DEPARTMENT OF ORTHOPAEDICS and PHYSICAL MEDICINE

ANNUAL REPORT

MUSC
Medical University of South Carolina

Dear Friends and Colleagues:

It is my pleasure to provide this introduction to the 2018 Annual Report of the Department of Orthopaedics and Physical Medicine at the Medical University of South Carolina. Engagement in pursuits unique to an academic health center differentiates us in the contemporary health care marketplace and, accordingly, these are some of the aspects of our Department about which we are most proud. Our mission is to provide exemplary and compassionate musculoskeletal care to our patients while educating tomorrow's physicians, nurturing an environment that encourages scientific inquiry, and serving our community.

As recognition of our commitment to the highest quality patient care, we are proud to be ranked #37 among all orthopaedic programs in the country this year by *US News and World Report*. This achievement is the direct result of the incredibly dedicated team that is MUSC Orthopaedics and Physical Medicine.

This year we are particularly pleased to acknowledge the expansion of the Department's clinical scope with the addition of "Physical Medicine" to our name. This clinical expansion will also benefit our academic agenda through rehabilitation education to both undergraduate students and graduate trainees in our new Interventional Spine Care fellowship program.

The most distinctive aspect of our clinical care is a firm commitment to intellectual rigor and discovery. Emblematic of this commitment is the PEPPER study of medications commonly used to prevent blood clots that result in pulmonary embolism, and sometimes death, after total hip and knee replacement. MUSC serves as the lead clinical site in this national trial, which is the largest federally funded clinical trial ever to be conducted in orthopaedics. All six of our joint replacement surgeons at MUSC are deeply engaged in this endeavor and have made MUSC the leading enrollment site in the entire trial.

Our clinical research is complemented by a productive relationship with the Clemson Bioengineering program, which is housed on the MUSC campus and promises the development of new and better medical devices.

Some of our most rewarding endeavors occur in partnership with learners at all stages in their professional careers and include the mentoring of students and trainees who will be the healthcare thought leaders of tomorrow. This was the fifth consecutive year of a perfect performance by our residents on the certifying exam of the American Board of Orthopaedic Surgery. We have also received national attention for pioneering an accelerated program of transition from medical school to residency. It serves a dual purpose of reducing student debt and increasing surgical experience so that graduates are better prepared to pursue independent orthopaedic practice upon graduation.

Finally, our faculty harbor a strong service commitment motivated by a desire to lead and "give back" to both our profession and our local communities. We now boast two West Point graduates among our faculty ranks, as well as a resident member of the Board of Directors of the Society of Military Orthopaedic Surgeons. Through theirs and others' military deployment in service to our country, and the support of all our faculty in covering during their absence, we remain prominently engaged in the medical care of our servicemen.

On a more humanitarian note, we continue to send faculty and resident teams twice yearly to Haiti to provide orthopaedic care to underserved communities ravaged by the recent flurry of storms in the Caribbean. These engagements provide great societal good as well as unique educational experiences to expand our academic mission.

On behalf of the faculty and staff of MUSC Orthopaedics and Physical Medicine, I am delighted to share our accomplishments of the past year with you in the pages that follow.

Vincent D. Pellegrini, Jr., MD
John A. Siegling Professor and Chair
Department of Orthopaedics and Physical Medicine
Medical University of South Carolina
Adjunct Professor of Bioengineering
Clemson University

Who we are – 2018 by the numbers!

Faculty, Staff & Trainees

87

- **29** Faculty
- **24** Staff
- **21** Residents
- **1** Research Resident
- **1** Fellow
- **1** Post doctoral fellow
- **10** Clinical extenders (PA, NP, RN, ATC)

Visiting Learners

- **23** Visiting Medical Students
- **8** Haiti Residents

Research

21 Active Awards*

- **$2,424,762** Federal & Foundation
- **$301,839** Corporate

$2,726,601 TOTAL

*2018 expenditures

$1,663,619 Six new awards in FY18

12 Active clinical studies

10 Divisions

- Adult Reconstruction and Total Joint Replacement
- Foot & Ankle
- Hand
- Oncology
- Pediatric Orthopaedics
- Physical Medicine & Rehabilitation
- Sports Medicine
- Shoulder & Elbow Surgery
- Spine
- Trauma

U. S. News & World Report Rankings

#37 Adult Orthopedics
#43 Ped. Orthopedics

Joint Commission

Advanced Certification for Total Hip and Total Knee Replacement

Patient Satisfaction

Overall willingness to refer

CGCAHPS	HCAHPS
90.6%	82.4%

Surgical Case Volume

- **2,266** Ambulatory cases
- **3,190** Inpatient cases

5,456 TOTAL

81 Total Peer-reviewed Publications

116 Professional Society Presentations

Sports Medicine Coverage

4 Professional teams | **3** Semi-Professional/Adult Teams | **8** High Schools
5 Collegiate & Club Teams | **4** Tournaments | **2** Injury-protection Programs

Interdisciplinary Department Collaborations

Rheumatology | Clemson BioEngineering | Endocrinology | Family Medicine
General Surgery | Hematology | Neurosurgery/Spine | Pediatrics
Plastic Surgery/Hand | Psychiatry and Addiction Medicine | PT/OT
Sickle Cell Disease Program | General Surgery Trauma Program

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DEPARTMENT OF ORTHOPAEDICS DIVISIONS

12 Adult Reconstruction/Joint Replacement

14 Sports Medicine

18 Physical Medicine and Rehabilitation

22 Pediatric Orthopaedics

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30 Orthopaedic Oncology

34 Foot and Ankle

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Front cover: Dr. Charles A. Reitman in surgery.

MUSC Orthopaedics leads medical education innovation to shorten residency training, improve competence, and reduce debt burden for students at graduation

The Accelerated Curriculum For Orthopaedic Residency (ACFOR) program

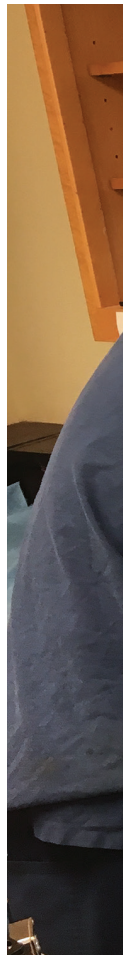
Health care in the United States has changed dramatically over the past century. Surprisingly, the system of medical education responsible for training physicians has not kept pace. Courtesy of advances in our knowledge of disease, there is far more for the newly minted physician to learn. New technologies and less invasive techniques add to the list of skills that surgeons must master by the time they start practice. Yet, an increased awareness of the stress of medical training and the fatigue that accompanies long hours on the job has brought much needed reform in work hour limits for residents in training. While a typical work week ranged from 110 to 120 hours for a surgical resident 30 years ago, a maximum of 80 hours per week is now imposed by regulatory bodies. The net effect is a perfect storm. Residents have more to learn in a shorter period of time than was required one hundred years ago when the last serious review of medical education in the United States was undertaken.

And to make matters worse, medical education (like everything else) costs much more than it did one hundred years ago and physician pay has actually decreased over the past 30 years as a result of the health care reform movement. The average education debt of the graduating medical student in the United States was nearly $200,000 in 2018 and it appears that this reality has dampened the enthusiasm of the brightest and most talented students to pursue a career in medicine.

In an effort to mitigate this issue, as well as provide orthopaedic trainees with greater surgical experience and confidence in their own skills at the time of graduation, Dr. Pellegrini has pioneered an accelerated program of transition from medical school to residency. Educators at the Medical University of South Carolina in the Department of Orthopaedics and Physical Medicine are developing a new pathway of medical education by repurposing the 4th, and last, year of medical school. The program, called the Accelerated Curriculum For Orthopaedic Residency (ACFOR), was initiated by our Department with support of the Dean's office two years ago and has attracted national attention as an innovative approach to addressing some of the great challenges of contemporary medical education. It has enjoyed such popularity and acclaim on our campus that nearly every clinical department at MUSC will be launching similar accelerated transition to residency programs modeled after ACFOR next year.

Traditionally, the final year of medical school allows time for students to explore career options in different specialties and to visit other medical centers where they might be interested in pursuing residency training. This is a time consuming, and expensive, endeavor... particularly for students that have already decided which field they would like to pursue as a career, and even which program they would like to join for residency training.

The ACFOR program affords an opportunity to some of our most accomplished students, who have already decided upon the field of medicine that they wish to pursue as a career, to graduate a full year early and repurpose what would have been their 4th year of medical school towards residency training. The program requires adjustment of the order of courses in the third year of medical school, which is a complicated scheduling feat, so there is a limited number of interested students who can apply for the program. Once accepted as an applicant, the student's schedule of rotations is modified to have some of the most critical services occur early enough to support a decision about admission to the ACFOR program. Typically, this decision occurs in February of the third year of medical school. All of the required courses, which by mandate of



the Licensing Committee on Medical Education (LCME) must include no less than 130 weeks of structured instruction, are completed in three academic years and the medical degree is awarded. Prior to graduation the ACFOR student has opportunity to do three or four elective rotations that are specifically designed to better prepare them for their chosen career in orthopaedics.

Ultimately, the year of medical school "saved" by early graduation is rolled forward into the residency program so the ACFOR resident will spend six rather than five years studying orthopaedics. However, in the final (sixth) year, the ACFOR resident can personalize their training by picking subspecialty areas in orthopaedics, such as hand surgery or sports medicine, in which to concentrate their studies. Presently, more than 90% of graduating orthopaedic residents already voluntarily choose to pursue an additional year of fellowship training after the conclusion of their traditional five-year residency. There is some evidence to suggest that one of the reasons for this is a lack of confidence by the graduating residents to start independent practice immediately upon completion of the residency. In many instances, we expect that this additional training in one or two areas chosen by the ACFOR resident will lessen the need and desire for an additional year of fellowship surgical training dedicated to a single specific subspecialty area. As such, the ACFOR graduates will have completed 3 years of medical school and six years of residency training in the period that currently includes four years of medical school and five years of residency. If a fellowship year is felt unnecessary by the ACFOR graduates, an entire year of training will be saved.

As envisioned, the net effect of the ACFOR program will be to graduate residents who are better prepared to enter independent practice upon completion of the residency program by virtue of the additional surgical experience gained in the sixth year. Moreover, they will pay one year less tuition by graduating in three years rather than four. And, if the fellowship year is foregone, the total time in training will be reduced from 10 to nine years so the practice life of newly minted physicians will be extended.

The ACFOR program is in its third year and has met with success and great enthusiasm thus far. It has attracted attention at a national level and was the centerpiece of a symposium concerned with deriving greater benefit from the fourth year of medical school at the 2017 Annual Meeting of the Association of American Medical Colleges. Locally, the popularity of the ACFOR program has led to an initiative to introduce accelerated transition to residency programs in almost every clinical department on the MUSC campus. ACFOR is poised to bring a simultaneous "win" to all constituencies involved in this discussion - the student and resident learners, the healthcare system, and our patients!

Medical students aspiring to pursue a career in orthopaedics refine their surgical skills in an animal surgery laboratory.

