Unblocking the Carotid Artery: A Collaborative Approach to Stenting

CTA Imaging

Strategic Expansion: New Institutes

InterStim® Therapy

Bariatric Surgery

Quality & Patient Safety News

Birmingham Hip Resurfacing™

Sports Medicine

Geriatric Care

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Aiming High

This issue marks the retirement of John Sanders, M.D., editor-in-chief of Vital Signs since 2001. It is with great respect for the excellent precedent set by him that I assume his role. Dr. Sanders’ long-standing commitment to quality will remain an example for us all. His leadership will be missed.

This issue also is the first to appear since the Greenville Hospital System University Medical Center (GHS) Board of Trustees approved our system’s strategic plan, which sets ambitious goals for several years that focus on three strategic aspirations: continue as the community’s healthcare provider of choice, continue to have Greenville Memorial Hospital serve as the region’s tertiary care hospital and become the state’s leading university medical center in healthcare delivery.

Success will require disciplined implementation of numerous broad-based tactics. We must expand access to services through growth and regionalization; hone our expertise at Total Health care by progressive involvement in ambulatory care and prevention, wellness and disease management, while maintaining stellar inpatient care for routine and complex illnesses; and continue to develop destination specialty centers through high-volume specialty programs enhanced by clinically-oriented research and education. Fortunately, we are blessed with state-of-the-art facilities, excellent nursing care, outstanding staff and strong university partners, particularly as a teaching hospital of the University of South Carolina Division of Health Sciences.

We are equally fortunate to have a Medical Staff dedicated to improving our services. Inside you will find a sample of the kind of expertise offered. In partnership with our physicians, GHS will continue to raise the bar for our communities.

Jerry R. Youkey
Editor-in-Chief

Jerry Youkey, M.D., is GHS Vice President of Medical Services and Dean of Academic Services.
Five interventionalists from Endovascular Surgery, Radiology and Cardiology have joined forces to form the Carotid Stenting Service at Greenville Memorial Hospital (GMH) to ensure optimal patient care while centralizing research and outcomes data. The service, formed about a year ago, builds on years of participation by Greenville Hospital System (GHS) University Medical Group in carotid stenting clinical trials and application of the technique to patient care.

Carotid stenting is one of the few medical procedures requiring review by a physician other than the proceduralist to document its success. GHS carotid stent protocols require an independent neurologist to conduct a pre- and post-procedure evaluation of each patient. Success is determined not only by avoidance of complications, such as stroke, but also on the long-term ability of the technique to prevent stroke.

“Carotid stenting has an excellent record of stroke prevention,” said Bruce Gray, D.O., director of GHS Endovascular Services. “We have had only one patient suffer a stroke during the seven years we have been performing this procedure and following the patients here at GMH.”

The Carotid Stenting Procedure
A proceduralist inserts a catheter in the groin and advances it to the carotid artery. Dye is injected to visualize the lesion. One of three types of umbrella filter devices is positioned upstream from the blockage to trap debris. The narrowed artery is opened with a balloon, and a stent is inserted to hold the artery open and prevent recoil. The catheter and captured filter are then withdrawn.
The procedure takes about 45 minutes and is followed with an ultrasound to ensure the artery is open and blood flow has been normalized.

“Stents in this location do superbly well – they re-narrow in less than five percent of patients,” said Dr. Gray, noting that since GMH began performing carotid stenting in 2001, it has not had to reopen any stent because of scar tissue formation or re-narrowing.

Who Qualifies for Carotid Stenting?
The FDA restricts carotid stenting to patients who meet any one of the following criteria:

- Are at high risk for surgery
- Have experienced a transient ischemic attack or stroke
- Have a minimum of 70 percent stenosis

Most patients with significant stenosis who do not fit these criteria undergo carotid endarterectomy, an open surgical procedure. At GMH, the results of carotid endarterectomy are equivalent to the best reported national outcomes.

Post-market investigational studies available at GMH allow carotid stenting for patients who do not meet current Food and Drug Administration criteria but who may benefit from this minimally invasive procedure. Medicare covers patients enrolled in these studies. GMH is involved in four active studies, but has participated in nine since 2001. Patients still have access to the four trials.

Dr. Gray is the first physician in South Carolina to enroll patients in EPIC (Embolic Protection Device In Carotid Artery Stenting). This trial involves the FiberNet® Embolic Protection System from Lumen Biomedical Inc., which is designed to capture particles dislodged during the procedure. Particles are trapped in a high-tech weave of 4DG™ fibers developed by Clemson University’s biomedical engineering program, which has collaborated with the vascular program on research since 1994.

“It is important for physicians and patients to understand that we are working with investigational, not experimental, devices,” Dr. Gray emphasized. “We know these devices work, and we are simply evaluating how they compare to national standards. All outcomes are reviewed by other physicians and are available to everyone participating in the study. Final data are published and presented at national meetings.”

Because of the systemic nature of cardiovascular disease, every patient coming to GMH for coronary artery bypass surgery is screened for carotid disease. Members of the Carotid Stenting Service work with other specialists in the hospital to identify all patients at increased risk for stroke and ensure they receive appropriate screening and treatment.

For more information on carotid stenting or to refer a patient, call Dr. Gray at (864) 454-2801.

Bruce Gray, D.O., is the program director for Vascular Medicine at GHS and director of Endovascular Services.

Small Incisions, Big Benefits
A comprehensive endovascular program at GHS University Medical Group enables a large percentage of patients to receive minimally invasive treatment for complex vascular disorders.

“The endovascular procedures available here cover the gamut of vascular care,” said Dr. Gray. “We treat peripheral arterial disease (blockages and aneurysms) in the neck, chest, abdomen and legs with minimally invasive techniques using laser, atherectomy, new thrombolytic drugs, the latest stents, wires and balloons. And because we have an active research program, we are able to work with new techniques and technology two or three years before it becomes routinely available.”

An example is the stent grafting procedure used for repair of abdominal aortic aneurysm (AAA). Formerly, this surgery required a large abdominal incision, general anesthesia and two-month recovery. Now it requires only an inch-long incision in each groin and takes 60 minutes to perform under epidural anesthesia. Patients are hospitalized overnight for observation on a regular nursing floor, can eat a regular diet that evening and may ambulate as desired.

In terms of morbidity and mortality, results from the endovascular approach often are dramatically different than those from open surgery.

“We have performed about 1,000 of these procedures since 1996, with only two patients requiring conversion to open surgery,” said Dr. Gray. “The procedure rarely requires transfusion of blood products, infection is prevented with good sterile technique and antibiotics, and lung complications are avoided by using epidural anesthesia. These minimally invasive procedures for AAA treatment save lives and free patients of the worry of their aneurysm without undergoing a big operation. All patients with an AAA should be considered for this treatment.”

For more information, call (864) 454-2801.
**Cardiovascular CTA: Powerful Imagery**

*Computerized tomographic angiography (CTA), also called CT angiography, is a powerful diagnostic tool for cardiovascular disease, thanks to ever-faster CT scanners and powerful 3-D modeling software.*

Greenville Hospital System University Medical Center (GHS) has three Brilliance 64-slice high-speed CT scanners from Philips Medical Systems.

“A 64-slice scanner offers unparalleled images and provides more information than any other imaging modality, even intra-arterial angiography,” said GHS vascular surgeon Christopher Carsten III, M.D. “It’s a very powerful tool.”

The scanner circles rapidly around the patient, capturing images within seconds. “Every pixel in the body is imaged the same in every dimension, so there is no distortion,” said radiologist Michael Devane, M.D., of Greenville Radiology PA.

**What Is CTA?**

Patients undergoing CTA receive an injection of contrast material into their vessels just before receiving a scan. Then the scan captures images of the patient’s vascular anatomy and bone structures.

CTA is less invasive than traditional angiography because it does not require a catheter to be threaded into a patient’s artery to inject contrast material beforehand. On the flip side, CTA is purely a diagnostic tool, whereas traditional angiography enables physicians to intervene immediately to address some problems.

In accordance with medical best practices, physicians should use caution before ordering a CTA or any test that involves radiation exposure.

**Evolving Use in Cardiac Patients**

CTA is still evolving as a diagnostic tool for cardiac conditions. The speed of 64-slice scanners overrides much of the heart motion that previously blurred images on older, slower scanners.

The next generation of scanners (see page 6) may be able to capture even clearer images despite the constant motion of the heart. The radiation dose for cardiac CTA is approximately six millisieverts (mSv) to 14 mSv, and improvements in the technology aim to reduce this in the future.

The medical community is working to determine the most appropriate use of cardiac CTA. A 2007 study in the *Journal of the American College of Cardiology* found that patients with low-to-intermediate pre-test probability of coronary artery disease (CAD) were the most likely to benefit from CTA.

Dev Vaz, M.D., a cardiologist with Carolina Cardiology Consultants PA, agrees with these findings, and advocates the “ Appropriateness Criteria for Coronary CTA” published by the American College of Cardiology and American Heart Association.

“If the test shows no evidence of CAD, there is a 99 percent chance this is correct. However, if the test is positive, you may have to refer the patient for a cardiac catheterization, and that adds more use of contrast and radiation. This needs to be
Dr. Vaz said, “You don’t want to scan patients with a low pre-test probability of CAD and expose them to radiation unless you have good reason, such as suspected anomalous coronary arteries.”

