economic activity within the health sciences for our state.”

– Bobby Hitt
S.C. Secretary of Commerce



Bobby Hitt, S.C. Secretary of Commerce

SPOTLIGHT

HSSC Completes Quality Improvement Study in Rural Practices

Lessons learned can help adoption of QI measures statewide

IN 2011, HSSC COMPLETED a two-year study of rural practices in South Carolina, which focused on the organizational factors that lead to change and adoption of quality improvement (QI) activities.

HSSC and its partners worked with 16 rural sites to complete the study. During the project, a QI coach and a data manager spent time at each site to identify and implement small changes that could lead to larger systems changes and ultimately result in quality improvement.

“In the study, we were able to implement change processes in several organizations for the first time, we learned a great deal about how organizational characteristics can impact change adoption or rejection, and we were able to document and quantify improvements in several quality indicators,” explains Kevin Bennett, PhD, of the University of South Carolina, the study’s principal investigator.

Bennett and Amy Brock Martin, DrPH, MSPH, who oversaw the project for HSSC, believe the study has strong translational value and reveals some of the major factors that influence change in medical practices:

1. Physician participation is key. In fact, physician acceptance or rejection is often the deciding factor in whether a practice adopts QI activities.



“The information we’ve gained in this study will be valuable to share with medical practices all across South Carolina.”

– Kevin Bennett, PhD
University of South Carolina



“We believe this is the first study of its kind, not just in South Carolina but nationally, that gives us practical information about what it’s going to take to get providers to adopt new technologies and achieve meaningful use.”

– Amy Brock Martin, DrPH, MSPH

Extramural Program Officer
Health Sciences South Carolina
Deputy Director
University of South Carolina
Rural Health Research Center

2. Practices need a QI champion, someone who will raise awareness internally. The study revealed that this person is sometimes a physician, but often an administrative staff person or nurse.

3. Perception is important. Some sites see QI activities as an opportunity to improve health care delivery or patient outcomes. Others see them as burdensome. The sites that viewed QI activities as burdensome made minimal changes or quickly abandoned the process.

4. To adopt change, practices must see the need. The study revealed that without a perception that change is needed, no change will occur.

5. Intrinsic factors are more likely to drive change than external pressures. The study showed little evidence that external factors, such as parent organization pressure or policy changes, spurred a desire for improvement. Instead, change seems largely to be driven by intrinsic factors and characteristics.

Martin notes that the practical lessons learned through the study will help HSSC as it works with practices to adopt health care changes.

“We believe this is the first study of its kind, not just in South Carolina but nationally, that gives us practical information about what it’s going to take to get providers to adopt new technologies and achieve meaningful use,” Martin says.

Bennett adds that the information gained in the study will be particularly valuable as South Carolina rolls out its statewide health information exchange (SCHIE).

“As SCHIE is rolled out to the state, there are many practical challenges that you cannot anticipate in advance and so many nuances per provider,” Bennett says. “The practical lessons we’ve learned will help us get practices through the adoption curve successfully to improve health care quality. The information we’ve gained in this study will be valuable to share with medical practices all across South Carolina.”

SPOTLIGHT

Researchers Look to Engineering and Management Tools to Improve Perioperative Decision Making

IN 2009, CLEMSON UNIVERSITY RESEARCHERS Lawrence Fredendall, PhD, MBA, professor of management in the College of Business and Behavioral Science, and Kevin Taaffe, PhD, associate professor of industrial engineering in the College of Engineering and Science, along with the University of South Carolina's Nathan Huynh, PhD, assistant professor of civil engineering, received a grant from HSSC to examine hospital perioperative services (POS) from an engineering and management perspective. Specifically, Fredendall, Taaffe, and Huynh wanted to determine whether the use of engineering management tools could improve decision making among perioperative staff, which could result in a more efficient flow of patients through POS (with implications for cost reductions and patient safety improvements). The study is nearing completion and some findings are beginning to emerge.

The researchers spent time at Greenville Memorial Hospital (GMH, the main facility within the Greenville Hospital System University Medical Center) observing operations and interviewing staff within the three divisions of POS: pre-op, where patients are prepared for surgery, the operating room (OR), where patients are given anesthesia and where the actual surgery takes place, and post-op, where patients recover from anesthesia and the immediate aftermath of the surgery.

"Observing staff was crucial. Without taking the time to do this, we wouldn't have been able to understand each person's role in the process," says Taaffe.

The researchers created flow maps of the entire perioperative process, and determined which factors most commonly influence delays and interruptions to POS flow (from how long it took staff to open sterile packages in the OR to the time required to complete the patient interview in pre-op). While the researchers observed delays and disruptions due to supplies, staff resource availability, and individual tasks involving the patient, the researchers also noticed that communication between staff and departments was often an area that could be improved.

"Perioperative services is a complex system and it requires very good communication to achieve coordination so that the patient flow through the system is not interrupted," says Fredendall.



Kevin Taaffe, PhD

Associate Professor of Industrial Engineering
College of Engineering and Science
Clemson University



Nathan Huynh, PhD

Assistant Professor of
Civil Engineering
University of South Carolina



Lawrence Fredendall, PhD, MBA

Professor of Management
College of Business and Behavioral Science
Clemson University

The research team identified multiple communication and coordination issues that delayed patients during the process. The team shared their findings with the POS managers, who agreed to use the findings as an opportunity to engage all staff in improving patient flow by acknowledging the multiple sources of delays and discussing their roles in reducing those delays.

To facilitate communication with the entire POS staff, the researchers identified the eight most commonly observed communication



**Greenville Memorial Hospital
Operating Room Staff Project Team**

and coordination delays (examples include delays that occur in notifying a surgeon about a request for a pre-op visit with a patient, delays in a surgeon responding to such a request, and delays in the OR notifying pre-op to send the next patient). Led by Taaffe's doctoral students, the research team developed a computer simulation that used a year's worth of POS data supplied by GMH to randomly generate "patients" and then let the simulation predict those patients' experiences on the day of surgery. The researchers could manipulate the experiences of these simulated patients by introducing or omitting one or more of the eight communication and coordination delays.

The researchers' next step was to engage small groups of staff using the tools as a way to generate discussion. Each group included a mix of pre-op, OR, and post-op staff such as nurses, anesthesiologists, technicians, and managers. They were presented with a simulation of a patient's journey through the system that included all eight of the coordinating delay points. Staff were then asked to pick the one they thought was causing the largest interruption to efficient patient flow through POS. Fredendall and Taaffe then ran the simulation again with one or more delays removed, so that staff could see the actual effect of those delays on the process.

"The idea was that the small-group discussion itself, with all the cross-functional input, would be a learning experience for them—that they would learn from each other," says Fredendall.