Clemson-MUSC Bioengineering collaboration links technology and medicine

The Clemson University-Medical University of South Carolina Bioengineering program's mission is to bridge engineering and physical sciences with the life sciences to better understand fundamental biology and related disease processes through:

- Application of engineering and physical science principles to unravel biological systems,
- Refinement of biomedical technologies through multi–disciplinary translational research, and
- Education and preparation of students for careers in bioengineering and related fields.

In addition to advances in health care and biomedical technologies that directly benefit the citizens of South Carolina and the United States, the Clemson-MUSC BioE program stimulates economic development through technology transfer and commercialization.

The program was established in 2003 through an inter-institutional agreement between Clemson and MUSC. Located in the Bioengineering Building on the MUSC campus, the institutional leadership of the program is charged to the Provosts at both MUSC and Clemson. The program is now comprised of five primary faculty from Clemson, permanently located with a full-time research presence on the MUSC campus in Charleston, and 26 basic science and clinical faculty from MUSC. While orthopaedics is a principal partner in the bioengineering program, research and education collaborations have been established in ten departments and colleges at MUSC involving cancer, heart disease, neuroscience, rehabilitation, dental and craniofacial medicine, ophthalmology, surgery, and pharmacology.

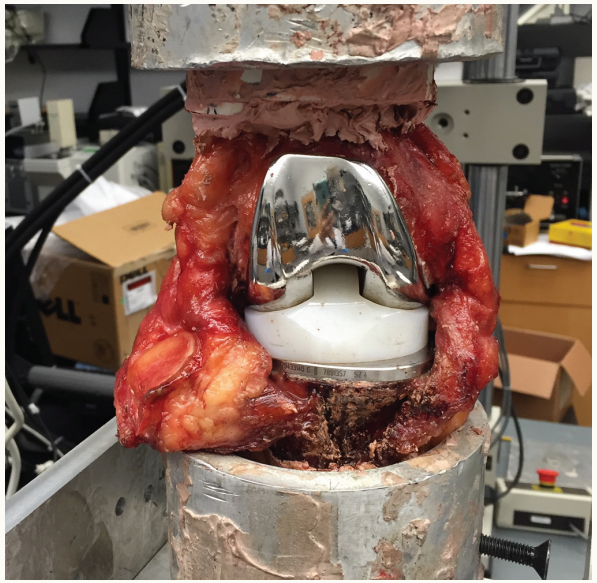
There is a full complement of state-of-the-art research laboratories and teaching facilities for graduate education. The unique opportunities for students include clinical immersion, direct collaboration with clinicians and basic life scientists, and exposure to life sciences education in an academic health center. Innovation and translational research are a particular focus of the program.

Studies are underway to develop real-time minimally invasive methods for evaluation of articular cartilage in diseased joints via arthroscopy to assess cell viability and extracellular matrix structure. This technology, which does not use antibodies or dyes for visualization, could provide direct benefit to surgeons evaluating patients with arthritis for cartilage restoration procedures or total joint replacement. Similarly, Clemson is a world leader in the development of smart sensors. Collaborations with surgeons aim to embed wireless, powerless, reportable sensors into joint replacement devices. This would allow real-time evaluation of implants during and after surgical placement, leading to better selection of implantable devices, improved alignment, and more reproducible patient outcomes.

A recently funded multi-year COBRE grant, led by Hai Yao, PhD, has led to establishment of the Clemson University NIH Centers of Biomedical Research Excellence, entitled "*South Carolina Translational Research Improving Musculoskeletal Health*." This new consortium seeks to improve product success rates and speed up regulatory approval processes by utilizing "Virtual Human Trials" to evaluate new products and custom-built computational models to assess product performance before undertaking human clinical trials. Yongren Wu, PhD, a graduate of the Clemson BioE program, is working closely with orthopaedic faculty to reveal the mechanisms of arthritis at the base of the thumb and the cause of spinal disc degeneration in the low back. Clemson's expertise in computational modeling and bioengineering holds great promise to efficiently vet poor products and identify good candidates for rapid commercialization.

Finally, while many investigators focus on how medical devices affect the human body, Jeremy Gilbert, PhD, Director of the Clemson-MUSC BioE Program, leads one of the few groups in the world studying how human biomolecules affect the material properties of implantable medical devices. Ongoing studies will examine how the immune response and other biological processes contribute to medical device failure and release of toxic compounds into the body, leading to new therapies to preserve and restore proper function of devices within the body.

Dr. Hai Yao working with student in the joint MUSC-Clemson bioengineering program



Knee replacement testing in a simulation device in the biomechanics laboratory.

JEREMY L. GILBERT, PhD

Director, CU-MUSC Bioengineering Program

Dr. Jeremy Gilbert is the Hansjörg Wyss Smart State Endowed Chair for Regenerative Medicine and Professor of Bioengineering at Clemson and Director of the Clemson – MUSC Combined Program in Bioengineering, as well as Professor of Orthopaedics at MUSC. He received his PhD in Metallurgical Engineering and Materials Science, and Biomedical Engineering at Carnegie Mellon. Dr. Gilbert was an associate professor in the Department of Biological Materials at Northwestern University Dental School and Department of Biomedical Engineering in the Engineering School before moving to Syracuse University, where he became Chair of the Department of Bioengineering and Neuroscience and subsequently was named Associate Dean for Research and Doctoral Programs in the College of Engineering. He is also the Founder of the Syracuse Biomaterials Institute. He is currently Editor-in-Chief of the Journal of Biomedical Materials Research – Part B: Applied Biomaterials, and past President of the Society for Biomaterials. Dr. Gilbert was elected as a Fellow of the International Union of Societies of Biomaterials Science and Engineering and the American Institute for Medical and Biological Engineers. He is also on the Medical Devices Committee of the Food and Drug Administration for Orthopedic and Rehabilitation Devices.

HAI YAO, PhD

Associate Chair, CU-MUSC Bioengineering Program

Dr. Hai Yao is Professor and Ernest R. Norville Endowed Chair in the Department of Bioengineering at Clemson University, and assistant professor of materials science in the College of Dental Medicine at MUSC, as well as assistant professor of Orthopaedics at the College of Medicine there.

Dr. Yao serves on several expert national panels. His research interests include the biomechanical function, degeneration, and regeneration of skeletal systems, including the temporomandibular joint and the spinal intervertebral disc. Dr. Yao's team contributed to the world's first demonstration of a full synovial joint regeneration. He has extensive collaborations with the Orthopaedics Department, including creation of computational models of shoulder replacement devices and assessment of spinal surgical implants. Most notable, is the recent funding of a NIH Center of Biomedical Research Excellence (COBRE) award. This multi-year $11.2 million award seeks mentorships for junior scientists and has strong linkage with the Department of Orthopaedics and Physical Medicine. Dr. Vincent Pellegrini serves as mentor and co-chair of the Clinical Advisory Committee.

MUSC leads massive nation-wide study to balance risks of pulmonary embolism and excessive bleeding after hip and knee replacement

*The Comparative Effectiveness of **P**ulmonary **E**mbolism **P**revention after Hi**P** and Kne**E** **R**eplacement (the PEPPER Trial)*

More than one million total hip and knee replacements are performed each year in the United States. Because disturbing the bone marrow cavity turns on the blood clotting system in humans, these operations are often complicated by formation of blood clots in the veins of the leg (deep vein thrombosis, DVT). These clots sometimes detach from the leg veins and travel to the lungs (pulmonary embolism, PE) where they interfere with the normal pumping of the blood from the heart. When a large clot gets stuck in the lung, it can result in death. The use of blood thinners around the time of operation has become standard practice to reduce the risk of PE, but increases the risk of bleeding from the raw bony surfaces that are created when the joint replacement is done.

The ideal balance between use of blood thinners to prevent PEs and the risk of bleeding associated with their use is unknown.

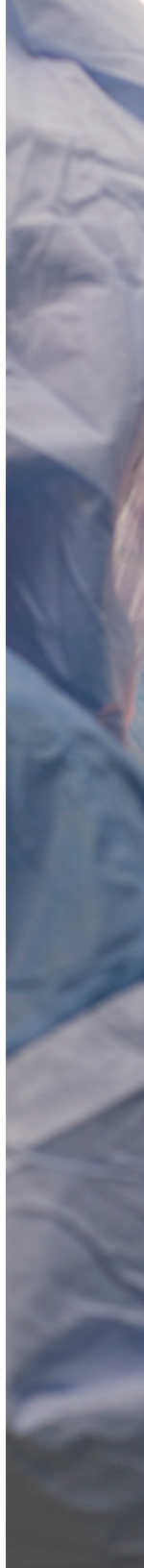
The purpose of the study "Comparative Effectiveness of **P**ulmonary **E**mbolism **P**revention after Hi**P** and Kne**E** **R**eplacement (PEPPER)," which is funded through a Patient-Centered Outcomes Research Institute (PCORI) award, is to combine information about effectiveness in preventing blood clots in the lungs and legs with information about the safety of the most commonly employed blood thinners. The relative concern of patients about avoiding blood clots compared with bleeding is a novel and important part of the study. This work will provide background information to help both patients and their surgeons in deciding which blood thinner would be best to use around the time of hip and knee replacement.

In order to generate reliable comparisons between the groups, 25,000 patients undergoing elective total hip or knee replacements will be enrolled at 25 centers across North America. The study will encompass six years, with a six-month startup, a six-month follow-up per patient, and six months for final data analysis. The principal investigator is Vincent Pellegrini, MD, John A. Siegling Professor and Chair of the Department of Orthopaedics and Physical Medicine at the Medical University of South Carolina.

For Pellegrini, this has been a three-decade quest. And now this has become the marquis clinical trial for the joint replacement surgeons at MUSC. As chief resident at the University of Rochester (NY) Medical Center in the 1980s, he befriended a hip replacement patient who – at the time – typically stayed three weeks in the hospital following surgery. One day that patient failed to show for his follow-up appointment. He died in the ED with a pulmonary embolism only a few days before his scheduled follow-up visit. Since then, Pellegrini has pursued several grants and trials to study the role of anticoagulants in preventing such events. Many of them were small and not definitive. Some were promising, but succumbed to the vagaries of funding and politics. Until now.

After unsuccessfully applying to NIH and AHRQ, PCORI – an instrument of the federal government created under the Affordable Care Act – was impressed with the need and particularly the design of the study and has awarded nearly $14.5 million for it. This makes PEPPER the largest clinical trial, both in terms of federal funding dollars and enrolled patients, ever performed in orthopaedics. The scale of this study is huge . . . and necessarily so. With the small fraction of patients who develop an embolism, no way could a small study of just hundreds of patients ever expect to inform surgeons as to the relative merits of the three most commonly prescribed anticoagulants – plain aspirin, warfarin (Coumadin) and rivaroxaban (Xarelto).