In patients with equivocal stress tests, CTA is useful to confirm the absence of CAD in cases with low-to-intermediate pre-test probability of CAD. When clinical judgment leans toward CAD, Dr. Vaz said catheterization is probably the best option for the patient.

CTA reveals information frequently unattainable through invasive angiography, including the magnitude of plaque in the vessel wall, the extent of calcified vs. noncalcified plaque and the extent of positive remodeling of a vessel. Such data help cardiologists understand the patient’s disease and better predict risk for heart attacks.

In the future, CTA may facilitate stent measurements before angioplasty and also may be a tool for the evaluation of stent patency. It is a useful tool for evaluating the patency of bypass grafts in post-bypass patients for the appropriate indication and in the right clinical setting. Judgment must always be used, Dr. Vaz stressed.

A heart rate of fewer than 60 beats per minute is required for optimal image quality. Therefore, patients undergoing CTA must be able to take atrioventricular nodal blocking agents. Atrial fibrillation, premature ventricular complexes and arrhythmias are contraindications because they result in poor image quality.

“If the rate cannot be lowered far enough or the heart rate maintained at a steady pace, physicians should think twice about ordering the test,” Dr. Vaz emphasized.

Applications for Vascular Disease

Vascular physicians and surgeons are finding CTA useful in evaluating most patients and essential in preparing for endovascular aortic aneurysm repair procedures, said Dr. Carsten.

“While not replacing catheter angiography, CTA can augment it and sometimes will replace an invasive procedure,” he noted.

Dr. Carsten and his colleagues are using CTA pre- and post-operatively to scan every patient treated for abdominal aortic aneurysms. “CT angiography enables us to measure the length, diameter and angulation of blood vessels with the click of a mouse,” he said. “Because each patient is a different size, this information is needed to fit the graft before inserting it using endovascular techniques.”

Post-operatively, CTA can evaluate the position of the graft and verify shrinkage of the aneurysm sac.

“In some cases, it lets us see inside the vessel as well as the outside wall of the vessel and everything around the vessel, including masses in the adjacent organs we might not have seen otherwise,” remarked Dr. Carsten.

CTA also is proving useful in patients with arterial occlusive disease, especially severe atherosclerosis. Scans enable physicians to visualize vessels on the other side of a blockage, often better than conventional angiography.

“We get better opacification of the collateral system and see patent vessels that we could not visualize otherwise,” he said. “We often do it with less contrast, which is good for patients who may have kidney disease.”

In addition, the accuracy of CTA helps surgeons avoid arterial puncture in cases where there is limited access to the repair area.

Referring a Patient: When Might CTA Apply?

Appropriate referrals for CTA include patients with peripheral vascular disease, aneurysm, renal artery stenosis with uncontrolled hypertension and chronic mesenteric ischemia. It also is used for pre-operative carotid surgery clearance in patients with CV disease and in those at high risk for, but without a history of, the condition.

As a precaution, physicians do not generally use CTA on women of childbearing age because of radiation risk to the ovaries and reproductive tissues and, in pregnant women, to the fetus. CTA also is discouraged for children because of radiation risk to rapidly growing body tissues.

There are no FDA guidelines for diagnostic CTA, although the contrast agent is approved. Most insurance companies reimburse for CT scans, but coronary scans usually require precertification.

For more information, call GHS’ Institute for Vascular Health at (864) 454-VASC (8272).

Christopher Carsten III, M.D., is a vascular surgeon with GHS University Medical Group–Department of Surgery.

Michael Devane, M.D., is a radiologist with Greenville Radiology PA.

Dev Vaz, M.D., is a cardiologist with Carolina Cardiology Consultants PA.
Greenville Hospital System’s CTA success stems from not only having the latest technology but also leveraging the expertise of an in-house 3-D Imaging Lab.

Because it has dedicated imaging resources, GHS can employ CTA “best practices” that go beyond what many CT labs across the state can offer, said Chris Gilmer, BSRT, R CT, manager of 3-D Imaging Services for GHS.

For instance, Gilmer works closely with CT manager Gerry Horvath and the CT technologists to ensure they optimize the timing of CTA scans to account for each patient’s unique physiology. In particular, technologists run special calculations – beyond the scanner’s automated recommendations – to determine the precise seven-second window when contrast dye will be in an optimal position in the patient’s arteries.

By successfully “riding the wave” of contrast dye, the technologist can capture CT images while arterial opacity is at its best and before venous contamination threatens to blur the picture, Gilmer explained.

The precision of this technique has enabled GHS to reduce the amount of contrast material injected into the patient. While CT labs typically inject about 100 ccs of dye to achieve successful carotid CTA scans, GHS injects an average of just 40 ccs.

GHS’ CT technology is in a league of its own in the region. In addition to having three of the most advanced CT scanners by today’s standard – the 64-slice scanner – GHS soon will become one of only about 10 hospital systems worldwide to use a scanner of the next generation: the 256-slice Brilliance iCT from Philips Medical Systems.

The 256-slice scanner will reduce radiation doses by 80 percent because it is 22 percent faster than the previous scanner generation. It also will deliver four times the image resolution of a 64-slice system, according to Philips.

“This is a phenomenal opportunity for GHS,” emphasized Gilmer.

GHS also uses TeraRecon’s Aquarius iNtuition™ and Workspace software for 3-D modeling and advanced post-processing of CTA images. The 3-D Imaging Lab performs stenosis analysis, advanced vessel analysis, vessel road mapping, cardiac electro-physiology and some vascular stent planning in conjunction with GHS physicians and primary care doctors who order CTA scans.

While physicians can conduct their own CTA analysis, they often value the lab’s ability to supply consistently packaged results, Gilmer said. These “work-ups” typically include a set of 2-D reformatted images for radiology review as well as 3-D images. The latter are helpful for surgery preparation and communication with patients. The packages also include many detailed measurements, such as vessel width in critical areas.

For more information, call (864) 455-7076.

Chris Gilmer, BSRT, R CT, is manager of 3-D Imaging Services for GHS.

Above: These images were captured with Philips’ new 256-slice CT scanner. GHS soon will become one of only about 10 hospital systems in the world to acquire such a scanner, which greatly reduces patients’ radiation exposure.
Greenville Hospital System University Medical Center (GHS) has opened two institutes at its Patéwood Medical Campus that offer comprehensive cardiovascular and musculoskeletal research, education and clinical care in an outpatient setting.

The Institute for Vascular Health and the Institute for Musculoskeletal Health & Wellness are located in the Patéwood C building. The facilities are a “one-stop shop” offering a wide variety of services, care and diagnostic testing; they also feature centralized patient registration, billing and concierge services. After registering, patients can be seen by any physician, clinic or service provider in that institute without re-registering.

The institutes are wired with the latest digital communications technology to connect physicians with key patient information, X-rays and other data electronically.

Eventually, Patéwood C also will house translational labs used by the institutes and the Clemson University Bioengineering program for bio-skills simulation, research and hands-on training in new surgical techniques and procedures.

The institutes have an overarching, conjoined academic mission to study and treat orthopaedic and vascular disorders that impair functionality.

About the Institute for Vascular Health
GHS’ Institute for Vascular Health provides care using guidelines of the Vascular Health Alliance, a GHS organization created to standardize patient care around an original set of evidence-based protocols for the treatment of cardiovascular disease. It houses vascular surgery, cardiovascular risk reduction, a vein center and wound care center. There are plans for a deep vein thrombosis center as well as an amputation clinic for patients rehabilitating from limb loss.

Designed to be a cardiovascular clearinghouse and disease management center for cardiovascular patients, the facilities have state-of-the-art diagnostic/therapeutic ancillary equipment and resources, including a 64-slice CT scanner, nuclear cardiac imaging, duplex ultrasonography, echocardiography, X-ray, phlebotomy, point-of-service labs and hyperbaric oxygen chambers.

GHS’ Division of Vascular Surgery provides teaching for the state’s only Vascular Surgery Residency Program, South Carolina’s first Vascular Medicine Fellowship and GHS’ General Surgery Residency Program. All are part of the GHS/University of South Carolina School of Medicine physician education programs. The vascular faculty participates in approximately 15 industry-sponsored clinical trials annually, and all cases are registered in a research registry for longitudinal study.

About the Institute for Musculoskeletal Health & Wellness
This institute has as its physician core the Steadman Hawkins Clinic of the Carolinas (SHCC), a nationally recognized practice specializing in orthopaedics and sports medicine. The clinic’s physicians perform surgeries for back and neck injuries, arthritis and joint replacement as well as arthroscopy and complex reconstruction surgeries to treat knee, shoulder, elbow, foot and ankle injuries.

There is on-site equipment for extremity MRI, bone densitometry testing for osteoporosis and digital radiography. The institute houses GHS physical therapy affiliate Proaxis Therapy, the sports-performance Acceleration Sports Institute (an SHCC affiliate), an after-hours clinic called Evening S.H.I.F.T. and the Orthopaedic Research Foundation of the Carolinas.

The Institute for Musculoskeletal Health & Wellness also serves as the home base for top healthcare professionals who have been tapped to participate in GHS/University of South Carolina School of Medicine Programs in Primary Care Sports Medicine, Orthopaedic Surgery and Physical Therapy. In addition, the only orthopaedic oncologist in South Carolina, who treats all forms of bone and tissue tumors, is based here.