Taaffe adds that the purpose of their study is not necessarily to impose solutions on staff, but to use re-engineering tools such as flow maps and simulation "to change staff awareness." Then they can "go back to their departments with a new outlook on how they contribute to delays, with a sense that everybody is important to the process, and

they won't just point fingers and say it's somebody else's issue or it just can't be fixed."

Fredendall and Taaffe find the use of simulation very promising. "Simulation allows us to run through a day in the life of a surgical operation in a minute, and then be able to talk about it. It gives POS staff a view of the entire system, versus just their own slice of it, which they'd never had before," Taaffe says.

"[Using simulation] really created 'a-ha moments'" during the group discussions, says Fredendall.

Early feedback and observations from the study indicate that exposure to simulation has a motivating effect on POS staff to reduce delays, both to make their work environment better and to help their patients.

"Overall, the simulation was a positive experience for those of us involved," says Jennifer Franklin, who manages pre-operative and post-anesthesia recovery services at GMH. "We have been working to solve many of the problems that the simulation identified as coordination/communication delays."

The research project is concluding with a smaller scale re-engineering effort at Palmetto Health Richland, being led by Huynh.

12

Centers of Economic Excellence



SmartState™
SC Centers of Economic Excellence

Driving health research through support of SmartState™ Centers, Endowed Chairs

South Carolina's visionary SmartState™ Program was created by the South Carolina legislature in 2002 and is funded through South Carolina Education Lottery proceeds. The legislation authorizes the state's three public research institutions, Clemson University, the Medical University of South Carolina, and the University of South Carolina, to use lottery funds to create Centers of Economic Excellence in research areas that will advance South Carolina's economy and create jobs. Each center is awarded from \$2 million to \$5 million in lottery funds, which must be matched on a dollar-for-dollar basis with non-state investment.

Health Sciences South Carolina and its member organizations have supported the SmartState Program since 2004. HSSC supports health care-related Centers of Economic Excellence through organizational and financial support, facilities, equipment, and talent. HSSC members have invested millions of dollars as matching funds and helped secure additional funding from industry, foundation, and federal partners. HSSC now supports 12 SmartState Centers of Economic Excellence and 17 SmartState Endowed Chairs, globally renowned scientists who lead the centers.

Brain Imaging Center

Joseph Helpern, PhD

Endowed Chair in Brain Imaging

Christopher Rorden, PhD

SmartState Endowed Chair in Neuroimaging



PARTNERS

Greenville Hospital System University Medical Center
Medical University of South Carolina
Palmetto Health (McCausland Center for Brain Imaging)
University of South Carolina
State funding: \$10 million
Private and federal funding: \$12 million



Cancer Stem Cell Biology and Therapy Center

Zihai Li, MD, PhD

Endowed Chair in Cancer Stem Cell Biology

PARTNERS

Clemson University
Medical University of South Carolina
State funding: \$5 million
Private and federal funding: \$7.8 million

Childhood Neurotherapeutics Center

John M. Henderson, PhD

Co-Director

Roger Sawyer, PhD

Co-Director

Dr. Inderjit Singh, PhD

Co-Director



PARTNERS

Greenville Hospital System
University Medical Center
Medical University of South Carolina
University of South Carolina

State funding: \$5 million

Private and federal funding: \$10.9 million

Clinical Effectiveness and Patient Safety Center

Jihad H. Obeid, MD

Endowed Chair in Biomedical Informatics

John J. Schaefer, III, MD

Lewis Blackman Endowed Chair for Patient Safety

Rita Snyder, PhD, RN

Endowed Chair in Health Informatics Quality and Safety Evaluation



PARTNERS

Clemson University
Greenville Hospital System
University Medical Center
Medical University of South Carolina

Palmetto Health
Spartanburg Regional Healthcare System
University of South Carolina

State funding: \$5 million

Private and federal funding: \$5.7 million



Health Facilities Design and Testing Center

David J. Allison, AIA

Director

PARTNERS

Clemson University
Medical University of South Carolina
Spartanburg Regional Healthcare System

State funding: \$5 million

Private and federal funding: \$912,500

Healthcare Quality Center

Jay Moskowitz, PhD

James Buchanan Duke SmartState Endowed Chair for Translational Research

Iain Sanderson, MSc, FRCA

Endowed Chair for Medical Informatics



PARTNERS

Clemson University
Greenville Hospital System
University Medical Center
Medical University of South Carolina
Palmetto Health
Spartanburg Regional Healthcare System
University of South Carolina

State funding: \$5 million

Private and federal funding: \$19.7 million

12

Centers of Economic Excellence



Medication Safety and Efficacy Center

Charles Bennett, MD, PhD
Endowed Chair in Medication Safety and Efficacy

PARTNERS

Medical University of South Carolina
University of South Carolina
State funding: \$2 million
Private and federal funding: \$1.9 million



Molecular Proteomics for Cardiovascular Disease and Prevention Center

Michael R. Zile, MD
Director

PARTNERS

Clemson University
Medical University of South Carolina
Spartanburg Regional Healthcare System
University of South Carolina
State funding: \$5 million
Private and federal funding: \$1.6 million

Regenerative Medicine Center

Martin Morad, PhD
BlueCross BlueShield of South Carolina Foundation
Endowed Chair in Cardiovascular Health

Richard E. Swaja, PhD
Endowed Chair for Regenerative Medicine

Dr. Xeujun Wen, PhD
Hansjörg Wyss Endowed Chair in
Regenerative Medicine



PARTNERS

Clemson University
Medical University of South Carolina
University of South Carolina

State funding: \$5 million
Private and federal funding: \$49.6 million



SeniorSMART® Center

Sue Levkoff, ScD, SM, MSW
Endowed Chair in Community and
Social Support – SmartHOME®

PARTNERS

Clemson University
Greenville Hospital System
University Medical Center
Medical University of South Carolina
Palmetto Health
University of South Carolina

State funding: \$5 million
Private and federal funding: \$7.2 million

HSSC participates in inaugural SmartState™ National Conference

In December, the SmartState™ Program held its inaugural national conference: Realizing a Knowledge-Based Economy. The event brought national leaders from academia, business, and government together in Charleston. Its purpose was to showcase not only the SmartState research centers and endowed chairs, but also progress and policies

related to knowledge-based economic development. The conference allowed attendees to share strategies and experiences and discover investment and research opportunities in South Carolina.