Patients are educated about the nature of the trial. In fact,



an advisory board of patients who have had hip or knee replacement has worked with the MUSC team to develop a video for participating sites to inform potential participants of the benefits of contributing to the study. Their surgeon has the last say in whether they will participate or must be treated with a different, specific medicine. And their primary care physician is being made aware of their patient's involvement.

Twenty-five of the 28 institutions participating have agreed to rely on a central MUSC IRB. Only two in the United States have chosen not to. The third is the University of Western Ontario, which under Canadian law must operate separately.

This is a first. Beginning in January 2018, the National Institutes of Health mandated that multi-site studies have a singular central Institutional Review Board or IRB. This is one of the first times that such a large group of institutions have voluntarily agreed to operate under one central IRB. Most institutions will naturally be reluctant to share control with others. However, since Pellegrini wrote the grant and the protocols, and MUSC picks up a lot of the administration of the grant, he serves as the principal investigator and has established that MUSC serve as the central IRB.

Does one automatically take universal precautions to prevent a PE and choose the most aggressive route? Or accept that excessive bleeding has its own risks for infection, additional surgery or even death. While on the surface, preventing death from a PE seems an obvious option over excessive bleeding, consider the math. Only one or two people in 1,000 are expected to die from a PE. Yet 30 to 50 patients in 1,000 administered the most potent anticoagulant to prevent PEs will have excessive bleeding, which can lead to a need for additional surgery or serious infections that require removal of the new joint replacement.

Typically, a small percentage of patients sign up for clinical trials, citing natural skepticism over being a guinea pig. In this case, nearly 70 percent of eligible patients have agreed to participate. Participating sites expect to enroll 1,000 patients each over the four-year period. While a bit behind the original schedule due to the time to recruit 25 sites and contract with them for use of a central IRB, more than 6,500 patients are now enrolled and recruiting is on track.

This study is not a winner-takes-all study; it is attempting to define "comparative effectiveness." "No less effective" is a more pragmatic bar than "better than." The scale of the study will help determine if – should they all be effective – one of the meds is more appropriate for certain populations. These subgroups might be defined by factors including obesity, ethnicity, smoking, genetics, comorbidities, dialysis patients, or other markers. Indeed, it is likely that no one drug will be a runaway winner over the others. In the end, the information collected about these medicines will assist patients and their physicians and surgeons to best decide which blood thinner is best for each individual having hip or knee replacement.

Conclusions will be determined and presented only upon the analysis of 25,000 cases. That is expected by 2022.

Dr. Vincent Pellegrini and team performing total knee replacement.

MUSC physicians serving in the military ply their expertise around the globe

Dr. Kristoff Reid deployed to Syria in 2018.

Following his graduation from West Point, Dr. Kristoff Reid served in the United States Army for five years, with service in Kosovo, the Sinai Peninsula, and Afghanistan. He currently serves as a surgeon in the U.S. Army Reserves, holding the rank of Major.

He recently returned from deployment overseas with the U.S. Army to Iraq/Syria. He was assigned to a medical unit tasked with immediate treatment of battle casualties. This was his second deployment since arriving at MUSC in 2013. Prior to medical school, Dr. Reid was a decorated infantry officer and served as an Army Ranger.

Dr. Reid is an AO faculty member and a member of the Society of Military Orthopaedic Surgeons. He attended the American Academy of Orthopedic Surgeons (AAOS) faculty development course this fall.

Dr. Alec DeCastro served Active Duty Air Force from 2005-2009. He was deployed to Balad Air Base, Iraq in support of Operation Iraqi Freedom in 2007 and served as the Intermediate Care Ward Physician in one of the busiest trauma centers of the region, caring for injured troops and Iraqi Nationals. He currently serves in the USAF Reserve as Chief of Medical Staff and flight surgeon for the 315th Airlift Wing at Joint Base Charleston, supporting the global mission of providing combat-ready C17 airlift around the world.

Dr. Alec DeCastro with his children at a Veterans Day celebration at their school.

Dr. Josef Eichinger at West Point for his 25th graduation reunion (class of 1993) in his nephew's (Jacob Scriffiny – class of 2021) barracks room, 2018.

Dr. Josef Eichinger received his undergraduate degree from the United States Military Academy at West Point and his MD degree from Temple University School of Medicine.

He just retired as a Colonel in the U.S. Army Medical Corps after 22 years of active and reserve duty. He was formerly the chief of orthopaedic surgery at Madigan Army Medical Center in Tacoma, Washington, and at Womack Army Medical Center at Fort Bragg, North Carolina. He deployed to Haiti and to Afghanistan with the 541st Forward Surgical Team.

Dr. Eichinger has published more than 25 peer-reviewed scientific articles and book chapters in such journals as the Journal of Bone and Joint Surgery, Journal of Arthroscopy and Related Research, Journal of Shoulder and Elbow Surgery, Journal of the American Academy of Orthopaedic Surgeons, and Military Medicine.

Dr. Langdon Hartsock at Naval Air Station Pensacola for reserve duty, 1991

Dr. Langdon Hartsock served in the U.S. Naval Reserve for 10 years, and holds an Honorable Discharge at the rank of Lieutenant Commander, Medical Corps. He was an AAOS/OTA Distinguished Orthopaedic Trauma Scholar at Landstuhl Medical Center in Germany in 2011 for two weeks treating military casualties from Iraq and Afghanistan.

Dr. Sophia Traven (2nd row, far right) with her flight, the Hotel Heatstrokes, from officer training school in Birmingham, 2011.

Dr. Sophia Traven joined the military in 2010 during her last year of college following applications to medical school. She received a full scholarship to the University of Virginia School of Medicine. Before matriculation, she went through basic training for 10 weeks in Alabama and then entered the Reserves. Upon graduation, the Air Force allowed her to defer her active service to complete a five-year orthopaedics residency at MUSC. She currently holds the rank of Captain. Following completion of her residency, she will serve the U.S. Air Force as an active duty orthopaedic surgeon. Dr. Traven is also an active member of the Society of Military Orthopaedic Surgeons (SOMOS), and currently serves on the Board of Directors as the Air Force resident representative. Dr. Traven has also volunteered in Haiti with MUSC faculty as part of her residency experience.

Global Health Training Program serves communities in need and trains culturally competent physicians

Lindsey Demos, PT, wife of Dr. Harry Demos, coordinates MUSC trips to Haiti and provides hands-on caring to patients.

This program was started in 2015 by Robert Belding, MD, with the enduring support of Shane Woolf, MD of MUSC Orthopaedics, and is organized and coordinated through the South Carolina Orthopaedic Association Foundation. Twice a year as adjunct to the orthopaedic trauma and pediatrics rotations, each South Carolina orthopaedic residency program sends a faculty member and upper level resident, plus various ancillary staff team members, to Port-au-Prince, where the team teaches on ward rounds and gives presentations at the Hospital de la Paix program.

The team then travels roughly four hours by land to Hospital Lumière in Bonne Fin, Haiti which is a small town in the mountains of the southern peninsula of the island. The hospital provides services to a local catchment area of over 30,000 and draws patients from over 100 miles away. The team cares for inpatients, emergent patients, orthopaedic clinic and ortho operating room cases for the week. Two Haitian ortho residents from de la Paix and a local Haitian surgeon are also at the hospital for teaching and patient care as part of the international team.

Six Haitian ortho residents (three separate pairs) later come to the U.S. to spend a one-week observership with one of the South Carolina ortho residency programs.

Part of the experience for the U.S. residents and team members is to review and plan in advance for complex cases, prepare for culturally and spiritually sensitive communications and behaviors, and to learn CDC recommendations for international travel and medical preparation.

Haiti is the poorest country in the western hemisphere. Its citizens' life experience is of third world conditions and austere medical care at best. In the U.S., the Accreditation Council for Graduate Medical Education (ACGME) guidelines for residency training require formal education of residents in five core competencies: professionalism, patient care, medical knowledge, interpersonal and communication skills, and system-based practice, which are formally taught by the attending surgeons during these rotations. Our residents and team members are mentored to provide culturally competent care in a resource-poor region. Several studies have demonstrated that participation in international electives plays a positive and influential role in resident education. Our residents have described this experience as "life changing" and one of the best rotations during their five years.

To date, the South Carolina teams have seen over 2,000 patients in the orthopaedic clinic, supervised over 650 inpatients, and performed more than 550 surgeries. The surgical diversity is remarkable, especially given the fact that many traumatic injuries present to the clinic long after initial injury. The teams have specifically concentrated on teaching basic orthopaedic principles. Acute fractures, malunions, nonunions, acute and chronic infections, untreated congenital abnormalities, and soft tissue and osseous tumors are commonly encountered. For example, the teams have treated more than 175 fractures, nonunion and malunion repairs, 15 lower extremity amputations, and 27 femoral neck fractures managed with hemiarthroplasty. In addition, numerous osteotomies have been performed, along with other general cases such as carpal tunnel releases, posteromedial hindfoot releases, tendoachilles lengthenings and treatment for chronic osteomyelitis.

Faculty who have led trips as part of the SCOA program:

Shane Woolf
Keith Merrill
Langdon Hartsock
Zeke Walton
John Glaser
Chris Gross

Residents who participated in the SCOA program:

Cory Messerschmidt
Steve Stacey
Max Mondestin
Sophia Traven
Dane Daley
Seth Bowman
John Neal
Lex Hanna

above: Most orthopaedic cases in Haiti are the result of trauma, not elective or arthroscopic surgery.

below: Dr. Shane Woolf instructing Haitian and MUSC residents during exchange program.

MAX A. MONDESTIN, MD

MUSC orthopaedic graduate, 2017

Dr. Max Mondestin attended medical school at Emory, completed his orthopaedic residency at MUSC, did a fellowship at Johns Hopkins and is now in private practice as a spine surgeon in Atlanta. During his residency, he participated in a MUSC Haiti medical mission and resident exchange program.

"It was a life changing experience that gave me a new perspective on medicine. In a country with so few resources and numbers of physicians, people were so grateful to have your assistance.

"We have almost any type of orthopaedic instrument you could want. That's not the case in Haiti. You have to know exactly what you have – there are not a whole lot of ways to improvise on the fly unless you planned it out. So, the experience was very beneficial to my understanding of preoperative planning.

"I learned that the people there are really, really tough! For example, one patient we saw had dislocated his hip in a motorcycle accident. A patient in the United States would undergo conscious sedation – be almost completely out of it. This patient in Haiti did not get any medication at all. We proceeded to reduce his hip and he didn't make one peep, and thanked us for our efforts. In the U.S., that patient afterward would have had morphine or fentanyl I.V. This patient got Tylenol. It really puts into perspective the opioid epidemic. Maybe we are trying too hard to take everyone's pain away.

"The focus of the residents there is more on trauma in orthopaedics because that's what they see, and less on the elective surgeries like sports medicine or arthroscopic surgery. There was an arthroscopic tower there, but it was as old as I am and I don't think it even worked. The Haitian residents who came to South Carolina were fascinated by all the gadgets, the instrumentation we have available. The instruments we had in our simulation lab were better than they had in their hospital.