For more information, call (864) 454-VASC (8272) (Institute for Vascular Health) or (864) 454-SHCC (7422) (Institute for Musculoskeletal Health & Wellness).

Editor’s Note: The next issue will feature in-depth coverage of the institutes and their role in completing the healthcare circle at GHS.
InterStim Therapy works by sacral neuromodulation. Mild stimulation is transmitted through a lead implanted adjacent to the sacral nerves. These nerves govern the reflexes that control the bladder, sphincter and pelvic floor muscles.
InterStim® Therapy for Urinary Incontinence

Bladder control problems can have a debilitating effect on quality of life. Behavior modification, pelvic floor exercises, biofeedback and pharmacologic therapies are effective for some patients. Other people are unresponsive to these treatments, usually because of poorly tolerated side effects or limited medication efficacy. If bladder control problems derive from urinary urge incontinence, urgency/frequency issues (alone or in combination) or nonobstructive urinary retention problems, InterStim Therapy can offer symptom reduction or resolution.

Described as a pacemaker for the bladder, InterStim Therapy works by sacral neuromodulation. The device consists of a lead connected by an extension wire to a battery-operated stimulator (about the size of a Kennedy half dollar coin). The lead is implanted adjacent to the sacral nerves, which govern the reflexes that control the bladder, sphincter and pelvic floor muscles. InterStim Therapy mildly stimulates these nerves.

This device is typically implanted under the skin of the upper buttocks below the beltline. The rate, frequency and amplitude of the stimulation are programmable, and patients can adjust stimulation within certain parameters with a hand-held remote.

Developed by Medtronic Inc. and FDA-approved since 1997, InterStim Therapy has been in the mainstream for several years. Jeffrey Garris, M.D., a urogynecologist with Greenville Hospital System (GHS) University Medical Group, is a national InterStim preceptor and one of only a few physician providers in the Upstate offering this therapy.

“This surgery changes lives, but the word on it has been slow to get out,” said Dr. Garris. “I see many patients who are refractory to standard, conservative treatment for urinary control. They often have seen several doctors and been told they have reached a dead-end street or that they just have to live with it.”

Dr. Garris performs, on average, about one InterStim procedure a week and has better than a 90 percent success rate. “Most patients say improvement in bladder control is immediate or occurs within a week,” he stated. “Their leaking episodes lessen or disappear, and their voids per day fall to a more normal number. Those with urinary retention problems are reducing or eliminating the use of catheters. Medication is either minimized or discontinued. ‘I’ve got my life back’ is one of the most common things I hear.”

Before he places the device, candidates test its effectiveness with an external stimulator at home, tracking their progress with a voiding diary. If the testing phase is successful, the minimally invasive implantation procedure, which takes 30 to 60 minutes, can be performed while a patient is awake or under anesthesia. Complications include mild discomfort, infection, transient electrical shock, lead migration and change in bowel function, but these are not common and are generally resolvable. Stimulation can be discontinued or the device removed at any time.

InterStim Therapy can be used to help male and female patients in a wide age range, though most of Dr. Garris’ InterStim patients are younger to middle-age females. Some of his colleagues have tested the therapy successfully in infants and children; however, InterStim Therapy is not indicated for the pediatric population at this time. Likewise, it is not indicated for fecal incontinence and defacatory disorders, though clinical studies show promise for such use.

“I’ve seen patients implanted with the device who had both urinary complaints and anal incontinence, and both problems improved,” said Dr. Garris. “In some cases, InterStim also helps resolve or lessen the pain associated with interstitial cystitis and reduces vulvar and vaginal pain. The potential benefits to this therapy are tremendous.”

InterStim Therapy is not intended for patients with mechanical obstruction such as benign prostatic hypertrophy, cancer or urethral stricture, or those unable to operate the hand-held remote. Patients using InterStim should not receive diathermy or MRI. Safety has not been established for use of InterStim Therapy during pregnancy, and those allergic to nickel are not candidates because its components are made of that metal.

Most private insurance companies cover InterStim Therapy, and Medicare provides coverage for all approved indications.

For consultation or referral, call (864) 455-1600.

Jeffrey Garris, M.D., is the director of Female Pelvic Medicine & Reconstructive Surgery for GHS University Medical Group—Department of Obstetrics & Gynecology and the medical director of GHS Women’s Surgical Services.
Bariatric Surgery: Big Wins Beyond Weight Loss

Bariatric Solutions, a part of Greenville Hospital System (GHS) University Medical Group, offers a comprehensive approach to bariatric surgery, enabling patients to not only lose weight but also avoid potentially fatal comorbidities of obesity.

Weight loss after bariatric surgery is significant – patients typically lose 85 percent of excess weight after gastric bypass and 50 percent after gastric banding. Benefits that accompany this pound shedding are equally compelling. For example, more than 80 percent of patients with type II diabetes are cured of the disease on the operating table.

“Patients on medication for type II diabetes often take their last pills for this condition the day before surgery and no longer need their medicine afterward,” said Eric Bour, M.D., founder of Bariatric Solutions.

Likewise, studies have shown that 95 percent of patients who undergo gastric bypass procedures conquer their pre-surgery high cholesterol problems, and 80 percent overcome sleep apnea – often within one year (see chart).

Impact of Bariatric Surgery on Medical Problems

Two common bariatric surgical procedures have a track record for reducing or eliminating comorbidities of morbid obesity.

<table>
<thead>
<tr>
<th>% Improvement or Resolution</th>
<th>Gastric Bypass</th>
<th>LAP-BAND®</th>
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<tr>
<td>Hypertension</td>
<td>75%</td>
<td>38%</td>
</tr>
<tr>
<td>Diabetes improvement</td>
<td>90%</td>
<td>80%</td>
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<tr>
<td>Diabetes resolution</td>
<td>85%</td>
<td>48%</td>
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<tr>
<td>Sleep apnea</td>
<td>80%</td>
<td>40%</td>
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<tr>
<td>High cholesterol</td>
<td>96%</td>
<td>60%</td>
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A Center of Excellence

Such positive outcomes were major factors behind Bariatric Solutions’ selection last year as a Center of Excellence by the American Society for Metabolic and Bariatric Surgery. To achieve this prestigious designation, a program must perform at least 125 bariatric surgeries annually, with a complication rate of less than one percent.

Among many other criteria, the program must have a dedicated multidisciplinary bariatric team that includes surgeons, nurses, medical consultants, nutritionists, psychologists and exercise physiologists. Bariatric Solutions exceeds these criteria. For instance, whereas some hospital-based bariatric programs connect patients with general hospital psychologists and dietitians for pre- and post-surgical counseling, Bariatric Solutions employs a full-time psychologist and two dietitians, all specializing in bariatric care.

Psychologist Susan Calhoun, Ph.D., who recently joined the staff, said she is not aware of another bariatric practice in the nation that puts as much emphasis on the patient’s total health. “We’re really on the forefront in terms of being
a comprehensive program,” she stated. “We have an education-based program, and education is often the missing link that separates successful programs from those that are not.”

The Bariatric Solutions office includes a 90-seat conference room where Dr. Bour leads two-hour introductory education sessions twice monthly – usually to a full house. Pre- and post-operative support groups meet regularly at the facility. A full schedule of education programs are led by Dr. Calhoun, dietitians Cammy Stephan, R.D., and Michele Dillingham, R.D., and exercise physiologists from the GHS Life Center® Health & Conditioning Club.

The office adjoins Nutrition Solutions, an independent business that offers nonsurgical weight-loss programs, nutrition counseling and educational classes. Nutrition Solutions has a retail store that sells vitamin supplements, low-fat foods, scales and other equipment and supplies. It recently hired a bariatric-certified executive chef who teaches healthy cooking classes, offers grocery shopping guidance and prepares pre-cooked, portion-appropriate meals for patients at all stages of bariatric surgery recovery.

What’s Next?

Bariatric Solutions stays current on the latest surgical techniques. Dr. Bour performs the laparoscopic Roux-en-Y divided gastric bypass – the “gold standard” in bariatric surgery because of its successful track record. The procedure is a difficult one, and bariatric surgeons train extensively to master it.

W.L. Gore & Associates asked Dr. Bour to be the first surgeon in the nation to test its SEAMGUARD® Bioabsorbable Staple Line Reinforcement for circular staple lines. Early results indicate that the product significantly decreases post-operative gastrojejunal stricture formation and lessens the incidence of anastomotic leaks and bleeding.

Bariatric Solutions also performs adjustable gastric banding procedures. It is recognized as a best practice site in the “Victory Division” of gastric band and medical device supplier Ethicon Endo-Surgery Inc. This division includes practices across the Carolinas, Tennessee, Virginia, Washington, D.C., Maryland and parts of Georgia.

In January, Dr. Bour and bariatric coordinator Katie Myers, C.S.T., were among an elite group of bariatric surgery professionals invited to the first training session for Ethicon’s new REALIZE™ Adjustable Gastric Band, recently approved by the Food and Drug Administration.

For more information, call (864) 676-1072 or visit www.bariatricsolutions.com.

Eric Bour, M.D., is the bariatric medical director of Hillcrest Memorial Hospital and a bariatric/general surgeon with GHS University Medical Group–Department of Surgery/Minimal Access & Bariatric Surgery.