Conference sessions focused on Perspectives on Knowledge-Based Economic Development; Roles of Academia, Government,

Stroke Center

Robert J. Adams, MS, MD

Endowed Chair for Stroke

Marc Chimowitz, MD

Countess Alicia Paolozzi Endowed Chair
in Translational Neurology

Souvik Sen, MD

Endowed Chair in Clinical Stroke Research



PARTNERS

Greenville Hospital System
University Medical Center
Medical University of South Carolina

Palmetto Health

University of South Carolina

State funding: \$5 million

Private and federal funding: \$6.7 million



Technology Center to Enhance Healthful Lifestyles

Dr. Frank Treiber, PhD

Endowed Chair in Technology Applications to
Prevent and Manage Disease and Reduce Risk

PARTNERS

Medical University of South Carolina

University of South Carolina

State funding: \$3 million

Private and federal funding: \$12.7 million

Totals through June 30, 2011

HERE'S A CLOSER LOOK at a few recent accomplishments of the HSSC-supported SmartState™ Centers:

- The Regenerative Medicine Center established the MedTransTech Program, a partnership among health care delivery organizations, academia, and industry to accelerate the commercialization of research advances.
- At the Clinical Effectiveness and Patient Safety Center, Healthcare Simulation South Carolina has grown to include 8 collaborative members and 22 affiliate members throughout South Carolina.
- At the Molecular Proteomics in Cardiovascular Disease and Prevention Center, scientists have identified a new class of biomarkers to detect heart failure indicators called micro-RNAs that have diagnostic, prognostic, and therapeutic importance.
- The Stroke Center received Joint Commission certification as a Primary Stroke Center at the University of South Carolina.

Additionally, this center added six new telemedicine sites (to the eight already in place) where patients in rural areas of South Carolina now have access to stroke specialists.

- The Medication Safety and Efficacy Center was selected as the lead subcontractor for a \$10 million master contract awarded to the Eastern Research Group (ERG) by the FDA's Center for Drug Evaluation Research (CDER) to help CDER improve its operations and analytic capabilities. The other co-awardee of the grant is IBM.
- The Healthcare Quality Center has provided instrumental support to the Center for Information Technology Implementation Assistance (CITIA-SC) program, which is helping S.C. primary care practices adopt electronic health records.
- The SeniorSMART® Center launched startup company Smart Innovations, LLC, to help bring innovations to market. The center's intellectual property and products include a fall detection device and components of a driver simulator.

and Industry; and Expectations and Challenges. The event featured representatives from many different sectors and organizations, including General Electric, Michelin, the Federal Reserve Bank of Chicago, Harvard University, the National Center for Manufacturing Sciences, the American Association for the Advancement of Science, the American Medical Association, the U.S. Navy, and the U.S. Department of Commerce. The Consulate General of Israel to the Southeast, Opher

Aviran, spoke on the opening day of the conference. Peter Beattie, the former premier of Queensland, Australia, who is now an advisor in residence at Clemson, closed the conference.

Participating in the conference and in the SmartState Program are among the ways HSSC is supporting the use of health sciences to advance South Carolina's economy.

A CONVERSATION WITH **NEIL WILLIAMS**, Chairman of the Board of Trustees, The Duke Endowment

IN OCTOBER 2011, HSSC ANNOUNCED that it had received an \$11.25 million grant from The Duke Endowment to support the organization's continued efforts to improve health, health care, and health research in South Carolina. The Duke Endowment, based in Charlotte, has provided more than \$2.8 billion in grants since its inception in 1924, focusing on four program areas in North and South Carolina: higher education, health care, rural churches, and child care.

Below, Chairman Neil Williams explains more about The Duke Endowment's investments in HSSC.

Q. Please tell us a little about the vision of The Duke Endowment.

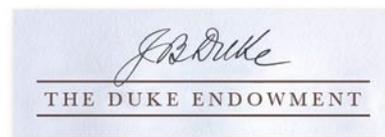
A. When James B. Duke created The Duke Endowment in 1924, his vision was "to make provisions, in some measure, for the needs of mankind along physical, mental and spiritual lines." Health care is one of four areas in which the Endowment focuses its grantmaking in North and South Carolina.

The field, of course, is much different today than it was in 1924. Advancements in medicine and medical education are allowing people to live longer and better lives. And because of the complexities of modern care, effective collaboration is more important than ever.

Q. Why has The Duke Endowment chosen to invest in HSSC?

A. In its support of health care in North and South Carolina, The Duke Endowment targets successful organizations and programs where lasting improvements are the result of collaborative and innovative strategies.

HSSC is truly something innovative and collaborative. Established in 2004, it includes the state's major academic institutions and health care systems with a common goal of improving health care and the health of every South Carolinian.



“From the beginning, trustees of The Duke Endowment were impressed with HSSC’s vision and commitment from the partner organizations to share knowledge and to work together.”

– Neil Williams
Chairman of the Board of Trustees,
The Duke Endowment



PHOTOGRAPH BY THE COLUMBIA REGIONAL BUSINESS REPORT

Neil Williams, Chairman of the Board of Trustees, The Duke Endowment and Jay Moskowitz, PhD, President & CEO of Health Sciences South Carolina

Q. Last fall's \$11.25 million grant was not the first time that The Duke Endowment invested in HSSC, correct?

A. Correct. Five years ago, we awarded a \$21 million grant to HSSC to support research in clinical effectiveness, patient safety, and health care quality.

At the time, the historic grant was the largest award ever made by The Duke Endowment's Health Care program area. It helped establish the Center for Healthcare Quality, and helped develop the infrastructure needed to advance research and clinical practice.

Q. What about HSSC appeals to your board of trustees?

A. From the beginning, trustees of The Duke Endowment were impressed with HSSC's vision and commitment from the partner organizations to share knowledge and to work together. The magnitude of the HSSC plan, the spirit of cooperation, and the true potential to bring about positive change for all South Carolinians inspired us.

Our grant in 2006 was a vote of confidence for South Carolina institutions and leaders. We recognized the opportunity for the state to lead the nation in developing new and improved models of health care.

Q. You have called the most recent grant a "significant vote of support," why?

A. Yes, we see Jay Moskowitz, PhD, as a national leader in biomedical research.

This new award will support the South Carolina Center for Healthcare Quality and build on established programs and infrastructure. Through this new investment, we believe South Carolina has a chance to bolster leading-edge programs and impact pressing health issues. Most of all, it will help HSSC continue its vital role in making good health possible in South Carolina.

MAJOR INITIATIVE

ONE

Centerpiece of HSSC's statewide IT infrastructure—the Clinical Data Warehouse—continues to take shape



Iain Sanderson, MSc, FRCA, HSSC's Chief Medical Information Officer, is leading efforts to develop a statewide health informatics infrastructure. The clinical data warehouse is a central part of this infrastructure.

AS HSSC SHIFTS TOWARD a more implementation-centered approach to improving patient care and population health, the organization is making tremendous progress in establishing a complex and powerful biomedical informatics infrastructure that will be used by health providers and researchers throughout the state. This infrastructure will allow medical teams to use clinical data to make evidence-based decisions, resulting in better patient care. It also underpins HSSC's efforts to improve health care through the use of data-driven, evidence-based research.