"They don't have the opportunity to subspecialize. One of the residents said they only have one or two MRIs on the island, and they didn't work all the time because of power outages. I am a spine surgeon. Without an MRI, that would be difficult!

"I think the residents would want to do more subspecialty training here. But they seemed like they would want to go home to practice in Haiti.

"Anyone who has the opportunity to participate in a medical mission should take advantage of it. This hits a little closer to home for me. My parents were born in Haiti and came to this country in their early 20s and teens. Had they not chosen to come here, those Haitian patients could be my family."

Spine surgeon Dr. Max Mondestin traveled to Haiti while doing his residency at MUSC.

ADULT RECONSTRUCTION AND ARTHRITIS TOTAL JOINT REPLACEMENT

Adult Reconstruction and Arthritis is a comprehensive, multi-disciplinary program that spans the gamut from non-operative care of arthritis, to primary hip and knee joint replacement, to complex revision joint replacement surgeries and infection management.

MUSC Health is a tertiary referral center for such complex procedures and management of related complications, balancing the benefits of the most innovative techniques with proven technology to improve outcomes and facilitate recovery.

The multidisciplinary joint replacement team includes dedicated fellowship-trained orthopaedic surgeons, anesthesiologists with special expertise in regional techniques and nerve blocks, pain management specialists, hospitalists, physicians' assistants, nurses and nurse navigators, physical and occupational therapists, case managers, clinical research coordinators, and program manager and administrative support – all dedicated to the specific and multifaceted needs of joint replacement patients.

Dr. Vincent D. Pellegrini, Jr.

FACULTY LEADERSHIP

Dr. Vincent Pellegrini is the Medical Director of the Orthopaedic and Joint Replacement inpatient unit at MUSC and Dr. Harry Demos is the Director of Quality Assurance and Process Improvement for the joint replacement program.

VINCENT D. PELLEGRINI, JR., MD

John A. Siegling Professor and Chair – Department of Orthopaedics and Physical Medicine

Medical Director Inpatient Unit, Joint Replacement Division

Dr. Vincent Pellegrini graduated from Dartmouth College summa cum laude with a BA and a double major in biology and economics, and received his medical degree from the Dartmouth Medical School with award of the Dean's Valedictory Medal. He was elected to the Phi Beta Kappa and Alpha Omega Alpha honor societies. After two years of general surgery at Hartford Hospital, he completed an orthopaedic surgery residency and a postgraduate fellowship in surgery of the hand and upper extremity at the University of Rochester, Strong Memorial Hospital. He is a

diplomat of the American Board of Orthopaedic Surgery and holds a certificate of added qualifications (CAQ) in surgery of the hand and upper extremity. For the past 26 years, since 1992, he has chaired three different university departments of orthopaedics at academic health centers, including the Pennsylvania State University College of Medicine, Milton S. Hershey Medical Center, and the University of Maryland School of Medicine. In April 2013, he assumed the position of John A. Siegling Professor and Chair of the Department of Orthopaedics at the Medical University of South Carolina and in 2015 was appointed as the Chief of the Musculoskeletal Institute of MUSC Health.

HARRY A. DEMOS, MD

Associate Professor

Director of Quality, Joint Replacement Division

Dr. Harry Demos received his BS in computer science with an emphasis in bioengineering from Clemson University and his MD from the Medical University of South Carolina. He completed an orthopaedic research fellowship at Boston City Hospital and his internship at Boston University before pursuing an orthopaedic trauma fellowship in Birmingham. He then returned to the Medical University of South Carolina to complete his orthopaedic surgery residency, followed by a fellowship in adult reconstruction at the University of Western Ontario Medical Center in London, Ontario. Dr. Demos is passionate about his role as chair of the Quality Assurance and Process Improvement Committee for the joint replacement program and represents the department in multiple areas throughout MUSC Health, including his appointments to the health information services committee and EMR advisory board.

CLINICAL

MUSC is one of only two hospitals in South Carolina to have its joint replacement program recognized with Joint Commission Advanced Certification for Total Hip and Knee Replacement. More than 700 primary and complex revision hip and knee replacement procedures were performed at MUSC last year. In addition to the #37 *U.S. News & World Report* overall ranking, the total joint replacement program received the highest designation as "High Performing."

- 702 total hip and knee replacements
  - 15% revision cases
  - 126 increase over 2016
  - 55% TKA / 44% THA
- No inpatient deaths – Mortality index 0.0
- Average Length of Stay 2.4 days – LOS index 0.88
- 2.5% 30-day readmission rate
- 1.6% complication rate
- HCAPS Overall Top Box Score >80%
- 81% of patients ambulating on day of surgery
- 90% of patients discharged home
- 99.6% adherence to antibiotic guidelines

Dr. Harry A. Demos

RESEARCH HIGHLIGHTS

The division is committed to intellectual rigor and fostering a spirit of inquiry conducive to continuous improvement in patient care. MUSC is the lead institution for the Comparative Effectiveness of **P**ulmonary **E**mbolism **P**revention after Hi**P** and Kne**E** **R**eplacement Trial, which is funded through a $14.35M Patient-Centered Outcomes Research Institute award. Additionally, MUSC serves as the central IRB for 25 of the 28 participating institutions, making MUSC one of the first institutions in the U.S. to sponsor a central IRB for a large multi-institutional clinical trial.

MUSC faculty members presented a collaborative instructional lecture entitled, "Preventing Hospital Readmissions and Limiting the Complications Associated with Total Hip Arthroplasty" at the American Academy of Orthopaedic Surgeons annual meeting during the past three years.

MUSC is also part of the American College of Surgeons Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery – supporting 700+ hospitals in implementing evidence-based perioperative pathways to improve clinical outcomes, reduce hospital length-of-stay, and optimize patient experience.

Joint Replacement team

SPORTS MEDICINE

The MUSC Health Sports Medicine team is focused on restoring patients' ability to safely enjoy activity. It doesn't just patch up injured jocks; but is a fully comprehensive Sports Medicine service designed to prevent injuries, keep athletes at their best in their beloved activities and return them safely should they be injured. The patient population includes elite and professional athletes, weekend warriors, regular folks who just want to be active, and kids whose growing bodies need to be carefully prepared for participation in various sports.

MUSC Health Sports Medicine seeks to be regarded as a model system within our region for the delivery of integrated and high quality/high value medical care to our patients.

The nucleus of the team consists of:

- Orthopaedic surgeons and primary care physicians with fellowship training specific to sports medicine
- Physician extenders dedicated to care of sports-related injury
- Sports-specific physical therapists
- Full-time athletic trainers dedicated to specific teams under our care

as well as other specialties that complete a comprehensive team including:

- Sports neurologists and concussion experts
- Musculoskeletal radiologists with skills specific to ligament, tendon, and joint injury

The MUSC Health Sports Medicine program is earning distinction as the premier resource for education of athletes and the community on injury prevention, diagnostic techniques, treatment methods, and general health/wellness.

The program's hallmark is a team-oriented approach to patient care, particularly for complex cases and we are often a referral center for difficult cases presenting locally and throughout the Southeast.

SHANE K. WOOLF, MD

Associate Professor
Chief – Sports Medicine

Dr. Shane Woolf is board-certified and holds a certificate of added qualification (CAQ) in orthopaedic sports medicine. He has served as chief of sports medicine at the Medical University of South Carolina since 2013. Along with other members of the MUSC Health sports medicine team, he provides medical coverage and support as head team physician to the Charleston Battery, chief tournament physician for the Volvo Car Open tennis tournament, as well as team physician for the Charleston RiverDogs, numerous local high schools, and other sports organizations. He is a member of the American Academy of Orthopaedic Surgeons, American Orthopaedic Society for Sports Medicine, Arthroscopy Association of North America, and the American Orthopaedic Association.

Woolf is president-elect of the South Carolina Orthopaedic Association and a past president of the Charleston County Medical Society. He has published numerous scientific articles on knee and shoulder research topics.

CLINICAL

MUSC Health Sports medicine aligns with evidence-based and state-of-the-art practices. Among the interests that differentiate us are ACL graft selection, rotator cuff repair optimization, complex shoulder instability repair, concussion assessment and management and our service as a tertiary referral center for local and remote cases, second opinions, revision procedures, complex surgical cases, minimally invasive procedures, and high-quality care of athletes from all levels of competition.

As a tertiary care center, MUSC Health is positioned to be the best-organized comprehensive health care service in the region, with clinical access to specialty care across the Lowcountry. As a result, MUSC Health Sports Medicine is the only local/regional practice that includes unified access to all aspects of athletic care under one banner, including orthopaedics, physiatry, primary care sports, women's health, sports neurology, sports cardiology, and rehabilitation services.

Dr. Harris Slone treating injured RiverDogs player and reporting status to New York Yankees management.

FACULTY LEADERSHIP

HARRIS S. SLONE, MD

Assistant Professor

Dr. Harris Slone specializes in the operative and non-operative treatment of sports medicine injuries with a focus on arthroscopic and minimally invasive surgery of the shoulder and knee. He has provided care to several collegiate and professional teams, including Emory and Georgia Tech University (NCAA), the Charleston RiverDogs, the Charleston Battery and the Atlanta Falcons. As an active clinician scientist, he has published numerous peer-reviewed articles and textbook chapters as well as presented his research on ACL reconstruction with various graft options at national and international meetings.

ALEC O. DECASTRO, MD

Primary Care Sports Medicine

Dr. Alec DeCastro is a primary care physician with a focus on sports medicine. He has extensive training in the non-operative management of musculoskeletal problems, from acute injury through rehabilitation, and is trained in the use of musculoskeletal ultrasound for diagnostic and treatment purposes. His main areas of interest are sports medicine, sports-related concussions, musculoskeletal ultrasound and medical education.

ELIZABETH E. BARTON, MD

Assistant Professor

Dr. Libby Barton splits her clinical time between the emergency department, sports medicine clinic, and event coverage. She specializes in non-surgical treatment of sports medicine injuries in the female athlete, including knee and shoulder injuries, but also medical conditions in athletes and physically active individuals. She has specific interests in emergent orthopaedic/sports medicine conditions and injuries, ultrasound applications in sports medicine, and medical education.

EUGENE S. HONG, MD, MPH

Chief Physician Executive

Dr. Eugene Hong is a primary care sports medicine physician, board certified in both sports medicine and family medicine. His professional interests include the areas of concussions, tendinopathy, and tendinosis; injury prevention; acute and chronic injury and illness related to sports and exercise; exercise science; and the health and wellness of athletes of all ages and abilities. He has served as a team physician for several universities and colleges, two national U.S. lacrosse teams, and a number of high schools.

MICHAEL J. BARR, PT, DPT, MSR

Manager, Sports Medicine

Mike Barr is the Sports Medicine Manager and a physical therapist at MUSC Health. He is responsible for the day-to-day operations of the Sports Medicine division, including overseeing MUSC Health's athletic trainers, outreach program, and event coverage.