Bryan Morse, M.D., will join the group in 2009. Dr. Morse studied under Dr. Bour as a surgical resident and will begin a bariatric fellowship after completing his residency program at GHS.

Demand-driven Expansion

Bariatric Solutions has a patient base of 1,500 and is experiencing a 25 percent growth in patients each year. Founder Eric Bour, M.D., performed 191 bariatric surgeries (176 bypasses and 15 bands) in 2007, up 33 percent from 144 (132 bypasses and 12 bands) in 2006.

In January, Dr. Bour and bariatric coordinator Katie Myers, C.S.T., were among an elite group of bariatric surgery professionals invited to the first training session for Ethicon’s new REALIZE™ Adjustable Gastric Band, recently approved by the Food and Drug Administration.
GHS Initiates Inpatient Glucose Control Program

Greenville Hospital System University Medical Center (GHS) is taking action to better control glucose levels in hospitalized patients. Evidence-based literature and recent guidelines from the American Diabetes Association® (ADA) and American Association of Clinical Endocrinology recommend tight control of glucose levels to reduce risk of infection, especially in the post-surgical setting. The strongest evidence has come from studying blood sugar control in post-bypass surgery patients.

The GHS Inpatient Diabetes Steering Committee has developed insulin protocols for the management of hyperglycemia, both in intensive care and floor settings. These include IV insulin drip protocols, standardized subcutaneous order sets and discharge instructions for patients taking insulin.

An educational program regarding newer methods of controlling hyperglycemia in the hospital was presented to nursing staff throughout the hospital system in small group settings. Formed in 2006, the steering committee, which is comprised of representatives from GHS’ medical staff, nursing, nursing administration, pharmacy, nutrition and information technology areas, meets monthly to review progress and discuss issues that arise.

Order Sets Designed to Reduce Errors

“Insulin is always listed in the top five medication errors in the inpatient setting. Often this is due to misinterpretation of orders,” said endocrinologist John Bruch, M.D., who chairs the steering committee. “The new order sets are designed to reduce those errors and also serve as teaching tools for physicians and nurses.”

Order sets for subcutaneous insulin are based on the concept of basal, prandial and correction insulin. Basal (non-nutritional) insulin, administered even when the patient is not eating, usually accounts for 50 percent of the patient’s total daily insulin dose. Prandial insulin covers the glucose load of a meal or enteral nutrition. Correction insulin provides extra insulin for unexpected hyperglycemia from medical or surgical stress or miscalculation of basal or prandial insulin doses. The protocol order sets include starting dose suggestions for patients who are new to insulin and correction algorithms based on a patient’s total daily insulin dose.

Computer-based Algorithms Ensure Tight Control

The Glucommander™, an insulin drip calculator, has been implemented in the CVICU and Medical-Surgical ICU at Greenville Memorial Hospital, and plans are to expand its use to all ICUs. The Glucommander’s computerized algorithm achieves tight glucose control with minimal hypoglycemia and eliminates errors in calculation.

The committee is tracking data from the CVICU and the nursing floors to establish benchmarks for measuring progress.

“Thirty percent of patients undergoing heart surgery have diabetes, some unrecognized prior to hospitalization,” said Dr. Bruch. “Many more develop hyperglycemia in the postoperative setting from the significant stress of CV surgery. This, too, requires intervention to normalize blood sugars.”

Tightening control of glucose levels is “especially important in the ICU setting for reducing infection and complication rates,” he added.

Dietary Management and Education

The traditional ADA diets – i.e., 1,200-calorie, 1,500-calorie and 1,800-calorie meals – have been replaced with consistent carbohydrate diets recommended by the ADA. Options now include 45 gm, 60 gm or 75 gm carbohydrate (CHO) diets for diabetic persons. The 60 gm CHO diet for persons with diabetes is similar to the old 1,800-calorie diet.
GHS’ steering committee has noted the importance of timing in meal-tray delivery and worked on several pilot projects to improve it. The goal is to instruct nurses, patient care technicians and patients on counting carbohydrates consumed at meals.

In December, Lori Bristle, R.N., NSN, joined GHS as a full-time inpatient diabetes educator. Bristle, who has type I diabetes and uses an insulin pump, is committed to giving patients not only the “survival skills” to manage their diabetes but also an understanding of diabetes and that it does not have to stop them from living active lives.

Suggested criteria for referral to our inpatient educator include the following:
- New insulin starts
- Significant change in insulin regimen
- Severe hypoglycemia
- Diabetic ketoacidosis
- Insulin pump patients
- Pregnant patients on insulin

Bristle manages complex patients, including children with diabetes and women with gestational diabetes. A team of diabetes resource nurses is available to all patients with diabetes to provide instruction and ensure that educational materials are easily accessible on the floors.

For continuation of diabetes education and management initiated in the hospital, GHS coordinates patients’ follow-up appointments with the GHS Outpatient Diabetes Management Program upon discharge.

For consultation or information, please call (864) 455-9031 (Department of Endocrinology) or (864) 455-4577 (inpatient diabetes educator).

John Bruch, M.D., is an endocrinologist with GHS University Medical Group–Department of Internal Medicine/Endocrinology.
VeinViewer™ Technology Improves Patient Comfort

Greenville Hospital System University Medical Center (GHS) is adding VeinViewer technology from Luminetx™ Technologies Corp. The system, the only of its kind in the Upstate, will be stationed at GHS Children’s Hospital, where it will spare children from repeated “sticks” of the needle as caregivers locate the best veins for starting IVs or drawing blood.

The purchase is made possible in part by donations to the Virtual Toy Drive, a year-round online fundraiser managed by the GHS Office of Philanthropy & Partnership.

The VeinViewer can be used to view difficult-to-find veins on patients of any size, age or skin color. The viewer uses near-infrared light and patented imaging and projection technologies to illuminate veins under the patient’s skin. In some cases, it also can locate arteries. The mobile device projects images of the veins onto the surface of the skin to serve as a guide for caregivers who are inserting needles. It can be used to find veins in the hand, arm or neck.

“One of the greatest fears children have related to hospitalization is getting stuck with a needle,” said Nina Lee-Pittman, M.S., R.N., CPN, a clinical nurse specialist in General Pediatrics at Children’s Hospital. “Anything that can improve our ability to have only ‘one stick’ when starting IVs or drawing blood is a wonderful tool to have.”

For more information, call Beth Burney, R.N., nurse manager for General Pediatrics at Children’s Hospital, (864) 455-4277.
Cancer Pharmacy Moves

Facility Gets Major Upgrade

The Cancer Center pharmacy at Greenville Memorial Medical Campus (GMMC) has moved into a new space with upgrades that will ensure the highest levels of safety and quality in compounding and handling cancer drugs.

Only authorized staff may enter the compounding areas, and they must be fully gowned, garbed and scrubbed up to meet the facility’s clean room standards. The pharmacy’s new location on the second floor of the Cancer Center was designed to be safer, cleaner and more efficient for the production of compounded sterile preparations (CSPs). These preparations include antibiotics, chemotherapy and investigational pharmaceuticals.

Richard Capps, Pharm.D., GMMC pharmacy manager, said the move gave the Cancer Center pharmacy an opportunity to implement upgrades that will enable it to meet growing cancer research initiatives and Joint Commission safety and quality requirements for the foreseeable future.

“It was a chance to get out in front of the best industry practices in a lot of areas,” Dr. Capps said.

Particularly when it comes to experimental or proprietary cancer drugs, strict protocols address all aspects of storage and handling. GHS must guarantee controlled environmental conditions, such as temperature and security.

The stringent environmental controls and many safety precautions of the facility are essential to keep contaminants from entering preparations that will be administered to cancer patients, whose immune systems often are very weak. These measures also are critical to protect staff and other caregivers from risk of exposure to dangerous compounds.

Many upgrades are not obvious because they affect air quality and flow. State-of-the-art ventilation systems ensure proper negative and positive air flow between the clean rooms and within the biological safety cabinets (BSCs). The BSCs – high-tech stainless steel workstations where pharmacists and technicians prepare chemotherapy and other hazardous drug IV admixtures – are located within a negative pressure room. The combination of vented BSCs and negative air pressure in the room ensures compounds remain sterile while preventing hazardous materials from escaping the clean room. In fact, the room’s air meets ISO 7 clean room standards. The classification is based on the number of particles in the air that are 0.5 microns or larger in size and the number of air exchanges of the room per hour.

Set apart from the rest of the pharmacy is a room built to house a new ChemoSHIELD® compound aseptic containment isolator (CAI), a two-chamber unit housed in a special room of the Cancer Center pharmacy reserved for handling the most hazardous compounds.

In addition to preparing drugs for outpatient services, this pharmacy serves the Ambulatory Infusion Center, BI-LO® Charities Children’s Cancer Center, Oncology Research Institute and surgical oncology team.

For more information, call Dr. Capps at (864) 455-7065.
Greenville Memorial Hospital (GMH) care measure ratings are consistently above average for teaching hospitals and for all hospitals nationwide, according to a December 2007 release of comparative hospital data from the Association of American Medical Colleges’ Council of Teaching Hospitals and Health Systems (COTH).

This report was based on discharge data from April 2006 to March 2007. It gave COTH hospitals a benchmark of their performance against peer institutions and against the national average for all hospitals. Here is a look at GMH’s performance average in a variety of areas.