A central aspect of this infrastructure is the clinical data warehouse (CDW), which will accumulate real-time clinical data from across HSSC's collaborative hospitals. It will also combine an individual's medical records from multiple hospitals in a single database. The CDW comprises a range of components, each of which will play a crucial role in managing, organizing, and providing useful access to the large amount of patient data generated by HSSC's hospitals. This amassed patient data—and its potential to

be used for analysis—is “what makes our ability to add value to patient care so powerful,” says HSSC's Chief Medical Information Officer Iain Sanderson.

Inside the CDW

The first component of the CDW is a “message engine,” which manages streams of health care data as they are sent to the CDW in real time from all of HSSC's collaborative hospitals. For example, when a patient is admitted to a hospital, that event is sent as a message to the CDW, which then incorporates that message as a piece of data within the CDW—one of many thousands of messages that are generated by HSSC's hospitals every hour.

The next component of the CDW is the enterprise master patient index (EMPI), which assigns a unique identifier to each patient who has data in the CDW, and ensures that each patient is accurately identified even if some of his or her personal information has changed since a previous hospital visit.

“Perhaps you got married, and your name changed,” says Sanderson. “But the system will know from the

POLICY STEERING COMMITTEE

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Clemson University

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Greenville Hospital System
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5 Prakash Nagarkatti, PhD

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6 Jim Raymond, MD

Sr. VP, Quality, Medical Education & Research
Palmetto Health

7 Mike Tillirson, DO

Executive VP and Chief Medical Officer
AnMed Health

8 Greg Mappin, MD

VP, Medical Affairs
Self Regional Healthcare

9 Etta Pisano, MD

VP, Medical Affairs
Dean, College of Medicine
Medical University of South Carolina

10 Donna Isgett, RN

VP, Clinical Effectiveness
McLeod Health

fact that you're at the same address, or you have the same social security number, and that your first name is the same, that you are one and the same person, and not some other person."

The EPMI uses sophisticated algorithms to correctly identify patients who could potentially be confused with others, such as twins or people who have the same name as a parent.

"Keeping a unique identifier for every individual in our system is essential if we're going to have the best possible patient registry with the best possible data for research or patient care. We have to know who's who," says Sanderson.

Once a piece of data has traveled through those first two components of the CDW, it gets loaded into a "Data Trust," which is the part of the CDW where all the clinical data is stored. Data from the Data Trust can then be "outputted" in one or more "data marts," which are specialized views or subsets of data in the Data Trust. One of those subsets is called i2b2, or Informatics for Integrating Biology and the Bedside. It's a specialized data mart that supports research discovery and hypothesis building. HSSC has adapted i2b2 from its home institution at Partners Healthcare in Boston, where it is the cornerstone of hundreds of millions of dollars of sponsored research per year.

Accessing the data for research through i2b2

If a researcher wanted to access data on a group of patients to perform a study, he or she would use the i2b2 web application. Sanderson refers to the i2b2 application as a "front door" to the CDW that makes it easier for researchers to sort through the immense store of data contained in the CDW so that they can make meaningful use of it.

Specifically, a researcher uses the i2b2 technology to browse

through the i2b2 data mart, searching for the number of diabetics under the age of 16 in the Upstate of South Carolina, for example. The information in the i2b2 data mart has been scrubbed of any identifying information on individual patients, to protect their privacy.

Final agreements still being worked out

Back in early 2010, HSSC's hospitals signed a memorandum of understanding agreeing to feed their data into the CDW, but the parties are still working out precisely how health professionals and researchers will be allowed to make use of that data, which for now is simply being stored, but not accessed. That's where a data collaboration agreement (DCA) will come into play. Simply put, the DCA describes how HSSC's otherwise competing hospitals and institutions work together with the CDW. It determines the ground rules for accessing data and issues such as the admission of new members, or the retention of data if a member leaves, for example.

There are also many complicated issues surrounding the use of patient data for research involving federal regulations, patients' rights, intellectual property, liability, data access, and so on. These issues must be addressed by the federally regulated Institutional Review Boards (IRBs) at each of HSSC's member institutions, which have to be convinced that HSSC's intended use of the data and its process for research use do not put patients' personal information at risk.

The good news is that all the IRBs of HSSC's institutions have now approved the use of the CDW for research. "It's a huge vote of confidence in our vision, methods, and staff," says Sanderson.



A CONVERSATION WITH **FRANK TREIBER, PhD** and **STEVEN BLAIR, PED**

SmartState™ Endowed Chair in the Technology Applications Center for Healthful Lifestyles (TACHL), Medical University of South Carolina

Internationally recognized researcher, University of South Carolina Arnold School of Public Health

CHRONIC ILLNESSES such as type 2 diabetes, stroke, heart disease, and cancer are all too common causes of disability and mortality in the United States. Unhealthy behaviors such as sedentary lifestyles and poor diets, along with the obesity that often results, are major reasons why people develop these chronic health problems.

With the goal of developing new technologies that will help people make healthier lifestyle choices, HSSC has provided support for the Technology Applications Center for Healthful Lifestyles (TACHL). The center, created through South Carolina's SmartState Program in 2009, is a partnership between the University of South Carolina and the Medical University of South Carolina.



Frank Treiber, PhD



Steven Blair, PED

Q. Please tell us about a few of the technologies you and your team at the TACHL are developing.

Treiber: We are working with several investigators to utilize mobile technologies (Bluetooth-enabled medical devices with smart phones as signal transfer devices, electronic medication reminder units with built-in modems) to remotely monitor medication adherence and biomarkers in several groups of clinical patients with high levels of non-adherence to medication regimens. This includes recent kidney transplant recipients who have hypertension and/or type 2 diabetes, pediatric HIV patients with a history of medication non-adherence, and ethnic minorities from rural areas with uncontrolled hypertension due to lack of consistent medication adherence. We also are working with individuals in an outpatient alcohol detoxification program using remote monitoring of blood pressure/heart rate and self reporting of [patients'] physical and affective state via smart phone videoconferencing.

Another project involves development of a smart phone application for a stress-reduction program involving breathing mediation. On this effort, we have worked with Clemson University bioengineers and an S.C.-based Android app company, Reaction Apps. Initial findings indicate high adherence rates and significant reductions in resting and ambulatory blood pressure among prehypertensive adults.

The efforts underway at the HSSC-supported TACHL are helping those with chronic diseases live longer, healthier lives.

Q. How can these types of technologies help people lead healthier lives?

Blair: To solve our health care crisis in the United States, we have to get substantially more people practicing healthful lifestyles. It will not be possible to deliver face-to-face interventions to the millions of people who need to improve their lifestyles. Therefore, we have to develop cost-effective behavioral interventions that can be widely disseminated.