SPORTS MEDICINE

Orthopaedics – coordinated referral center for complex or routine ortho/sports conditions including all limbs and joints, hand, foot/ankle, spine

Primary Care Sports Medicine – general medical care with particular focus on athletes and active patients

Dedicated Program Manager – Michael Barr, DPT, who serves at the Primary Point of Triage and administrative partner to the Sports Medicine physicians

Sports Neurology – head injury/concussion program, advanced diagnostic and imaging capability, referral center for local and regional patients

Sports Cardiology/Pulmonology – full array of adult and pediatric specialists for screening of at-risk athletes and assessment of new-onset conditions

Women's Health – access to complete gynecologic services, female athlete triad assessment, and medical issues unique to our female athletes

Bone Health Program – coordination with rheumatology/endocrinology/orthopaedics

Dedicated Radiology/MSK Imaging Specialists – daily coordination with orthopaedic clinicians, weekly case reviews for quality assurance

Dental Medicine/Oral Surgery/ENT/Facial Plastics – specialists for face/mouth/tooth/jaw injury

Ophthalmology Services – for eye/globe injuries

Electronic Medical Records – all MUSC providers (physicians, ATs, PTs, staff) access same EMR to facilitate scheduling, orders, imaging studies, documentation, and communication

On-site at Schools – MUSC Health Sports Medicine ATs are on the "front lines" of the sports medicine community. They have the first contact with the injured athletes, their family members and coaches and communicate directly with our program manager and the MUSC Health Sports Medicine clinicians.

MUSC Health Sports Medicine experts encourage limiting pitch counts to prevent injury to developing youth athlete shoulders.

Professional Sports Medicine Coverage
Charleston Battery
Charleston RiverDogs
Volvo Car Open
Major League Lacrosse Championship 2018
Semi-Professional/Adult Teams
Lowcountry High Rollers – Roller Derby
Charleston Outlaws Rugby Football Club
Charleston Blockade Rugby Club

High Schools
Academic Magnet High School
Charleston Collegiate School
Charleston School of Math and Science
Coastal Christian Preparatory School
First Baptist School
James Island Charter High School
Palmetto Scholars Academy
Pinewood Preparatory School

Collegiate Club Teams
College of Charleston Club Sports

Youth Club Teams/Organizations
TMP Basketball
Charleston Battery Academy
Charleston Battery Camp
DAE Foundation

Recent Tournaments Covered
ACC Women's Soccer Semifinals and Championship
ACC Men's Soccer Championship
Charleston Boxing Club's Annual MOJA Cup
National Senior Women's Tennis Association Championships

Community Programs
Safe Kids Trident Area
Stop Sports Injuries, AOSSM program

TRAINING AND RESEARCH

MUSC Health scientists and physicians are exploring new frontiers in sports medicine related clinical and basic science research.

The team collaborates on state-of-the-art-research in areas such as ACL graft advances, radiographic assessment of shoulder bone loss from instability, the impact of medical conditions such as diabetes and obesity on treatment outcomes, among many topics. New areas of collaboration with the Clemson University Bioengineering program are in development.

MUSC Health Sports Medicine and the Department of Orthopaedics and Physical Medicine recently concluded participation in a clinical trial sponsored by Flexion Therapeutics investigating the safety and efficacy of repeat dosing of a long-acting corticosteroid for knee arthritis. This product is now available and was shown to be effective for outpatient treatments.

The Department of Orthopaedics and Physical Medicine partnered with the Department of Regenerative Medicine and Cell Biology to create a unique and fully outfitted training facility that enables specific focus on arthroscopy and sports medicine, as well as other surgical techniques. The William B. Evins CASE Orthopaedic Bioskills Laboratory is the product of this collaboration. It provides training space for MUSC faculty, residents and students internally and for private industry-sponsored workshops and continuing education events.

above: Dr. Shane Woolf leading a training session for MUSC orthopaedic residents

left: Physical therapist Mike Barr assessing external rotation of the shoulder at 90 degrees of abduction.

above: MUSC Health Sports Medicine is the official provider to the USL Championship Charleston Battery and dozens of other sports teams.

left: Dr. Alec DeCastro checking patient after concussion.

PHYSICAL MEDICINE AND REHABILITATION DIVISION

The Department is elevating physical medicine and rehabilitation service to formal division status

The Department of Orthopaedics is expanding its clinical scope with the addition of "Physical Medicine" to its name - The Department of Orthopaedics and Physical Medicine - as well as the increased depth and breadth of clinical programs that goes along with such an expansion. In the spirit of providing broad support of the College of Medicine's diverse missions, this clinical expansion will also benefit the greater institutional agenda by providing rehabilitation education to both undergraduate students, as well as graduate trainees in our new Interventional Spine Care fellowship program.

DAVID R. O'BRIEN, JR., MD
Associate Professor
Chief – Physical Medicine and Rehabilitation
Director, Interventional Spine and Musculoskeletal Fellowship

"At the present time, we are focused on developing an outpatient spine and musculoskeletal program of excellence to complement the achievements of the MUSC Orthopaedic and Neurosurgery Departments here at MUSC." - David O'Brien, MD

FACULTY LEADERSHIP

Dr. David O'Brien, Jr. is the newly hired Chief of Physical Medicine and Director of the Interventional Spine and Musculoskeletal Fellowship within the Department of Orthopaedics and Physical Medicine at MUSC. He is a fellowship-trained specialist in spine, musculoskeletal and sports medicine and specializes in the non-operative evaluation and treatment of back, neck and joint pains. He performs minimally invasive procedures, injections and tests to evaluate and treat patients with numbness, weakness or pain in their arms, legs or spine.

Dr. O'Brien has four Board Certifications in Physiatry, Sports Medicine, Pain Medicine and Electrodiagnostic Medicine. He has been a fellowship Director for over 17 years and has trained over 25 graduates to date. Dr. O'Brien brings the first and only interventional spine fellowship in South Carolina recognized by the North American Spine Society (NASS) to MUSC.

Dr. O'Brien graduated from Indiana University School of Medicine and performed his residency at the University of Cincinnati Hospitals prior to completing a Fellowship at Portner Orthopaedics in Honolulu, HI in 1996. Dr. O'Brien has been named to "America's Top Physicians®" 10 times. He has given more than 120 national/international presentations in seven countries in addition to publishing numerous articles and book chapters on the subject of back pain, sports injuries and healthcare policy. Dr. O'Brien was the co-chair for the 2009 North American Spine Society Annual Convention, and has served as course director and/or instructor for numerous spine-related injection courses and conferences around the world. He has served on the NASS Board of Directors, previously as Director of Health Policy and currently as Treasurer. Dr. O'Brien is a past Board Member for the Spine Intervention Society and is a member of their Health Policy Division. He is an associate editor for The Spine Journal and editorial reviewer for The PM&R Journal and Spineline.

Dr. Emily Darr physical medicine physician

EMILY A. DARR, MD

Assistant Professor

Dr. Emily Darr received her undergraduate degree from the College of Charleston, earned her medical degree from MUSC, and completed a residency in Physical Medicine and Rehabilitation at the University of Virginia. Dr. Darr has been the primary PM&R physician at MUSC for the last five years. Dr. Darr is also a certified acupuncturist and offers EMG-guided botox injections for certain FDA approved MSK conditions. She has been an investigator for two studies regarding the iFuse Implant™ a small, triangle-shaped implant designed to stabilize and fuse the sacroiliac joint, with grant funding from SI Bone, Inc. Two recent publications related to these studies are "Four-year outcomes after minimally invasive transiliac sacroiliac joint fusion with triangular titanium implants" and "Rapid Communication: 4-Year Outcomes after Minimally Invasive Trans-Iliac Sacroiliac Joint Fusion with Triangular Titanium Implants."

PHYSICAL MEDICINE AND REHABILITATION DIVISION

Vaughn Pyles, PTA, kinesio taping a patient's calf.

CLINICAL

The physical medicine and rehabilitation service has historically been bundled with the MUSC Spine Center. Beginning this year, Physical Medicine and Rehabilitation is being elevated to its own division.

The Physical Medicine and Rehabilitation Division will specialize in the evaluation and non-surgical treatment of patients suffering from spine, sports and musculoskeletal injuries. The Physiatrists perform image-guided diagnostic and therapeutic injections to evaluate and treat patients with back, neck or limb pain. They also perform electrodiagnostic studies, such as EMG and nerve conduction studies, to evaluate patients that present with numbness, tingling, pain or weakness in their arms or legs.

The new Division will also focus on outpatient spine and musculoskeletal medicine which reflects the subspecialty focus of the physicians recruited to complement the needs and practices of MUSC's orthopaedic surgeons. This will help our mission in providing comprehensive orthopaedic care to our community and academic goals by increasing the diversity of teaching available to MUSC medical students, residents and fellows. With time, the Division may recruit physicians to provide general rehabilitation and other physiatry subspecialty care if needs present.

For the near future, rapid growth is expected for this service. Our vision for care of patients with spine and orthopaedic conditions includes Physiatry as a critical component of patient centered, comprehensive care.

Physical therapist Vicky Whalen working with patient.

Physical therapist Jodie Rush with patient.

TRAINING AND RESEARCH

The collective clinical training and didactic educational experience of Drs. O'Brien and Darr will help development and grow the orthopaedic department and the interventional spine and musculoskeletal fellowship program, which will be the only North American Spine Society-recognized fellowship in South Carolina.

Engagement in the education and research missions of the professional societies will be a focus of the MUSC PM&R faculty in the Department.

"The most rewarding aspect of volunteering at professional societies has been the ability to teach internationally. It is much more cost efficient to have physicians from the U.S. travel and teach oversees as opposed to hundreds or thousands of foreign physicians to try and come here. In the past few years, I have had the good fortune to meet and teach physicians in Africa, the Middle East, China and other Asian countries," says Dr. O'Brien. "Besides on-site training in China, many of our courses are webcast to over 100,000 physicians."

PEDIATRIC ORTHOPAEDICS

The MUSC pediatric orthopaedic program provides comprehensive care of infants, children and adolescents with musculoskeletal injuries, conditions, and deformities. It was ranked #42 in *U.S. News and World Report* for 2018-2019. MUSC boasts the only pediatric fellowship-trained orthopaedic surgeons in the Lowcountry.

ROBERT F. MURPHY, MD

Chief – Pediatric Orthopaedics
Assistant Professor

Dr. Robert Murphy completed his fellowship in pediatric orthopaedics and spine and limb deformity at Boston Children's Hospital, affiliated with Harvard Medical School. He is active in clinical research as well as medical education. He is an active member of the American Academy of Orthopaedic Surgeons and the Pediatric Orthopaedic Society of North America. He has also participated in international medical outreach trips to Colombia and Nicaragua.

MATTHEW A. DOW, MD

Assistant Professor

Dr. Matthew Dow completed his fellowship in pediatric orthopedics and spine and limb deformity at the Hospital for Special Surgery in New York City, affiliated with Cornell Medical School. He is active in the medical education of residents and medical students and involved in the local community through the Ronald McDonald house. He is an active member of the Pediatric Orthopedic Society of North America. He says the longitudinal care of the pediatric orthopedic patient and their family is the most important and most rewarding part of his job.