### Appropriate Care Measure

<table>
<thead>
<tr>
<th>Measure</th>
<th>GMH</th>
<th>COTH</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Attack Patients Given ACE Inhibitor or ARB for LVSD</td>
<td>92%</td>
<td>89%</td>
<td>84%</td>
</tr>
<tr>
<td>Heart Attack Patients Given Aspirin on Arrival</td>
<td>97%</td>
<td>98%</td>
<td>93%</td>
</tr>
<tr>
<td>Heart Attack Patients Given Aspirin at Discharge</td>
<td>98%</td>
<td>98%</td>
<td>90%</td>
</tr>
<tr>
<td>Heart Attack Patients Given Beta Blocker at Arrival</td>
<td>96%</td>
<td>96%</td>
<td>88%</td>
</tr>
<tr>
<td>Heart Attack Patients Given Beta Blocker at Discharge</td>
<td>99%</td>
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<td>Heart Attack Patients Given PCI Within 90 Minutes of Arrival</td>
<td>58%</td>
<td>56%</td>
<td>58%</td>
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<tr>
<td>Heart Attack Patients Given Smoking Cessation Advice/Counsel</td>
<td>100%</td>
<td>95%</td>
<td>90%</td>
</tr>
<tr>
<td>Heart Failure Patients Given ACE Inhibitor or ARB for LVSD</td>
<td>93%</td>
<td>89%</td>
<td>83%</td>
</tr>
<tr>
<td>Heart Failure Patients Given Assessment of Left Ventricular Function</td>
<td>98%</td>
<td>97%</td>
<td>85%</td>
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<tr>
<td>Heart Failure Patients Given Discharge Instructions</td>
<td>76%</td>
<td>71%</td>
<td>65%</td>
</tr>
<tr>
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<td>99%</td>
<td>92%</td>
<td>85%</td>
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<tr>
<td>Pneumonia Patients Assessed and Given Influenza Vaccination</td>
<td>93%</td>
<td>72%</td>
<td>75%</td>
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<td>Pneumonia Patient Assessed and Given Pneumococcal Vaccination</td>
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<td>Pneumonia Patients Given Initial Antibiotic(s) Within 4 Hours of Arrival</td>
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<td>Pneumonia Patients Given Oxygenation Assessment</td>
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</tr>
<tr>
<td>Pneumonia Patients Given Smoking Cessation Advice/Counsel</td>
<td>98%</td>
<td>87%</td>
<td>83%</td>
</tr>
<tr>
<td>Pneumonia Patients Given the Most Appropriate Initial Antibiotic(s)</td>
<td>93%</td>
<td>88%</td>
<td>85%</td>
</tr>
<tr>
<td>Pneumonia Patients Whose Initial ER Blood Culture Was Performed Before Administration of First Hospital Dose of Antibiotics</td>
<td>91%</td>
<td>88%</td>
<td>90%</td>
</tr>
</tbody>
</table>

Source: AAMC analysis of hospital comparison data from Department of Health & Human Services

The hospital system thanks the physicians, nurses, allied healthcare workers and non-provider staff and management whose diligence and hard work made these results possible.
Laboratory Opens
New Equipment Supports Automation, Transplant Tissue Testing

Greenville Memorial Hospital (GMH) has opened a new laboratory that is not only outfitted with state-of-the-art equipment but also capable of performing more services to benefit patients and the community.

The new lab has two machines for conducting high-performance liquid chromatography (HPLC), coupled with dual mass spectrometry (MS) detectors. With this specialized capability, GMH can perform blood tests to determine how post-transplant patient tissue is responding to anti-rejection drugs. These tests, which are crucial to support future transplant surgeries at the hospital, can be performed by the lab shortly after a transplant or months or years later as part of a patient’s continuing care. Previously, most transplant patients (or their blood specimens) had to travel to the Medical University of South Carolina for such testing.

The lab also is equipped with two automated, robotic conveyor lines capable of “hands-off” sorting, routing, centrifuging, aliquoting, testing and storing of specimens. The larger of the two lines is dedicated to chemical blood tests. The other is reserved for hematology.

The GMH lab can perform approximately 300 various testing procedures, including rare tests not done by other labs within the hospital system. The GMH lab performs more than 2.2 million tests annually.

GMH offers its lab services to the physician community. Practices do not need to be associated with the hospital system to use the lab; system couriers can pick up and deliver samples.

For more information, call (864) 455-7136.

Stephanie Kelly, toxicology section leader for the GMH laboratory, tests one of the new HPLC/MS/MS machines. The machine can perform blood tests to determine how post-transplant patient tissue is responding to anti-rejection drugs.
An alternative to hip replacement – Birmingham Hip Resurfacing (BHR) – is being performed at Greenville Hospital System University Medical Center (GHS). In this bone-sparing procedure, only the surface of the acetabulum and femoral head are replaced.

"Hip resurfacing is ideal for younger, more active patients, as it potentially gives them a longer-lasting, more durable implant," said Brian Burnikel, M.D., an orthopaedic surgeon with Steadman Hawkins Clinic of the Carolinas. Dr. Burnikel is the first surgeon in South Carolina to be trained on the procedure and to perform it. His colleague Philip Wessinger, M.D., also has completed the training.

More than 65,000 BHR surgeries have been performed worldwide. The dislocation rate is low – 0.1 percent of patients vs. 2 percent for total hip replacement.

BHR components are made of finely machined cobalt chrome, with a low-friction finish that reduces wear. Recipients have run marathons, participated in triathlons and led the Tour de France. In May 2006, the Food and Drug Administration (FDA) approved BHR for men age 60 and younger and women age 55 and younger.

“Unfortunately, BHR is not appropriate for older patients because age-related deterioration in bone quality increases risk of breakage under the cap,” said Dr. Burnikel.
Performing the Procedure

To perform BHR, a centimeter of bone on the femoral head is removed and the surface capped with metal. A metal shell is then placed in the socket. On the femoral side, the BHR components are cemented; in the socket, they are press-fit using a surface finish that allows natural bone in-growth to stabilize the implant.

“Because the femoral head and neck are preserved, conversion to a standard hip replacement can easily be performed years later if need be,” he stated.

While the amount of bone removal is minimal compared to that needed for total hip replacement, the procedure itself is not minimally invasive. An open approach is required, and surgeons must undergo special training to learn how to access the joint without injuring bones, muscles and nerves. Still, patients require only one or two nights of hospitalization and ambulate more quickly than they do with traditional hip replacement.

Overcoming Bias

Results from BHR procedures performed eight years ago, obtained primarily in Australia and England, surpass those of total hip replacement, he said. “Moreover, resurfacing restores the kinematics of motion, giving patients a normal gait pattern without activity restrictions,” Dr. Burnikel added.

Despite these findings, Dr. Burnikel worries about bias against hip resurfacing. The first procedures had a high failure rate because components were made of a wear-prone combination of metal and plastic. The use of cement to fix the components instead of both cement and a press-fit finish also contributed to failures, as did less precise component machining. Today’s components are made entirely of metal, which has great advantages with joint motion.

“When precisely machined, the metal in these prostheses rubs on joint fluid produced by the body, which reduces friction, wear and pain,” emphasized Dr. Burnikel. “The more the hip moves, the more the fluid lubricates the joint.”

For consultation or referral, call (864) 454-SHCC (7422).

Brian Burnikel, M.D., is an orthopaedic surgeon with Steadman Hawkins Clinic of the Carolinas and director of the GHS Total Joint Replacement Program.

Hip Implants: Materials Matter

The first hip implants were designed in England in the 1960s by surgeon John Charnley. His low-friction arthroplasty device consisted of a small metal ball and a plastic socket cemented in place.

The plastic components wore out in young, active patients; as a result, research was stimulated to develop alternative-bearing surfaces. Today, there are metal-on-metal and ceramic-on-ceramic implants, as well as implants made of oxinium, a ceramic-like metal that articulates with extremely hard plastic in some implants.

Models continue to be made with plastic, but they are harder and more durable than in Dr. Charnley’s days. They also are less expensive, making them ideal for older, less active patients.

Anterior Approach for Hip Replacement

Dr. Brian Burnikel of GHS is one of the first surgeons in the state to perform the anterior hip replacement procedure, which is done with fluoroscopic guidance on a specially designed operating table that enables the patient’s leg to be elevated. The patient lies supine during the surgery. For the posterior approach, the patient lies on the side, which puts pressure on the shoulder and contralateral hip, and can lead to soreness.

Dr. Burnikel makes an incision of six to eight centimeters through the intermuscular plane, separating the muscles rather than cutting and reattaching them as is necessary with a posterior approach. The anterior approach gives him an immediate view of the position, size and fit of the implant.

The anterior approach is not ideal for patients who are very overweight, and there is a slight risk for fracture as well as injury to a cutaneous nerve that can lead to numbness in the thigh.