Treiber: In particular, the use of these technologies among individuals who live in rural regions or who are unable to easily get to their doctors for checkups will increase the receipt of timely health care delivery. Collectively, these efforts will result in increased longevity and quality of life. There also will be eventual decreases in health care costs due to reduced frequency of emergency room visits and hospitalizations. Additionally, prevention-based technology efforts can help slow down or prevent the onset of chronic diseases.

“If more people will be physically active, eat a healthful diet, not use tobacco, manage stress, and practice other healthful lifestyles, we can dramatically reduce prevalence of major chronic disease.”

– Steven Blair, PED University of South Carolina, Arnold School of Public Health

Q. Can you please discuss the commercial potential of any products being developed at the TACHL?

Treiber: Mobile health technology is a rapidly expanding enterprise and products that are user-friendly have strong commercial potential. For example, there are well over 5,000 health- and lifestyle-related applications [in] the Android and Apple app marketplaces. Effective apps and the medical device hardware involved in some of them are likely to be licensed and eventually purchased in large scale by consumers.

South Carolina has more than its share of citizens with chronic illnesses. The state ranks 6th nationally in obesity and 7th in prevalence of diabetes, according to the Centers for Disease Control and Prevention.

Q. How can your work assist health care providers?

Blair: Our goal is to develop programs that are easy for providers to use and to which they can refer their patients [with chronic diseases] to deliver more timely and efficient health care management.

Treiber: One example is mobile health applications involving smart phones, iPads, computer tablets, and Bluetooth-enabled medical devices. Also, if agreeable to the patient, these technologies could alert providers when patients' biomarkers are out of desired ranges or when medication changes or office visits are needed. For prevention programs, providers could receive monthly updates of patients' progress in reaching desired weights, [patients'] smoking cessation status, and other important indicators of risk status.

Q. How do you see the work of the TACHL fostering economic growth in South Carolina?

Blair: The center will develop effective behavioral interventions and these will lead to commercial development. These activities will require high-tech workers.

Treiber: As we develop these new interventions and products and as they are shown to be affordable and effective . . . we likely will see the development and recruitment of companies involved in various aspects of software and systems technology development and program delivery. We see a diversity of new jobs resulting including ones for software and hardware developers, technology-based education training, call center clinical intervention specialists, and publishing and advertising positions, among other high-tech, business-related occupations.

MAJOR INITIATIVE **2** TWO

HSSC-led electronic health records adoption ahead of schedule in South Carolina

AS PHYSICIAN OFFICES ACROSS THE NATION adopt electronic health record systems to comply with federal standards, South Carolina is ahead of the curve thanks to the success of an HSSC initiative.

That initiative is a regional extension center program called CITIA-SC (short for the Center for Information Technology Implementation Assistance in South Carolina). CITIA-SC is helping the state's primary care practices select certified electronic health records (EHR) products, implement the systems, and train staff so that each practice and its patients get the maximum benefit in terms of improved care, safety, and efficiency.

CITIA-SC is funded by a \$6.4 million grant HSSC received from the U.S. Department of Health and Human Services. The grant comes from federal funds allocated to lay the groundwork for a nationwide electronic health information system.

HSSC spearheads CITIA-SC; its partners in the effort include the Carolinas Center for Medical Excellence, the S.C. Office of Rural Health,



South Carolina is a leader nationally in electronic health records adoption. Health care providers throughout state are rapidly making the transition from paper-based records to EHR.

the S.C. Primary Health Care Association, the S.C. Hospital Association, the S.C. Office of Research and Statistics, Clemson University, the S.C. Department of Health and Human Services, AccessHealth SC, the S.C. Area Health Education Consortium, the S.C. Technical College System, and numerous physician and health systems.

CITIA | Center for
SOUTH CAROLINA | Information Technology
Implementation Assistance

So far, CITIA-SC's work has helped South Carolina make great strides in EHR adoption based on standards defined by the Office of the National Coordinator of Health Information Technology.

"South Carolina is a leader nationally in EHR adoption among physicians," explains HSSC Senior Program Manager Todd Thornburg, PhD. "We are 18 months into our efforts and already are approaching our two-year goals. We continue to be ahead of schedule."

Thornburg notes that CITIA-SC's work focuses not only on encouraging physicians to adopt EHRs, but also on meaningful use. The term "meaningful use" indicates that a physician is using health IT to improve the quality and safety of health services, deliver care in an efficient manner, and reduce health disparities. Encouraging meaningful use of EHRs will be a primary focus of CITIA-SC's work in the months ahead.

Because South Carolina is a leader in EHR adoption, physicians in the state also are reaping financial benefits at an accelerated pace. Physicians and other eligible professionals can qualify for incentive payments through Medicare and Medicaid, which can help offset the investment of moving to an EHR system. As of



James Atkison, MD, is a satisfied participant in the CITIA-SC program. Dr. Atkison is shown here with Maryanne Atkison, RN (center), and Lynn Hudson, CITIA-SC Consultant from the Carolinas Center for Medical Excellence.

November 2011, \$4.6 million has been paid out by the S.C. Department of Health and Human Services to providers registered with the CITIA-SC program.

“The tide is turning,” says HSSC President and CEO Jay Moskowitz, PhD. “As more and more physicians in South Carolina put an electronic framework in place, they are realizing long-term improvements in quality of care, patient safety, efficiency, and health costs. Part of our goal with HSSC’s CITIA-SC initiative is to make the transition from paper-based medical records to EHRs as seamless as possible in our state. We are extremely pleased with the early success.”

In addition to its work with physicians, CITIA-SC also is helping develop health IT solutions that will benefit all of South Carolina. As part of one recent project, CITIA-SC has contracted with Halfpenny, a technology company headquartered near Philadelphia. Together, the groups are working to develop a solution, known as a Lab Hub, that will connect labs across the state with physician EHRs. Since about 60 to 70 percent of all critical patient care decisions are affected by lab results, the Lab Hub can have a major impact on patient care in South Carolina.

SPOTLIGHT:

Sumter clinic adopts EHR with help of CITIA-SC

Through its CITIA-SC initiative, HSSC is helping medical practices smoothly transition to electronic health records (EHR) so they can deliver better patient care. One practice that has benefitted is run by James A. Atkison, MD, whose clinic transitioned to an EHR system in August 2011.

Practice manager Maryanne Atkison, RN, explains that although she and her staff believed the use of EHR would be good for patients and ultimately good for the practice, they initially felt overwhelmed by the transition. Help from CITIA-SC was invaluable. The practice’s CITIA consultant, Lynn Hudson with the Carolinas Center for Medical Excellence, made several visits and helped staff at the practice understand terminology and federal guidelines and helped them with the process of vendor selection.