CLINICAL

The Children's Ambulatory Campus in North Charleston will open in Spring of 2019. This facility which is located at the intersection of I-26 and I-526 is convenient to all children and families throughout the Lowcountry. It will offer outpatient exam rooms, CT scan and MRI on site. Additionally, there will be outpatient operating rooms for same day procedures, so that children can recover at home faster from their surgeries.

The MUSC Shawn Jenkins Children's Hospital opening in the fall of 2019 will have the technology and capability to treat infants, children and adolescents with all orthopaedic conditions, including the most complex trauma and pediatric deformity. It will be the only American College of Surgeons (ACS) Level I trauma center in the state.

Pediatric orthopaedic surgeon, Dr. Matthew Dow.

RESEARCH HIGHLIGHTS

MUSC Pediatric Orthopaedic Research has been presented at national and international meetings, including the Annual Meeting of the American Academy of Orthopaedic Surgeons and the Annual Meeting of the Pediatric Orthopaedic Society of North America.

Research on spinal deformity has been presented at the International Congress on Early Onset Scoliosis.

MUSC is active in The Children's Spine Study Group (CSSG) and The Setting Scoliosis Straight Foundation of the Harms Study Group to support discoveries, and advance techniques, in the treatment of spinal deformities in children and adolescents worldwide. This includes patient enrollment in international databases and quality improvement metrics to ensure that MUSC is at the forefront of innovation in treating children with complex spine deformity.

Pediatric orthopaedic faculty have also published dozens of scientific articles in peer reviewed medical journals.

We are pleased that Dr. Sara Van Nortwick will join our group this year after completing a prestigious pediatric orthopedic surgery fellowship at Stanford Children's Hospital in Palo Alto, California. She is actively involved in numerous research projects to advance the field of pediatric orthopedics including scoliosis, hip dysplasia, and fracture care. The treatment of patients with neuromuscular and congenital differences is especially enjoyable for her secondary to the lifelong relationships that can develop.

PEDIATRIC ORTHOPAEDICS

Orthopaedic conditions treated

- Fractures, dislocations, sprains and strains
- Scoliosis and related spinal deformities or conditions
- Hip conditions
- Leg length discrepancy and lower extremity angular deformity
- Clubfoot and flatfoot
- Cerebral Palsy
- Spina Bifida/Myelomeningocele
- Orthopaedic aspects of syndromes
- Musculoskeletal infections

7,400+ Pediatric orthopaedic clinical encounters and 550+ pediatric surgical procedures

- Non-operative and surgical treatment of all pediatric and adolescent injuries
- Surgical treatment of scoliosis, kyphosis and spinal deformity conditions
- Pelvic and femoral osteotomies for hip dysplasia and related conditions
- Arthroscopic treatment of adolescent hip dysplasia and related conditions
- Ponseti casting for clubfoot
- Growing spine treatment for early onset scoliosis (Casting, MAGEC, VEPTR, Growing Rods)

PROFESSIONAL AFFILIATIONS AND SERVICE

Pediatric Orthopaedic Society of North America (POSNA)

Scoliosis Research Society (SRS)

Ruth Jackson Orthopaedic Society

American Academy of Cerebral Palsy and Developmental Medicine

POSNA Quality, Safety and Value Initiative

SRS Quality, Safety and Value Initiative

Led by MUSC Children's Health, Safe Kids Charleston Area brings together health and safety experts, educators, corporations, foundations, governments and volunteers dedicated to preventing accidental injury to children. The team utilizes a combination of resources and outreach efforts to combat accidental injuries, including traffic injuries, drownings, falls, burns, poisonings and more.

The Pediatric Orthopaedics team partners with MUSC Children's Health to promote safety at area events including Second Sunday on King Street.

MUSC Pediatric Orthopaedics provides injury treatment, as well as prevention!

MUSC sponsors a Pediatric Orthopaedics Family Night at the RiverDogs baseball game to promote good health and injury prevention.

HAND SURGERY

The Hand Surgery service offers comprehensive care for problems from the elbow to the finger tips. The multidisciplinary medical team includes fellowship-trained hand surgeons, specialized hand therapists, nurses, and technicians who work together to provide the best possible care available. MUSC offers state-of-the-art surgical and nonsurgical treatment options including injections, minimally invasive arthroscopy, and microsurgical techniques. Providers in the Orthopaedics Department and Physical Medicine provide patient care in concert with plastic surgeons, endocrinologists and other specialists to manage complex problems and patients with chronic systemic illnesses such as rheumatoid arthritis and peripheral vascular disease.

Dr. Kyle Kokko explaining a hand surgery procedure to a patient.

KYLE P. KOKKO, MD, PHD

Assistant Professor

Dr. Kyle Kokko is a hand and wrist specialist at the Medical University of South Carolina. He completed his orthopaedic surgery training at MUSC and a hand surgery fellowship at the Hospital for Joint Diseases in New York City. Dr. Kokko specializes in microsurgery, wrist arthroscopy, minimally invasive surgical techniques, xiaflex injections for Dupuytren's disease, and platelet rich plasma (PRP) injections. He is an accomplished hand surgeon using the WALANT technique for office based surgical procedures.

ERIC W. ANGERMEIER, MD

Assistant Professor

Dr. Eric Angermeier is a hand and wrist specialist at the Medical University of South Carolina. He completed his orthopaedic surgery training at MUSC and a hand surgery fellowship at Duke University. Angermeier specializes in microsurgery, wrist arthroscopy, minimally invasive surgical techniques, complex traumatic injuries, and xiaflex injections for Dupuytren's disease. Dr. Angermeier is an accomplished hand surgeon using the WALANT technique for office based surgical procedures.

CLINICAL

Common Problems Treated

- Nerve: carpal tunnel syndrome, cubital tunnel syndrome, nerve injuries, hand numbness and tingling.
- Tendon: trigger finger, tendonitis, tenosynovitis, tendon injuries, flexor and extensor tendon lacerations, de Quervain's tenosynovitis, tendon transfers.
- Fractures: finger fracture, hand fracture, wrist fracture, boxer's fracture, scaphoid fracture, distal radius fracture, forearm fracture, malunions, nonunions.
- Arthritis: hand and wrist osteoarthritis, rheumatoid arthritis, thumb arthritis, CMC arthritis, SLAC wrist.
- Cysts and Tumors: enchondroma, epidermal inclusion cyst, hand and forearm tumors, ganglion cyst, glomus tumor, lipomas, mucous cyst, osteochondroma, giant cell tumor, Dupuytren's contracture.
- Ligaments: hand, wrist, and elbow ligament injuries, ulnar collateral ligament injuries, gamekeeper's thumb, skier's thumb, scapholunate ligament injuries, TFCC tears, DRUJ instability, sports injuries.

FACULTY LEADERSHIP

All three MUSC orthopaedic hand surgeons – Drs. Angermeier, Kokko, and Pellegrini – are active members of the American Society for Surgery of the Hand and are involved in scientific presentations at the Annual Meeting of the Society. Dr Pellegrini co-developed the Ligament Reconstruction Tendon Interposition (LRTI) arthroplasty, which is one of the most common techniques used to treat basal joint arthritis of the thumb. Drs. Kokko and Angermeier are also active members of the American Association of Hand Surgeons.

EDUCATION AND TRAINING

The Hand Surgery Service takes great pride in the education of resident trainees at MUSC. Over the past five years, eight orthopaedic residents have chosen to pursue subspecialty training in a hand surgery fellowship. This noteworthy accomplishment is a testimony to the exceptional teaching quality provided by Drs. Angermeier and Kokko, for which the hand surgery service is well known in the residency program.

Dr. Eric Angermeier assessing hand and finger mobility.

ORTHOPAEDIC TRAUMA

The Orthopaedic Trauma Division is part of the MUSC Level I trauma center available 24/7/365 to treat anything from a sprain to major life or limb threatening injury. As part of a comprehensive trauma center, we have full capability to treat all injuries – including hand, spine, and pediatric injuries. MUSC has two fellowship-trained orthopaedic trauma surgeons and the entire clinical faculty supports the trauma mission by providing subspecialty expertise. This level of sophisticated and technically advanced care is only available at Level I trauma centers. MUSC is the only American College of Surgeons-verified Level I trauma center in the Lowcountry and one of only five Level I centers in South Carolina. Trauma physicians at Level I facilities must meet stringent annual continuing-education requirements that exceed requirements for other hospitals.

Dr. Langdon Hartsock with Haitian residents training in orthopaedic trauma.

LANGDON A. HARTSOCK, MD, FACS

Professor

Chief – Orthopaedic Trauma

Dr. Langdon Hartsock is internationally known for his expertise in trauma and frequently teaches surgical techniques at national conferences and other universities.

He received his undergraduate degree from Davidson College and his medical degree from Duke University. He completed his residency in orthopaedic surgery at Duke University with two years training in the Department of Surgery's Division of General and Thoracic Surgery and four years training in the Division of Orthopaedic Surgery. He also completed a fellowship at the R. Adams Cowley Shock Trauma Center in Baltimore

Dr. Hartsock is currently a board member of AO Trauma North America. He has been past President of the Southeastern Fracture Symposium, the South Carolina Orthopaedic Association, and the Southern Orthopaedic Association. He has served on the South Carolina Health Policy and Planning Committee and is currently a member of the South Carolina Trauma Advisory Council. He has served on the American College of Surgeons Committee

on Trauma and serves as an oral board examiner for the American Board of Orthopaedic Surgeons.

He served as department Chair from 2000-2013 and was the inaugural holder of the John A. Siegling, MD professorship in orthopaedic surgery from 2006 to 2013. He has received the Order of the Silver Crescent from former South Carolina Governor Nikki Haley. Dr. Hartsock has been at MUSC for 22 years.

KRISTOFF R. REID, MD

Assistant Professor

Dr. Kristoff Reid graduated from the United States Military Academy at West Point, completed an orthopaedic residency at Johns Hopkins University, and then did a fellowship in orthopaedic trauma at Duke University. He served as active duty in the US Army and has been deployed three times.

Dr. Reid currently serves as the leader of the fragility fracture program at MUSC and is the department leader for disaster response. He is a member of the AO faculty and teaches at the annual Southeastern Fracture Symposium.