“It’s a matter of where we violate the tissue,” Dr. Burnikel said. “When you release the tissue in back of the joint, the hip can dislocate. The biggest advantage of the anterior approach is that the joint is more stable, and risk of dislocation is lower.”
Greenville Hospital System University Medical Center (GHS) has taken an innovative approach to position itself at the forefront of sports medicine in three arenas:

- An accredited sports medicine fellowship
- The country’s third largest certified athletic trainer network
- S.C.’s first use of computerized neuropsychological testing at the high school level to evaluate and manage concussions

**Sports Medicine Fellowship**

GHS’ one-year Primary Care Sports Medicine Fellowship is in its second year. This non-surgical fellowship, offered by the Family Medicine Residency Program in partnership with Steadman Hawkins Clinic of the Carolinas (SHCC), focuses on comprehensive care of the athlete, diagnosis and treatment of musculoskeletal injuries, and sports medicine. Thanks to GHS’ affiliation with Proaxis Therapy and SHCC’s affiliation with Acceleration Sports Institute, the fellow can learn from experts in physical therapy and sports performance.

Under supervision by a certified athletic trainer at school, athletes use ImPACT software to test their reaction time and other variables. Photos courtesy of The Greenville News.
Certified Athletic Trainers

With 27 staff members, the GHS certified athletic training network provides on-site sports medicine care to Greenville County’s 14 public high schools. It also serves three private high schools as well as North Greenville University and Carolina Elite Soccer Academy. Each has a full-time certified athletic trainer (ATC) paid by GHS. In addition, 10 of the 18 middle schools in Greenville County have ATCs.

In the 2006-07 school year, 14,425 student athletes were served by ATC staff; approximately 30 percent of these athletes sustained injuries.

GHS ATCs work with SHCC physicians to manage injured athletes’ care from the point of injury to return to play. The GHS ATC is at their schools daily from 1:00 p.m. until the end of the practice or games for all student athletes. Some of the functions of the GHS ATC are immediate injury management and treatment, injury triage and injury rehabilitation, along with education on injury prevention.

Concussion Management

The ATC network and SHCC team use ImPACT™ (Immediate Post-concussion Assessment and Cognitive Testing), an evidence-based software tool, to help evaluate an athlete’s recovery from a concussion. GHS has invested $20,000 in ImPACT, which also is used by the National Football League, National Hockey League and Major League Soccer.

An ImPACT test takes about 25 minutes on a computer. Students answer questions about concussion symptoms (if they are finishing a post-concussion test) and their medical history. They then complete computer exercises that assess their cognitive function, memory recall and reaction times.

This year, all sophomore football and soccer players (with parental consent) participated in ImPACT pre-testing to establish baseline readings. This pre-testing also included any student athletes who have sustained concussions.

From July 2007 through the start of the high school football season, approximately 530 pre-tests were administered. An equivalent number of sophomore soccer players were expected to undergo ImPACT pre-testing.

During the 2007 football season, SHCC physicians administered post-tests to more than 20 athletes who experienced concussions. Computerized neuropsychological post-testing is an accurate and reproducible way to evaluate key areas of brain function and may be important when making decisions about safely returning athletes to play.

For referral or more information, call (864) 454-SHCC (7422) or (864) 454-2092 (ATC network).

W. Franklin Sease Jr., M.D., is associate director of the Steadman Hawkins Clinic of the Carolinas Primary Care Sports Medicine Fellowship Program.

Harriett Pearce, M.S., P.T., ATC, is the program director for the GHS certified athletic trainer network.

Easy Access to Care

Many sports injuries don’t happen during business hours. That’s why GHS has services that give patients easy access to care.

Evening S.H.I.F.T.

SHCC offers an after-hours orthopaedic and sports injury clinic, Evening S.H.I.F.T. (Steadman Hawkins Injury and Fracture Treatment). This urgent care clinic is open on a walk-in basis from 6:00 p.m. to 9:00 p.m. weekdays at GHS’ Patewood Medical Campus. Here, orthopaedic physicians can begin prompt treatment for acute musculoskeletal injuries sustained late in the day. Full digital radiography and extremity MRI are available, and medical charges are the same as during business hours. Although student-athletes make up a sizable number of the patients seen, the service is open to anyone.

Saturday Injury Clinic

For 11 weeks each fall, a Bump and Bruise Clinic is available for athletes who have sustained injuries during Friday night football games, whether at home or away. This clinic opens at 9:00 a.m. Saturdays and is staffed by SHCC doctors, ATCs and radiology technicians. In the past two years, the clinic has served an average of more than 10 athletes each week.

The Evening S.H.I.F.T. and Bump and Bruise Clinic are located in Building C, Suite 100, on Patewood Medical Campus. For more information, call (864) 454-SHCC (7422).

Children’s Emergency Center

GHS has the Upstate’s only Children’s Emergency Center, which serves children up to age 18. Established about 14 years ago, the center receives more than 25,000 visits annually. Orthopaedic trauma care and other emergency services are provided by board-certified physicians on site around the clock. GHS is fortunate to have a full-time pediatric orthopaedic surgeon, Michael Beckish, M.D., as a faculty member as well.

The Children’s Emergency Center is located at Greenville Memorial Hospital. For more information, please call (864) 455-8860.
Greenville Hospital System University Medical Center (GHS) has strengthened its ability to support geriatric patients and their families throughout the elder care cycle, from outpatient assessment and inpatient intervention to lifestyle-focused simulation and coaching.

The Division of Geriatrics offers access to four geriatricians, two family physicians, a geriatric nurse practitioner, a licensed social worker and other staff members who are specially trained in elder care. The senior care system can also connect patients to state-of-the-art rehabilitative, orthopaedic, home health, women’s health and long-term care services. GHS physicians serve as medical directors for 14 area nursing homes, including The Cottages at Brushy Creek, an award-winning GHS facility featuring a home-like environment and companion care model.

GHS’ Center for Success in Aging operates a new home simulation lab in conjunction with Clemson University. At the lab, scientists measure seniors’ abilities to perform common home tasks. Volunteer Ronald Russell of Powdersville is spotted and timed by Clemson graduate student Josh Gomer during a dryer unloading test.

Specialized Outpatient Assessment
The Center for Success in Aging at GHS assesses elders’ medical, physical, cognitive and psychological states as well as living arrangements and medications.

“Whether someone is aging well and wants recommendations for ongoing success or has a long list of problems, complex comorbidities, cognitive issues or problems functioning at home – either older patient would benefit from a comprehensive assessment,” said William Logan Jr., M.D., director of GHS’ Division of Geriatrics. “Primary care physicians in the community can refer to the center for a thorough geriatric assessment.”
Assessments take about two hours in a single appointment. Some patients may need to return for a second visit. Dr. Logan evaluates the patient using a variety of tools while social worker Michelle Honchar-Curtis meets with the family.

Honchar-Curtis gives the family an opportunity to discuss concerns about the patient’s driving ability, living arrangements and mental or physical health. She offers guidance on caring for frail seniors and suggests resources for activities, such as exercise and social programs. She also may arrange for an occupational therapy/physical therapy (OT/PT) assessment of the patient’s home to help decrease risks and increase safety.

After the assessment, Dr. Logan sends the referring doctor a comprehensive report of the center’s findings. He may call the physician as well to discuss critical issues, such as medication change recommendations.

**Fact-based Guidance for Lifestyle Changes**

Communicating with patients about “unpleasant changes” – such as relinquishing driving privileges or altering living arrangements – poses challenges that Dr. Logan and his colleagues are trained to handle.

“These are huge issues affecting independence, but the recommendations are palatable coming from a professional in whom they have developed trust,” he said. Patients often agree to changes because they know their cognitive abilities, strength, balance, reflexes and other important dimensions have been evaluated with the center’s objective tools and tests. He added, “It also helps that we have spent time listening to their concerns.”

A home simulation lab at the Center for Success in Aging helps patients maintain their independence. At the lab, Clemson researchers measure ability to safely perform common home tasks.

**Innovative Inpatient Options**

If hospitalization is needed, GHS’ Inpatient Geriatric Consult Services program supplements the care of the primary inpatient treatment team. Geriatricians evaluate medication appropriateness and treat adverse reactions along with acute delirium. They assist with cognitive dysfunction, debility, discharge planning issues and perioperative medical management. In addition, they can assess the patient’s social situation and make recommendations for home, rehabilitative or long-term care.

“It is often difficult for the primary care team to have the time to meet with the family to discuss these potentially complex issues,” said Bernardo Gutierrez, M.D., one of GHS’ hospital-based geriatricians.

In early January, GHS opened the Acute Care for the Elderly (ACE) unit at Greenville Memorial Hospital. Unique in the state, ACE serves functional elders who typically reside at home or in assisted-living facilities. These patients may be suffering from acute exacerbations of chronic diseases or acute illnesses such as pneumonia, urinary tract infections or influenza. The unit also treats some elderly postoperative patients.

All ACE Unit patients automatically receive a consultation with a board-certified geriatrician. ACE’s interdisciplinary team of physicians, nurses, pharmacists, case managers, and PT, OT and speech therapists meets every morning to discuss each patient. It makes recommendations to the primary care team regarding treatment and discharge plans or the need for rehabilitation.

The unit tries to get patients back on their feet quickly. Special lighting, colors and furnishings encourage optimal senior functioning, and an activity center is planned for the unit.

“Seniors deteriorate quickly because they have no physiologic reserve,” Dr. Logan stated. “Three days in bed for them is equivalent to a month in bed for younger adults. We want them to leave as functional elders who are well, with less need for nursing home services.”

For patients who arrive delirious or become so post-admission, ACE offers close observation. The care team emphasizes non-pharmacologic and non-physical methods of delirium management.