“When we interviewed software vendors, our CITIA consultant was there. She asked questions we didn’t know to ask. She helped us in pointing out meaningful use criteria and addressing issues like security,” Maryanne Atkison explains. “Most of all, she gave us positive feedback and encouraged us that we could be successful.”

“We are encouraging other practices to work with CITIA-SC,” says James Atkison. “CITIA has provided a level of service that has gone far beyond our expectations.”

A CONVERSATION WITH **PETER EMERSON, CEO, Recombinant Data Corp.**

AS HSSC WORKS TO BUILD A STATEWIDE health information technology infrastructure, one of its key partners has been Boston-based Recombinant Data Corp. Recombinant is known nationally for its expertise in the field of health care data warehousing and large-scale research systems.

Recombinant has worked with HSSC to create a single “Data Trust,” which holds patient data from across South Carolina. In addition, Recombinant has teamed with HSSC to win a \$4.8 million Grand Opportunity Grant from the National Library of Medicine of the National Institutes of Health to develop a research collaboration tool, as well as to create a “rules of the road” standard for how health data is treated. This standard addresses everything from patient privacy protections to how data from one hospital system can be used by another.

Below, Recombinant CEO Peter Emerson offers his perspective on HSSC’s efforts and how they are unique.



Peter Emerson
CEO, Recombinant Data Corp.

Q. Tell us about the progress you’ve witnessed in the last two years as Recombinant has partnered with HSSC.

Emerson: As a result of the work to date, HSSC has created the foundation for a very beneficial data platform that can be leveraged not only for research, but also for improving the quality of patient care across the state. HSSC has established the framework to bring data from the four largest health systems in South Carolina into a single data repository in near real-time. The heavy lifting that has largely gone on behind the scenes will soon become visible.

Q. How have you seen HSSC mature in the field during the last two years?

Emerson: HSSC has been very creative in thinking beyond core research applications by exploring multiple secondary uses of clinical data. For example, there are many useful questions that can be answered about how patients are being cared for when comparing practice patterns from different parts of the state. This type of benchmarking allows physicians to see how their performance compares to others and informs preventive care strategies. Similarly, HSSC made a significant investment early on in building a master patient index system. This component is critical for running a near-real-time data warehouse because you must be able to reconcile similar patient



“HSSC has created the foundation for a very beneficial data platform that can be leveraged not only for research, but also for improving the quality of patient care across the state.”

– Peter Emerson CEO, Recombinant Data Corp.

names and identifiers in order not to mix up patient data. Over time, however, it has become clear that HSSC could also use its master patient index platform as a Health Information Exchange (HIE) to ensure that regardless of where a patient is seen in South Carolina, his or her medical records could be available to the treating physician. This capability improves patient safety and lowers cost by reducing redundant tests and procedures.

Q. How is HSSC’s system unique?

Emerson: First, HSSC is aggregating patient data in a single Data Trust. This creates a very powerful asset for multiple secondary uses. There are a number of other academic medical centers that have agreed to “federate” their data, which means allowing others to ask questions of the data, but not physically have the data. This sounds good—and it’s a lot easier to do than what HSSC has accomplished—but it doesn’t produce the powerful results you get when putting the data together. The other very powerful aspect of HSSC’s platform is the near-real-time capability.

Q. What will be needed to sustain the system?

Emerson: Recently, HSSC has been putting renewed effort into questions of sustainability, and thinking about offering technology and expertise on a utility model. This is timely because hospital and provider systems are under tremendous pressure to lower their costs and improve the quality of health care as insurance companies push the risk of expensive outcomes back onto the physicians. There’s now a much greater need for health care analytics to identify high-risk patients and provide more preventive care. HSSC can help its members

accomplish this if they embrace HSSC’s role and capabilities.

There’s also a basic savings model as it relates to IT investments, because HSSC members can pool their resources and build certain things jointly that they share, rather than everyone building overlapping tools. HSSC’s members must continue to work together to find these efficiencies. The fact that they’ve done as much as they have already is remarkable—especially compared with others around the country who we talk to who marvel at what South Carolina has done.

Q. What is your vision for what the system can become?

Emerson: HSSC has created a uniquely powerful platform for statewide medical research. The primary beneficiary will be the patients of South Carolina, but there’s likely to be a secondary benefit in terms of economic development. HSSC’s investments in the statewide data platform will fuel large research grants and will create jobs. Ultimately, pharmaceutical companies will be attracted to sponsor statewide clinical trials, creating further growth around the data infrastructure.

Q. Where do you see the system five years from now?

Emerson: I expect that HSSC will be leading multi-site clinical trials and large research grants, but I’m also hopeful that members will have taken advantage of the real-time clinical decision support capabilities being created today. This holds great promise for the future state of medical care in South Carolina.

Year in Review 2011

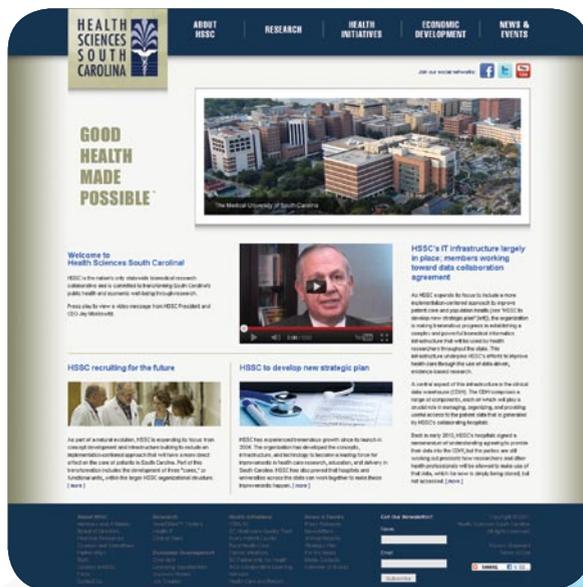
HSSC launches new website

HSSC was very excited to complete an overhaul of www.healthsciencessc.org at the end of 2011. The new site is more engaging and informative, with better organization and navigation.

A simplified menu system and a cleaner page structure are among the changes that make the site more appealing and user-friendly.

HSSC and its members are involved in a wide range of health initiatives and research activities. The new site makes information about all these important activities more accessible.

Current feature stories on the homepage cover (1) HSSC's strategic direction initiative, (2) the latest on the statewide health informatics infrastructure, and (3) HSSC's plans to recruit new talent to make the organization even stronger.



www.healthsciencessc.org

HSSC leads delegation to BIO

In June, HSSC led a team of South Carolinians to Washington, D.C., to represent the state's growing biosciences industry and business-friendly environment at the 2011 BIO International Convention. BIO is the largest and most prominent gathering of the biotech industry. During the four-day event, South Carolina's delegation had the opportunity to interact with a "who's who" of bioscience leaders from across the globe, including company executives, researchers, investors, and service providers.