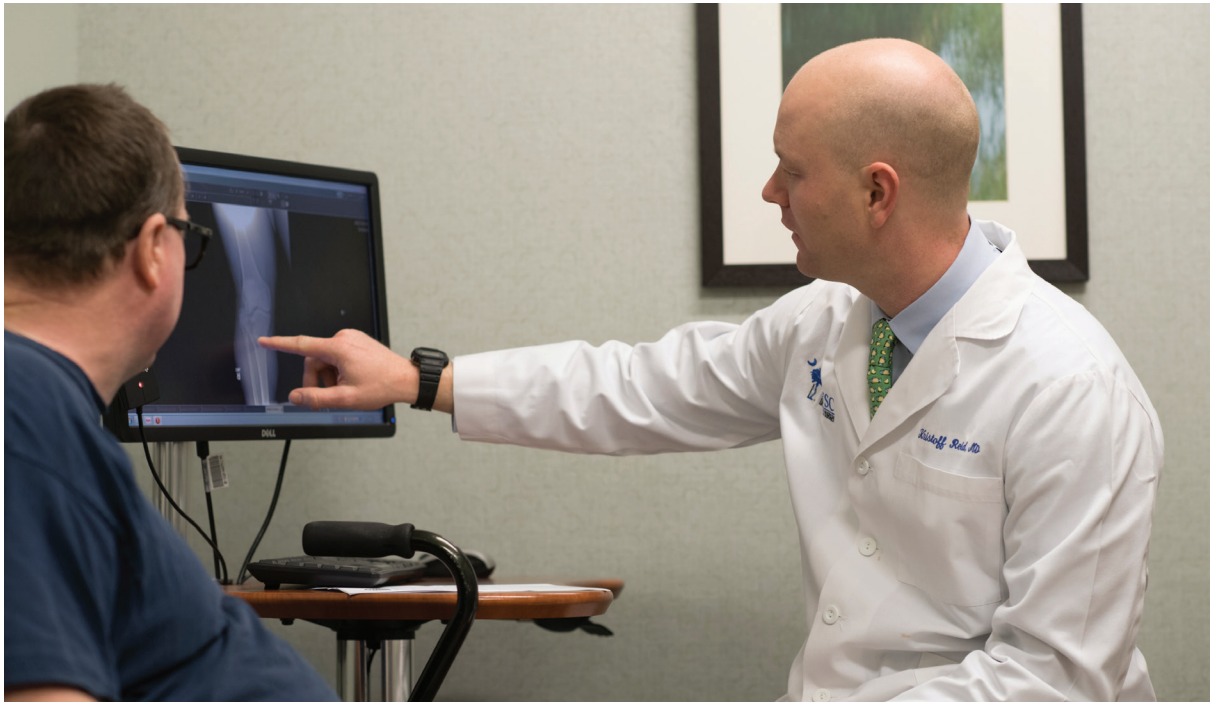
EDUCATION

MUSC is hosting our first AO international fellow this fall. The orthopaedic trauma service has a comprehensive training program for orthopaedic residents including lectures, discussion sessions, hands on skills lab sessions and daily clinical rounds.

CLINICAL

In addition to treating cases that present to the trauma center such as falls, motor vehicle collisions and industrial accidents, the Orthopaedic Trauma Service has established a fragility fracture program to coordinate care for patients with hip fractures or other fractures related to osteoporosis and aging. Many of these patients are elderly and have multiple medical problems. A coordinated program of orthopaedic and medical specialists – specifically endocrinologists with special expertise in metabolic bone disease and osteoporosis – treats these patients as a team to provide complete care with expertise for fracture care and treating the patient's medical conditions. In addition, we provide diagnosis and treatment for osteoporosis and arrange for follow up care for osteoporosis in order to reduce the chance of additional fractures.

Dr. Kristoff Reid following up with patient.



RESEARCH HIGHLIGHTS

Current research activities include evaluating the incidence of fracture nonunion or malunion in South Carolina, evaluation of the hospital financial performance for a dedicated trauma OR, complications following open tibia fractures, and evaluating the relationship between nutrition and nonunion.

A current on-going study has analyzed 350,000 fracture cases since 1998 in the South Carolina Department of Vital Statistics database. Despite advances in technology and improved training of surgeons, the rate of readmissions for nonunion or malunion has not changed significantly in 17 years. The team is interested in studying factors – such as poor/rural/underserved populations or those with comorbid conditions such as obesity, diabetes or an aging population as an explanation for this finding.

ORTHOPAEDIC ONCOLOGY

The Orthopaedic Oncology division is the state's major center for bone and soft tissue sarcoma care and is located within one of fewer than 70 in the U.S. and South Carolina's only NCI-designated cancer centers – The MUSC Hollings Cancer Center. The program services a large geographic area and provides comprehensive care to this unique patient cohort. The division of orthopaedic oncology consists primarily of two faculty members, Chief Dr. Lee Leddy and Dr. Zeke Walton. Crystal Reynolds is the trainer who supports the program. Melinda Ryan, RN, facilitates care coordination and navigation within the Hollings Cancer Center for the entire state.

LEE R. LEDDY, MD

Associate Professor
Chief – Orthopaedic Oncology
Residency Program Director

Dr. Lee Leddy did his undergraduate work at Emory University where he received his B.S. in biological science, while lettering on the varsity basketball team. He then received his MD from the University of Florida College of Medicine in Gainesville, Florida. He went back to Emory University to complete his internship and residency in the Department of Orthopaedic Surgery. He joined MUSC in 2009 after completing a fellowship in orthopaedic oncology at Emory University, where he helped establish the sarcoma program and is currently the leader of the Sarcoma Disease Focus Team at Hollings Cancer Center.

Dr. Leddy currently serves as the residency program director for the Department of Orthopaedics and Physical Medicine and won the MUSC teaching award twice. He is actively involved in both clinical and basic science research and collaborates in the Sarcoma Immunotherapy Lab.

In addition, Dr. Leddy has served on the Musculoskeletal Tumor Society (MSTS) executive committee, nominating committee, and membership committee. He is immediate past president of the Musculoskeletal Oncology Research Initiative.

FACULTY LEADERSHIP

ZEKE J. WALTON, MD

Associate Professor

Dr. Zeke Walton is an orthopaedic surgeon specializing in orthopaedic oncology, including the treatment of bone and soft-tissue growths, both benign and malignant. He obtained his medical degree from the Medical University of South Carolina, his residency in orthopaedics at MUSC, and completed a fellowship in orthopaedic oncology at Emory University in the treatment of bony metastatic disease, as well as all types of soft-tissue and bone sarcomas. His clinical interests include limb salvage surgery for all types of tumors of the extremities. Like many other MUSC physicians, he spends about half his time providing outstanding care for the region's veterans at the VA hospital.

CLINICAL

Clinical focus remains on providing accurate diagnostic work up for skeletal and soft tissue lesions and providing complex limb salvage reconstruction options. The division cares for adult and pediatric patients with soft tissue and bone lesions. Reconstructive options include noninvasive expandable limb salvage surgery for pediatric skeletal sarcomas. Care is coordinated through a multi-disciplinary tumor board.

RESEARCH HIGHLIGHTS

There is both a translational and clinical research focus in the oncology division. It encompasses the lab of Jessica Thaxton, PhD, who works closely with the orthopaedic oncology team. Her primary research focus is immune and metabolic modulation of tumor infiltrating T-cells in sarcomas. The lab has recently submitted an NHI R01 grant for their preliminary work.

The group also has a grant to study wound healing after pre-operatively irradiated lower extremity soft tissue sarcomas. This is a multi-centered project centered at MUSC involving University of Iowa, Stanford, University of Oklahoma, Cleveland Clinic, Johns Hopkins, and St. Louis University.

Several ongoing medical oncology clinical trials are open and enrolling through the MUSC Hollings Cancer Center Clinical Trials Office.

Dr. Zeke Walton in multi-disciplinary team rounds.

ORTHOPAEDIC ONCOLOGY

Skeletal Sarcoma Limb Salvage Surgery

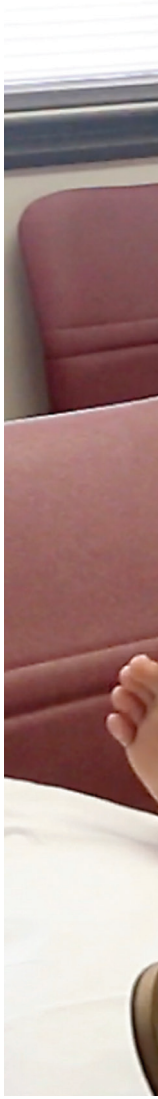
Once there is a suspicion of a skeletal sarcoma, the first step is often an evaluation by an orthopaedic oncologist who will coordinate tissue diagnosis through a biopsy. The next step is often to meet with the medical oncology team and usually provide upfront chemotherapy. Sometimes removal of the tumor requires amputation; however, in most cases, there's a limb salvage option. In a growing child, maintaining longitudinal growth when removing the bone that includes the growth plate is very challenging. But it provides a unique opportunity to do that in a non-invasive way, using magnets and gears to actually lengthen the extremity in proportion to the patient's growth.

An implant is manufactured based on the resection length and how much has to be rebuilt and how much remaining growth. During surgery, the tumor (with an adequate margin) is removed and reconstruction begins. Important arteries and nerves are preserved. In the case of a distal thighbone tumor, for example, a stem is cemented into the remaining femoral canal and the prosthesis is put in place. Soft tissue is reconstructed and the incision is closed. Once the patient has completed post-operative chemotherapy, the team will assess the limb for length discrepancies and begin a noninvasive expansion procedure.

The extremity is put into a magnet. How long a patient stays in the magnet determines the amount of lengthening. For every four minutes in the magnet, the prosthesis lengthens about 1 mm. Side-by-side X-rays taken approximately every three months depending on their peak height velocity are used to assure that the extremity is keeping pace with normal growth through skeletal maturity. Not all patients are eligible for this surgery. Very young patients with a lot of potential growth or certain tumor characteristics may preclude it.

The primary goal of the surgery is to safely remove the tumor. The secondary goal is have a functional extremity. If the limb can be salvaged without compromising the oncological safety of the patient, that is the ideal.

Dr. Lee Leddy in surgery removing a skeletal sarcoma.



Dr. Lee Leddy with patient using magnet to maintain longitudinal growth of femur.


Stanmore Implants

FOOT AND ANKLE

The Foot and Ankle Division is actively engaged in taking care of the patient across a multitude of disciplines, whether it be with limb salvage with vascular surgery, diabetic management with Endocrinology, or care of autoimmune issues and musculoskeletal pathology with Rheumatology.

The MUSC Health Foot and Ankle program specializes in treating a variety of injuries, including foot and ankle trauma, vehicular and sports injuries, as well as chronic conditions, such as arthritis and tendonitis. Patients include those who have been recently injured, as well as those who might have been injured in the past and now have chronic problems.

CHRISTOPHER E. GROSS, MD

Assistant Professor

Chief – Foot and Ankle Orthopaedics

Dr. Christopher Gross completed a fellowship at Duke University Medical Center after completing his residency training at Rush University Medical Center. He graduated from Harvard Medical School in 2009. He specializes in treating complex sports injuries, hindfoot deformities, ankle arthritis, and those who need revision surgery.

As a foot and ankle surgeon he is particularly interested in cartilage injuries that range from small defects to end-stage ankle arthritis. He hopes to develop and nurture a multidisciplinary research division within foot and ankle surgery with the goals of harnessing the power of biologics and improved implant design.

CLINICAL

Experienced orthopaedic surgeons in the Foot and Ankle Program at MUSC Health use a wide variety of non-surgical and surgical methods and techniques to treat foot and ankle injuries and conditions.