For more information, call (864) 454-8007.

**Research Initiatives**

GHS and Clemson University are collaborating on a research project to measure physical functioning in seniors. The research is ongoing at home simulation laboratories at the university and at GHS’ Center for Success in Aging, which is located at Patwood Medical Campus. Volunteers are needed. They will be paid $10 per hour, and the study typically takes two hours. For more information, please call Johnell Brooks, Ph.D., Clemson University Department of Psychology, at (864) 656-1703 or (864) 454-8007.

Another joint research venture between Clemson and GHS, kicking off this summer, will use the hospital system’s new driving simulator to conduct research in relation to seniors’ driving skills. This research is under way at a simulator at Clemson University.
Pulmonary hypertension (PH) can be an insidious and deadly disease, but with early intervention and treatment, it can be controlled. PH occurs when small arteries in the lungs narrow or become blocked, causing resistance to blood flow through the lungs. As a result, pulmonary artery pressure rises, forcing the heart’s right chamber to work harder to pump blood through the lungs.
If not diagnosed and treated, PH will worsen until the extra work put on the heart causes it to fail, said Armin Meyer, M.D., director of the Pulmonary Hypertension Program at Greenville Hospital System (GHS) University Medical Group.

Disguised Symptoms Delay Diagnosis
PH is challenging to diagnose because its cardinal symptoms – shortness of breath and fatigue – are non-specific complaints that apply to many illnesses. Likewise, lightheadedness, chest pain and leg edema are alarming symptoms of beginning heart failure, which may or may not be related to PH.

Secondary conditions may contribute to or even cause PH, and their symptoms may mask those of PH. For instance, a patient with a diagnosed rheumatologic condition and undiagnosed PH may avoid walking because it causes pain. Because the patient isn’t exerting herself, her lack of activity can disguise a dwindling ability to breathe, a red flag for PH.

Similarly, a morbidly obese patient may suffer from sleep apnea, which can trigger PH. This patient’s weariness and shortness of breath may be attributed to being out of shape, overweight and sleep deprived. But those factors could be only part of the problem, as PH may be overtaxing the arteries and heart muscle.

Patients suffering from scleroderma are susceptible to PH, as are those with a combination of obesity, long-standing hypertension and diabetes (metabolic syndrome). Others at risk for PH include individuals with a history of sickle cell disease, HIV or use of the diet drug Fen-Phen that was taken off the market in 1997.

To remain vigilant for PH, physicians should watch for patients who mention symptoms such as shortness of breath and lack of energy that seem out of proportion to other known causes, said Dr. Meyer, who trained at Duke University, which has one of the largest PH centers in the United States. A case in point might be a moderately obese patient who complains of shortness of breath.

PH symptoms present gradually and subtly, which means sufferers are often less likely to seek medical attention than they would be if they experienced chest pain or sudden shortness of breath.

The only way to accurately diagnose PH and measure its severity is to perform a pulmonary artery catheterization. However, an echocardiogram can be used as an effective screening tool to detect elevated pulmonary pressures and right heart strain. A pulmonologist who specializes in PH can work to identify causes of the disease and develop a treatment plan.

Effective Treatments Available
No longer should physicians and patients have a nihilistic attitude about prospects for treatment of PH, said Dr. Meyer, who has seen more than 60 patients with PH in the past year. Six effective FDA-approved treatments are currently available. The first drug to become available for PH had many side effects and was continuously infused through a central venous catheter. Now many patients can be successfully treated with oral, nebulized or subcutaneously infused drugs.

Given the growth of its Pulmonary Hypertension Program, GHS expects to participate in clinical trials of new PH drugs in the upcoming year.

Other than drug therapy, elimination of the secondary condition that brought on PH – such as sleep apnea – may alleviate PH. But in other situations, PH remains a chronic disease to be managed for life, regardless of whether the secondary condition disappears.

Careful exercise with a pulmonologist’s oversight also plays an important role in the treatment and well-being of PH patients. In fact, one of the most basic but important tests of successful PH therapy is the “six-minute walk test,” Dr. Meyer said. With this test, the pulmonologist measures how far a patient can walk in six minutes, gauging oxygen levels and heart rate along the way.

For referral, call (864) 454-4200.

About the Lung Center
The Lung Center at GHS University Medical Group is a central resource for diagnosis and treatment of numerous pulmonary problems. With two locations, it is the state’s most comprehensive practice devoted to the diagnosis and treatment of lung-related conditions.

The multidisciplinary center has programs for pulmonary hypertension, asthma, chronic obstructive pulmonary disease, pulmonary nodules, sleep disorders and interstitial lung disease. It also offers cough evaluation. Since its formation in 2005, the center’s 12 pulmonary specialists have evaluated and treated more than 6,000 patients.

GHS also has a Pulmonary Rehabilitation Program closely aligned with the system’s Life Center® Health & Conditioning Club. This program educates and coaches patients with lung disease on how to exercise safely, cough effectively, manage diet for optimal respiratory function, and use breathing techniques to control exercise-related shortness of breath and anxiety. Second Wind, a free public support group offered by the program, meets the second Thursday monthly at noon in the Life Center and features a variety of speakers who discuss breathing disorders. Participants should register in advance by calling (864) 455-2269.
Endoscopic ultrasound (EUS) technology is helping physicians better visualize and analyze cysts and tumors in the pancreas, stomach and esophagus.

A special endoscopic procedure, EUS is useful in evaluating many gastrointestinal (GI) diseases. Indications for EUS are constantly evolving, and it now plays a central role in the evaluation and management of several diverse conditions.

Placing a high-frequency ultrasound probe directly inside the GI tract provides pictures of the surrounding organs with unprecedented detail and resolution. In addition, real-time image acquisition and interpretation are unique advantages of EUS compared to evaluation of static images.

**Staging Tumors, Gathering Tissue**
The most common indication for EUS is the evaluation of upper GI malignancies, particularly cancer of the esophagus, stomach and pancreas. Along with CT and PET scans, EUS plays a vital role in staging these malignancies. Accurate assessment of tumor stage is particularly important because of the trend toward preoperative chemotherapy and radiation for many patients.

EUS also is used to obtain tissue samples for definitive diagnosis of malignancy. Fine-needle aspiration (FNA) is performed with ultrasound guidance during the procedure. In pancreatic cancer, this technique allows endoscopic biopsy and often prevents the need for percutaneous biopsy or exploratory surgery. Suspicious lymph nodes can be biopsied and ascites aspirated to identify patients with metastatic disease.

**Evaluating Pancreatic Problems**
Another rapidly growing role for EUS is the evaluation of cystic lesions in the pancreas. Such lesions have been identified with increasing frequency during the past decade, likely because of greater use of cross-sectional imaging as well as the aging of the baby boomer generation.

Cystic lesions of the pancreas may be symptomatic or asymptomatic. They may be detected incidentally during a CT, MRI or transabdominal ultrasound performed for other reasons. Some lesions are benign, such as retention cysts or pseudocysts. Others may be premalignant or frankly invasive, such as intraductal papillary mucinous neoplasm (IPMN), mucinous cystadenoma or cystadenocarcinoma. EUS-FNA allows cyst aspiration and fluid analysis for tumor markers that help determine if a particular cyst requires surgical resection or continued monitoring.

EUS is useful in the evaluation of unexplained pancreatitis or suspected common bile duct stones as well. If biliary pancreatitis is suspected clinically despite negative imaging results, EUS may be appropriate to further evaluate the biliary tree. Other than endoscopic retrograde cholangiopancreatography (which is more invasive), EUS is the most sensitive imaging test for choledocholithiasis. Other causes of unexplained pancreatitis include biliary microlithiasis and pancreas divisum. Both conditions are difficult to detect with standard imaging techniques, but may be identified with EUS.

**Considerations for EUS Referral**
Procedures are conducted on an outpatient basis in the endoscopy suite at Greenville Memorial Hospital. EUS can be performed with conscious sedation or anesthesia and is associated with a low rate of complications (similar to that of colonoscopy or upper endoscopy).

New echoendoscopes are smaller and easier to pass into the esophagus. Improvements in ultrasound technology produce high-resolution images and Doppler capabilities that aid in making a definitive diagnosis.

The indications for EUS are numerous and constantly evolving. Currently, appropriate patients to refer include those with an upper GI malignancy, unexplained lymph node enlargement in the upper abdomen, pancreatic cyst or fluid collection, unexplained pancreatitis and those with abnormal upper endoscopy results, particularly if a submucosal mass is seen in the esophagus or stomach.

For consultation or referral, call (864) 232-7338.

Stephen Brackbill, M.D., is a gastroenterologist with Gastroenterology Associates P.A.
Jonathan Markowitz, M.D., M.S.C.E., a pediatric gastroenterologist with Greenville Hospital System (GHS) University Medical Group and GHS Children’s Hospital, has co-edited a new textbook, *Pediatric Inflammatory Bowel Disease*.

The book seeks to raise awareness about pediatric inflammatory bowel disease (IBD) among healthcare professionals, and encourage early diagnosis and treatment. Dr. Markowitz emphasized that the book is not just for pediatric GI specialists.

“It’s actually a tool that we see as being useful for general pediatricians, family practitioners, adult GI specialists and pediatric and adult surgeons, especially in areas where there isn’t much pediatric GI support,” he said.