HSSC's role in leading the delegation fit perfectly with the organization's work to promote health sciences-related economic development within the state.

Other participating organizations included the S.C. Department of Commerce, SC BIO, the SmartState™ Program, SCLaunch!, the Medical University of South Carolina, USC Innovista, the Savannah River National Lab, Greenwood Partnership Alliance, Innovate Anderson, Upstate SC Alliance, Immunologix, and NXT Health. The goals of the delegation were to boost the profile of South Carolina within the biotech industry, to establish and nurture relationships with industry leaders, and to identify opportunities for the state, such as attracting the expansion or relocation of a biotech company or other collaborative opportunities.



"The BIO International Show is the largest convention of its kind. The South Carolina collaborative benefitted greatly from its participation in the show. From startup to multinational conglomerate, BIO offers something for everyone."

Michael Randall, PhD, MBA
Chief Economic Officer,
Health Sciences South Carolina

HSSC builds global relationships

In 2011, HSSC worked to establish and strengthen relationships with international entities from China, Israel, and Poland.

In October, HSSC President and CEO Jay Moskowitz, PhD, was solicited to apply for a 2012 foreign expert position with the Tianjin Bureau of Public Health, the People's Republic of China.

In November, two endowed chairs from HSSC-supported SmartState™ Centers were among 26 state business, university, and economic development leaders who traveled to Tel Aviv to pursue economic, trade, and research opportunities with counterparts in that country. Charles Bennett, MD, PhD, of the Center in Medication Safety and Efficacy, and Sue Levkoff, ScD, SM, MSW, of the SeniorSmart™ Center, took part in the mission.

Among HSSC's more mature international relationships is an alliance with Germany-based Siemens, which is a global provider of imaging and laboratory diagnostics, therapy solutions, and medical information technology. This alliance is contributing to the development of HSSC's statewide informatics and clinical trials network.

HSSC adds new finance manager

Welcome to **Felissa Carter-Moore**, HSSC's new finance and administrative manager. Felissa directs HSSC's business activities related to grants and research groups operating within HSSC and provides fiscal, personnel, and procurement management for the organization. Felissa has more than 16 years of administrative, human resources, finance, and grant management experience at the University of South Carolina. She has a bachelor's degree in business administration from USC.



Year in Review 2011

Interns gain health policy, outreach experience

HSSC was fortunate to host two college-level interns for six weeks during the summer of 2011. Eleasa Van Slooten is a junior at the University of South Carolina (USC) who is pursuing a public health degree with an emphasis on health policy; she plans to go to medical school. Morgan Ashmore is a junior at USC who is pursuing a nursing degree. Both women want to devote their health careers to working with underserved populations.



Morgan Ashmore



Eleasa Van Slooten

During their time with HSSC, Eleasa and Morgan worked with staff to develop a National Institutes of Health grant proposal for a health care conference, and helped implement a social media plan for HSSC. They also visited a rural community health center and learned about HSSC's hospital-acquired infection prevention and patient safety efforts and how state government health policy is formed.



Social media presence grows

HSSC built its social media presence in 2011 by relaunching its Facebook page, establishing a YouTube channel, and tweeting daily about the latest news in health care and health research.

Be sure to “like” HSSC on Facebook, follow us on Twitter @HSSCtweets, and subscribe to our YouTube channel (HSSC2011) to receive the latest updates on HSSC news and activities.



In Memoriam

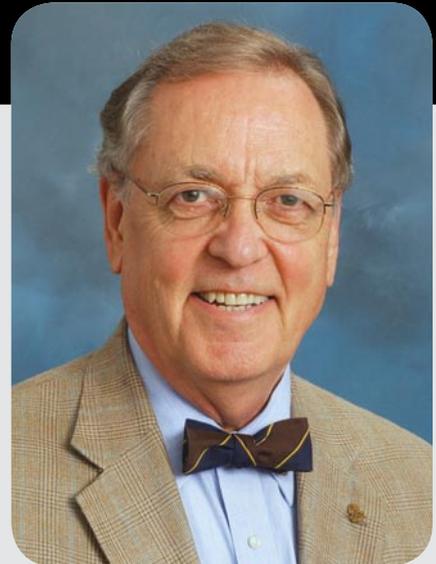
HSSC lost one of its founding board members in 2011 with the death of former University of South Carolina President Andrew Sorensen. Sorensen served as chair of HSSC's board in 2008–09.

Sorensen was president of USC from 2002 until 2008. He was previously president of the University of Alabama and held other posts at the University of Florida, Johns Hopkins Medical Institute, and the School of Public Health at the University of Massachusetts at Amherst.

"Dr. Sorensen was committed to fostering cooperation among students, faculty, and institutions. He forged partnerships with leading academic institutions and communities throughout South Carolina and, in fact, the world," said HSSC President and CEO Jay Moskowitz. "With equal resolve, he demonstrated sensitivity to national, social, legal, ethical, and economic matters."

"Dr. Sorensen never met a stranger," said Celia Hartman, executive assistant to the dean's office at USC. "He had ties with students, faculty, staff, and administrators. Up until his death, [past colleagues and associates] kept in contact with him and, like myself, will forever treasure the time spent with him."

Sorensen was serving at Ohio State University as senior vice president for development, president of the Ohio State University Foundation, and special assistant to the president for advancement at the time of his death.



Andrew Sorensen, PhD

Former President, University of South Carolina
(and member of HSSC's Board of Directors)

HSSC would like to note the passing of two other colleagues in 2011

Clay Steadman
Clemson University
General Council
(and member of HSSC's
Legal Committee)



Lindsay Cathcart
University of South Carolina
Assistant IRB Administrator
(and member of HSSC's
eIRB Committee)



LOOKING AHEAD >

> **HSSC is developing a new strategic plan to guide the organization to focus on research and analytics that support more direct improvements to patient care and population health.**

Since its launch in 2004, HSSC has developed the concepts, infrastructure, and technology to become a leading force for improvements in health care research, education, and delivery in South Carolina. HSSC has also proved that hospitals and universities across the state can work together to make these improvements happen.

Now, HSSC is in the process of developing a new strategic plan that will help steer the organization during the next five years and beyond. The plan will help guide HSSC as it strives to achieve the goals of the Institute for Healthcare Improvement's "Triple Aim" model: (1) improve population health, (2) enhance the patient experience of care, and (3) reduce health care costs.

A major part of this strategic growth effort is a re-orientation of HSSC's assets—including its talent, technology, and research data—to better align HSSC's research agenda with clinical solutions, and to ultimately ensure a more direct impact on patients in the real world.

This reorientation includes the establishment of three clinically oriented "cores" of activity:

■ **The Analytics, Statistics, and Population Science Core**

This core will provide methodological and statistical support for analyzing the complex clinical data that underpins HSSC's quality improvement research, clinical and comparative effectiveness studies, and patient safety programs.

■ **The Evidence-Based Care and Clinical Effectiveness Core**

This core will identify effective treatments, preventatives, and other health interventions (based on evidence gathered via HSSC's academic health centers and clinical trials) that should be disseminated to the wider health care community. This core will be staffed mostly by clinical providers—including physicians, nurses, pharmacists, and social workers—at our supporting institutions.

■ **The Implementation Science Core**

This core will take findings from the Evidence-Based Care and Clinical Effectiveness Core and determine

the best ways to disseminate information about more effective health interventions to doctors, nurses, and other professionals who treat patients in both urban and rural health care settings throughout South Carolina.

HSSC will, of course, also continue to build on the statewide information technology infrastructure that has been developed during the past several years. We will diligently look at IT and its relationships to clinical care and how it can be used to achieve Triple Aim goals. We will also seek to determine how HSSC's efforts with real-time data collection, data aggregation, data sharing, and analytics fit together with the missions and priorities of our supporting and partner organizations.

HSSC will continue to identify the areas in which we excel and the ways in which we can capitalize on our strengths and better support our members' research. Through the HSSC-supported SmartState Centers, we have established strengths in clinical areas such as cardiovascular disease, stroke, and diabetes; along with interventions related to readmissions, medication safety, surgical checklists, and hospital-acquired infections. We will seek additional areas in which we can enhance our members' efforts.

We will work to determine how HSSC can use its resources to better position itself for future federal, state, and non-governmental funding opportunities. We will also continue to develop a sustainability model that balances grant and foundation funding

with new revenue sources, allowing HSSC to achieve financial stability and a return on the investment that our hospitals and our other investors, such as The Duke Endowment, have made in HSSC.

HSSC will also focus on delivering more value to our supporting organizations and affiliates. During the first seven years of our existence, we have worked to establish trust, build infrastructure, and prove concepts; now we will seek to strengthen existing collaborations and deliver products and services that will provide a real benefit to our members.

HSSC plans to have the new strategic plan complete by early 2012.

We are very excited to be establishing a new balance among our discovery, development, and delivery efforts. With an increased emphasis on research related to delivery, HSSC will more efficiently move translational science from the lab to commercialization and ensure that research leads to improved patient care and safety, as well as better health and well-being for South Carolinians and ultimately, for people across the world. >





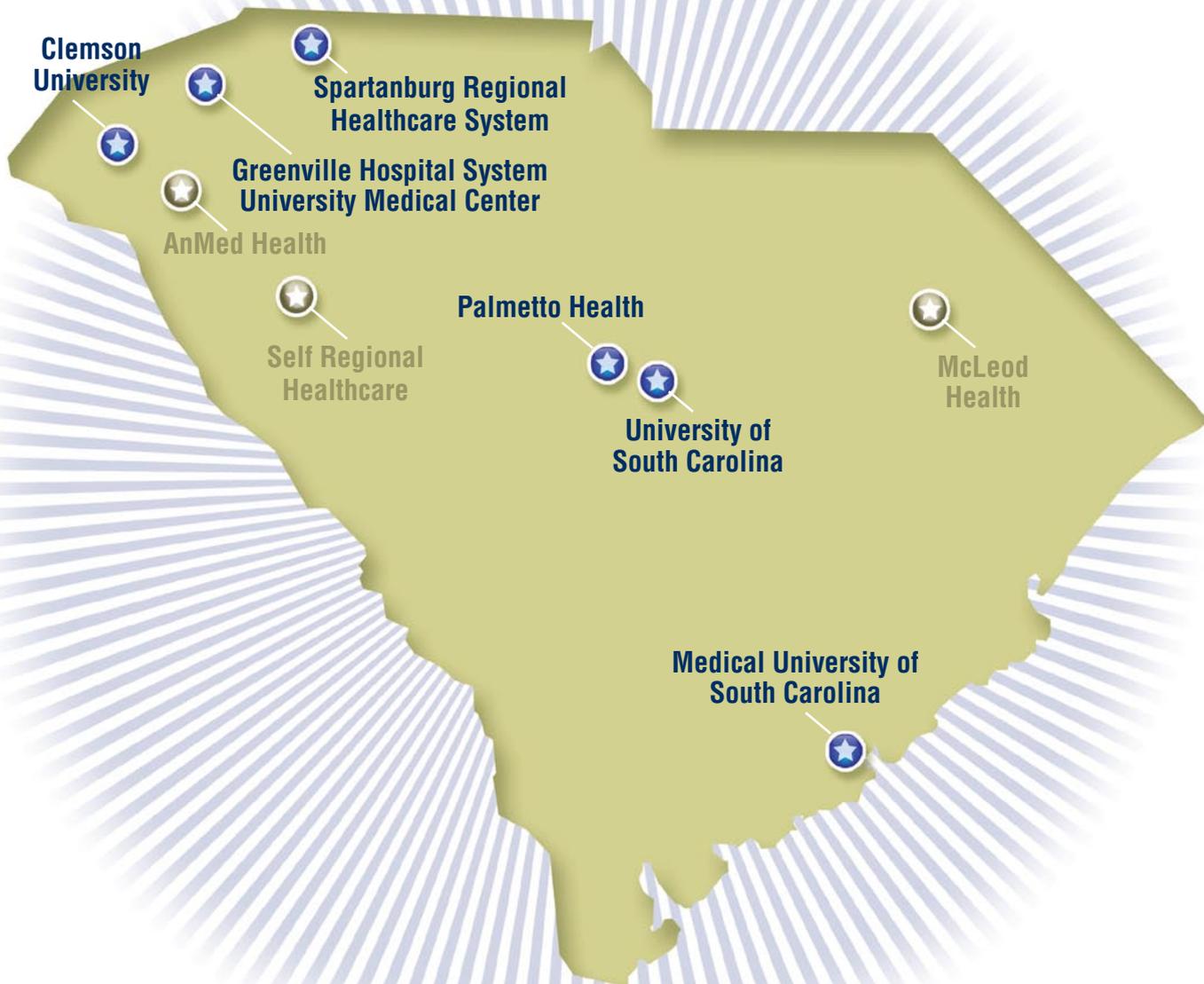
SUPPORTING ORGANIZATIONS



AFFILIATES



HSSC's SIX supporting organizations and THREE affiliates.



The addition of AnMed Health, McLeod Health and Self Regional Healthcare as affiliates in 2010 greatly expanded the geographic reach of HSSC and increased the number of people across the state who are served by an HSSC institution.



803.544.HSSC (4772)

www.healthsciencessc.org

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