**Book Emphasizes Holistic Care**

The book, which Dr. Markowitz edited with former colleagues Drs. Petar Mamula and Robert Baldassano of the Children’s Hospital of Philadelphia, features chapters written by more than 75 of the world’s top experts on pediatric IBD – and IBD in general. It shares the latest information on etiology and pathogenesis, epidemiology and clinical features, diagnosis, medical and surgical therapy, and research. There also is a chapter on “special considerations” (such as mental health ramifications), the difference between IBD and irritable bowel syndrome, and legislative advocacy.

The most progressive treatment of pediatric IBD requires a holistic approach that involves not only physicians and nurses but also social workers, dietitians, legislative advocates and mental health professionals, Dr. Markowitz pointed out.

The book includes samples of letters that doctors can use to apply for rights on behalf of their patients with school officials, insurance companies and others. As the book’s chapter on advocacy notes, “Although this is not something we are taught in medical school, it has become an integral facet of practicing collaborative medicine in the United States in the 21st century.”

**Specialized Care Facilities**

GHS’ Pediatric Gastroenterology/Center for Digestive Health at Children’s Hospital specializes in treating children with IBD and other GI problems. Antibiotics, corticosteroids and other immune-modulating drugs are among treatments that may be recommended. In the most severe cases, surgery may be necessary to remove or bypass diseased segments of the intestines, or to install feeding tubes to sustain adequate nutrition.

The outpatient GI center at GHS has full anesthesia support for pediatric patients undergoing colonoscopies and other procedures. GHS also offers pediatric wireless capsule endoscopy (WCE), a diagnostic procedure in which the patient swallows a tiny camera that travels the GI tract, gathering and transmitting images and data.

“WCE has enabled us to increase our diagnostic capabilities and also helped us differentiate between the two types of IBD – ulcerative colitis and Crohn’s disease,” he stated.

Children’s Hospital’s GI center recently opened a dedicated area for infusions, including REMICADE® – “one of the more ground-breaking treatments for Crohn’s disease,” said Dr. Markowitz. Children on REMICADE therapy typically receive infusions approximately every two months.

In terms of early diagnosis of pediatric IBD, Dr. Markowitz encourages physicians to watch for unexplained lack of growth. “That may be the first manifestation before the onset of the more obvious signs and symptoms, such as diarrhea and abdominal pain,” he said.

For more information on the Pediatric Gastroenterology/Center for Digestive Health at Children’s Hospital, call (864) 454-5125.

Jonathan Markowitz, M.D., M.S.C.E., is a pediatric gastroenterologist at GHS University Medical Group–Department of Pediatrics/Children’s Hospital and associate program director of GHS’ Pediatric Residency Program.

**IBD by the Numbers**

- 1.4 million: People with IBD in the U.S.
- 45,000-100,000: Children with IBD in North America
- 10,000: Pediatric IBD cases diagnosed annually

*Source: Pediatric Inflammatory Bowel Disease © 2007*
Acknowledges the historic and growing collaborative relationship among the University of South Carolina, USC School of Medicine and GHS.

Stroke Protocols Update
Building on protocols streamlined by the Greenville Memorial Hospital Emergency Department (ED), the hospital’s Rapid Response Team (RRT) is implementing protocols for handling inpatient strokes.

The ED has been using stroke protocols developed two years ago based on guidelines from The Joint Commission and the American Stroke Association. These best practices are designed to prevent or stop ischemic strokes. The protocols require a strong team effort, primarily because of the many checks and balances necessary before administering tissue plasminogen activator (tPA). This drug is proven to be very effective in treating strokes, but it also carries risks for hemorrhage. For more information, call stroke program coordinator Shannon Sternberg, M.S.N., R.N., CNRN, at (864) 455-8848.

Congratulation to Drs. Earle, Tobola

Congratulations to Julius Earle Jr., M.D., GHS Department of Psychiatry & Behavioral Medicine, on being approved for fellowship status in the American Psychiatric Association (APA). The honor recognizes Dr. Earle’s dedication to the work of the APA and the psychiatric profession.

Kudos also to Allison Tobola, M.D., Primary Care Sports Medicine Fellow with Steadman Hawkins Clinic of the Carolinas/GHS Family Medicine Residency, who scored highest in the nation on the sports medicine in-training examination. This year was the first one in which the 150 U.S. fellows took the test.

GHS Among Top Integrated Health Networks
GHS has been ranked among the nation’s top 100 integrated healthcare networks (IHN) by Verispan LLC, a healthcare data and consulting firm.

The 2008 Verispan IHN 100 ranking was based on the firm’s evaluation of more than 580 health systems. These networks were graded on operations, quality, scope of services and efficiency.

GHS has been included in this ranking for eight consecutive years. It is one of just two S.C. networks to appear in the 2008 listing and the only healthcare system in the Upstate to receive this honor.
GHS to Add Minimally Invasive Surgery (MIS) Suites
With its minimally invasive (or minimal access) surgery suite expansion, GHS is providing a state-of-the-art environment for surgical care today and laying the technological infrastructure to propel its growth as a leading regional medical center into the next decade. By staying on the leading edge of minimal access technology, GHS enables surgeons to perform the latest procedures and is poised to support new surgical trends, such as single port access surgery.

Greenville Memorial Hospital, which has 10 MIS suites, is completing the conversion of another nine traditional ORs into MIS suites this spring for a total of 19 MIS suites. In addition, Patewood Medical Campus has six MIS suites. Four such suites will be at the new Greer Memorial Hospital.

GHS’ MIS suites are between 650 and 850 square feet, and feature equipment to facilitate not only MIS procedures but also distance learning broadcasts. High-definition, flat-panel monitors and communications devices are supported by booms on the ceiling that can be retracted and lowered.

Simulation Center Opens
The Greenville HealthCare Simulation Center is enabling medical, nursing and allied health students and professionals to practice procedures and improve clinical competencies.

The center is an outgrowth of Health Sciences South Carolina, which brings together the state's largest universities and health systems to increase health sciences research, drive economic development and improve the health of South Carolinians. The facility houses 12 adult, child and infant simulators. For more information, call (864) 455-2201.

GHS ORs at a Glance
- Greenville Memorial Hospital: 30 ORs (outpatient and inpatient), including 19 MIS suites, plus three dedicated obstetric OR suites
- Patewood Medical Campus: four inpatient ORs, six outpatient ORs (including six MIS suites)
- Allen Bennett Memorial Hospital: four ORs (soon to be four MIS suites at the new Greer Memorial Hospital), plus one dedicated obstetric OR suite
- Hillcrest Memorial Hospital: four ORs
- Cross Creek Surgery Center: four ORs
- Total GHS: 56 ORs, including 29 MIS suites by autumn

For more information, please call Wendell James, M.D., at (864) 455-3646 or William Cobb, M.D., at (864) 676-1072.

GHS Has Busy FY ’07
GHS had a very busy year in fiscal 2007 (October 2006 through September 2007) as you can see by the following statistics:

Comprehensive Patient Care
- 19,110 Outpatient Surgeries
- 13,510 Inpatient Surgeries
- 3,023 Cardiovascular Surgeries
- 91,817 Medical Center Clinic Visits
- 674 Air Transports
- 360,499 Radiologic Procedures
- 17,380 Vascular Lab Procedures
- 27,673 Echocardiogram Lab Procedures
- 1,172 Electrophysiology Procedures
- 6,728 Cardiac Catheterizations
- 42,681 Hospital Discharges

Expanding Academic Programs
- 41 Medical Students
- 164 Resident Physicians
- 7 Residency Programs (Family Medicine, General Surgery, Internal Medicine, Medicine-Pediatrics, OB-GYN, Orthopaedic Surgery, Pediatrics)
- 4 Fellowships (Developmental-Behavioral Pediatrics, Sports Medicine, Vascular Medicine, Vascular Surgery)
BI-LO Charities Donates $2.5 Million

The BI-LO Charities Children's Cancer Center embraces total family-focused care for pediatric inpatients and outpatients. It also pursues advanced childhood cancer research.

BI-LO Charities has donated $2.5 million to Children’s Hospital of Greenville Hospital System University Medical Center (GHS) for the BI-LO Charities Children's Cancer Center. The single largest donation in GHS history, the gift encompasses current inpatient units, research and outpatient programs for children diagnosed with cancer and blood disorders.

Research is ongoing at GHS to develop a “vaccine” immunotherapy for pediatric patients that would give children a less painful treatment alternative. In addition to supporting this work, the BI-LO donation will permanently fund vital cancer-related psychosocial programs with GHS Children's Hospital.

William Schmidt III, M.D., Ph.D., medical director of Children’s Hospital, said, “The center has board-certified pediatric hematology/oncology physicians, specialty-trained nurses, a Child Life specialist, a psychologist, a social worker and a chaplain who all work together to address the needs of children and families faced with a diagnosis of pediatric cancer.”

Commented Brian Hotarek, president and CEO of BI-LO and president of BI-LO Charities Inc., “The best thing that could happen in the future would be to find a cure for cancer so that the children’s center is no longer needed. Until then, we will offer hope and comfort for the youngsters and their families to ensure they receive the best care possible.”

For more information, please call Children’s Hospital at (864) 455-8860.

The information contained in Vital Signs is for educational purposes only – it should not take the place of medical advice or diagnoses made by healthcare professionals.