Minimally invasive surgery, such as ankle arthroscopy, may allow for earlier return to function after sports injuries.

For arthritis patients, ankle replacement surgery may be appropriate, which can preserve range of motion. Other patients may require reconstructive techniques such as bone fusion or tendon transfer to correct foot deformities.

Joining the team is a podiatrist to assist with the development of the Wound Care. He will streamline the care of the diabetic patients. In his elective practice, he will promote his minimally invasive approach to bunion correction which will be the first of its kind in South Carolina.

Regardless of the condition, the MUSC team practices proven techniques for bone and soft tissue healing, and cartilage preservation.

Conditions treated

- Complex deformities
- Sports injuries
- Achilles tendonitis and ruptures
- Fractures and dislocations
- Infections
- Gout
- Chronic pain of the feet and ankles
- Arthritis
- Plantar fasciitis
- Tendonitis
- Foot and ankle deformities
- Bunions and hammertoes
- Heel pain
- Arch problems
- Congenital deformities
- Nerve conditions
- Ligament sprains and tears
- Diabetic ulcers and Charcot deformities
- Correction and salvage of previously failed surgeries

Procedures and treatments

- 3D printed surgery
- Ankle fusion
- Ankle replacement surgery
- Arthroscopic ankle surgery
- Cartiva
- Joint immobilization
- Orthotics
- Splinting
- Spur removal

RESEARCH HIGHLIGHTS

Dr. Christopher Gross is the Principle Investigator for a grant awarded by the American Orthopaedic Foot and Ankle Society (AOFAS), the world's leading Orthopaedic Foot and Ankle Surgery society. He is investigating how genetic expression might be influenced by stretch on the Achilles tendon. Dr. Gross is recognized as one of the foremost authorities on ankle replacement. MUSC is now one of seven clinical sites in the country investigating the Wright Medical Infinity ankle replacement system in a prospective trial.

Dr. Gross has published extensively in the peer reviewed orthopaedic literature, including both original scientific research articles as well as authoring numerous chapters in textbooks. Additionally, he has presented his work both nationally and internationally this past year.

Other areas of current research include:

- Achilles tendon degeneration
- Safety of knee scooters
- Driving after total ankle replacements
- Radiographic outcomes following bunion surgery
- Antimicrobial properties of orthopaedic hardware

ORTHOPAEDICS AND SPINE

The Orthopaedic Spine specialists within the Department of Orthopaedics and Physical Medicine are members of the larger MUSC Spine Center. Additional providers from Physical Medicine, Neurosurgery, Psychiatry, Physical Therapy, Occupational Therapy, Neurophysiology, Neurology, Radiology, Nursing, Speech Pathology and Case Management round out this alliance of providers that specialize in the multidisciplinary care of spinal disorders. Patients with spinal disorders require a team of providers with a broad set of skills that are organized to provide efficient care seamlessly across multiple specialties. The Spine Integrated Center of Clinical Excellence was formally implemented three years ago to optimize patient-centered care. Through this collaboration, MUSC Health has realized improvements in patient access, hospital length of stay, post-surgical complications, and increased patient visits.

Spine Surgeon Dr. Charles A. Reitman

CLINICAL

MUSC offers a broad surgical expertise in deformity, tumor, trauma, infection and degenerative conditions as well as revision surgery. This includes minimally invasive surgery and motion sparing technologies when appropriate.

Blue Cross Blue Shield has recognized MUSC Health as a Blue Distinction Center for Spine Surgery. This designation means that MUSC provides high-quality specialty care for spine conditions. Becker's Hospital Review has named MUSC Health one of the top 100 Great Hospitals in America. The publication has also identified it as one of the top 100 Hospitals with a Great Spine Program.

FACULTY LEADERSHIP AND RESEARCH INTERESTS

CHARLES A. REITMAN, MD

Professor and Vice Chair, Department of Orthopaedics and Physical Medicine
Co-Director, MUSC Spine Center

Dr. Charles Reitman is the Vice Chair of the Department of Orthopaedics and Physical Medicine and Co-Director of the Spine Center, as well as a board examiner for the American Board of Orthopaedics. He is also the Administration and Development Council Director for the Board of Directors of the North American Spine Society (NASS), overseeing activities in governance, membership, leadership development, section development, finance and ethics. In addition, he serves on multiple committees for the health policy and research councils.

He is the Chair of the Appropriate Use Criteria Committee and primarily responsible for the development of that program for NASS. He has been the NASS delegate for collaborative efforts for AUC development with the RAND corporation in Southern California as well as grant funded projects in Canada and Switzerland, and is the current liaison with the American College of Radiology.

He has a long history of investigation defining kinematics and stability in the cervical spine, and has been recently awarded a $25,000 grant as Co-Principal Investigator for a study defining biochemical and biomechanical properties of the cervical intervertebral disc.

BARTON L. SACHS, MD, MBA

Professor

Dr. Barton Sachs was the winner of the Admiral Albert J. Baccioco Innovator of the Year Award, the highest honor awarded by the Medical University of South Carolina's Foundation for Research Development (FRD). The award recognizes MUSC researchers and clinicians who are working to promote commercialization of university intellectual property through new inventions, patents applied for, technologies licensed, and new startups formed.

He is currently the chief medical officer and founder of SnAPP, a startup focused on commercializing a software platform that coordinates the workflow of physicians and supports advanced practice providers in an easy-to-use mobile application. SnAPP was recognized by the nation's largest member-owned healthcare services company as winner of its Innovation Excellence Award following SnAPP's pilot at a leading teaching hospital.

Most recently, Dr. Sachs founded Hercules, LLC, in order to move forward with the Hercules spinal implant and system, an innovative spinal implant and reduction system for the treatment of any grade spondylolisthesis utilizing an anterior surgical approach.

He was recognized twice by Becker's Hospital Review as "One of the Top Ten Academic Spine Surgeons to Know." He has worked on five commercially available spinal technologies, ranging from endoscopic spine surgical tools to spine implant devices.

JOHN A. GLASER, MD

Professor, Chief of Orthopaedics at the Ralph H. Johnson Veterans Administration Medical Center

Dr. John Glaser is the recent chairman of the coverage policy committee for the North American Spine Society (NASS) and also serves on other committees within health policy and advocacy. He served as program director for the Orthopaedic Residency program for 10 years, and currently is chief of the orthopaedic service at the VAMC. He also manages the grand rounds schedule for the department.

His recent research interests include nonsurgical and minially invasive techniques for the sacroiliac joint and the use of motor/prefrontal Transcranial Direct Current Stimulation (tDCS) to reduce postoperative analgesia use.

Dr. Glaser is active in reviewing abstracts for numerous professional socieities and resident training. He has also served on several editorial review boards, including *Spine*, *Journal of Bone and Joint Surgery*, *The Spine Journal*, *Clinical Orthopaedics and Related Research*, *Orthopaedics* and *Open Orthopaedics*.

The MUSC Spine Center sponsors a regional spine education conference on a biannual basis. In 2018, Drs. Sachs, Glaser and Reitman collectively participated in the Controversies in Care of Spinal Disorders symposium.

SHOULDER AND ELBOW

The Shoulder and Elbow team specializes in reconstruction, replacement, and arthroscopy for patients of all ages, ranging from young athletes to active seniors. Most of the conditions treated can be managed non-operatively. When surgery is needed, the team performs both arthroscopic and open surgery – and, if necessary, joint replacement. Surgeons in the Shoulder and Elbow service are fellowship trained to perform the full gamut from simple procedures to the most difficult cases, and are often called on for revisions of previous unsuccessful surgeries. As part of an academic health sciences university, prevention, careful diagnosis, perioperative preparation and post-surgical follow-up are the hallmarks of exceptional patient-centered care.

RICHARD J. FRIEDMAN, MD, FRCSC

Professor

Adjunct Professor of Bioengineering, Clemson University

Chief – Shoulder and Elbow Surgery

Dr. Richard Friedman is Chief of Shoulder and Elbow Surgery, Professor at MUSC and Adjunct Professor of Bioengineering at Clemson University. He was formerly the chairman of the department of orthopaedic surgery and medical director of the joint replacement program at Roper Hospital in Charleston. He received his MD degree from the University of Toronto and completed residencies in surgery at Massachusetts General Hospital and Harvard. He also completed a clinical fellowship in surgery at Johns Hopkins, as well as clinical fellowships in surgery and orthopedic surgery at Harvard. Friedman served on the North American and International Hip and Knee Registry steering committees and was a former consultant to the orthopedic device review panel of the U.S. Food and Drug Administration. Dr. Friedman's special areas of interest are shoulder and elbow disorders, shoulder and knee replacement and arthroscopy of the shoulder and knee.

JOSEF K. EICHINGER, MD

Associate Professor

Dr. Josef Eichinger received his undergraduate degree from the United States Military Academy at West Point and his MD. degree from Temple University School of Medicine in Philadelphia. He completed his orthopaedic surgery residency at Madigan Army Medical Center in Tacoma, Washington and the Harvard shoulder and elbow surgery fellowship in Boston. He later became the chief of orthopaedic surgery at Madigan Army Medical Center, and at Womack Army Medical Center at Fort Bragg, North Carolina. His special areas of interests include total joint replacement surgery of the shoulder and elbow; surgical and non-surgical treatment of all shoulder and elbow disorders; sports medicine for overhead and throwing athletes including baseball, tennis and golf; and arthroscopic surgery. He also has expertise in the treatment of failed prior shoulder and elbow surgery as well as complex clavicle (collarbone), shoulder (proximal humerus), and elbow fractures.

Dr. Josef K. Eichinger preparing for surgery.

CLINICAL

MUSC Health has received the Joint Commission gold seal certification for total shoulder replacement. The Gold Seal of Approval® is a symbol of quality that reflects an organization's commitment to providing safe and effective patient care. Over 95 percent of patients achieve good to excellent results with relief of pain and significantly increase mobility and function.

FACULTY LEADERSHIP

Dr. Friedman is a fellow of the American Academy of Orthopaedic Surgeons, Immediate Past President of the Association of Bone and Joint Surgeons, a member of the American Shoulder and Elbow Surgeons, and the European Society for Surgery of the Shoulder and Elbow, among others. He was one of the founders of the initial orthopaedic research laboratory at MUSC and has a longstanding experience in corporate research collaborations. He has published extensively in the peer-reviewed scientific literature and has presented nationally and internationally at numerous medical conferences.

Dr. Eichinger is a fellow in the American Academy of Orthopaedic Surgeons. He is on the editorial board for the *Journal of Arthroscopy and Related Research* and is a reviewer for the *Journal of Shoulder and Elbow* Surgery, Orthopedics, *Journal of the American Academy of Orthopaedic Surgeons,* and *Military Medicine*. He has presented research and lectured at numerous national meetings and has authored many peer-reviewed scientific articles and book chapters.

RESEARCH

Drs. Friedman and Eichinger collaborate with faculty in the Clemson-MUSC Bioengineering program to develop new and improved devices for treatment of arthritis and related traumatic disorders requiring total joint replacement.

Current research studies

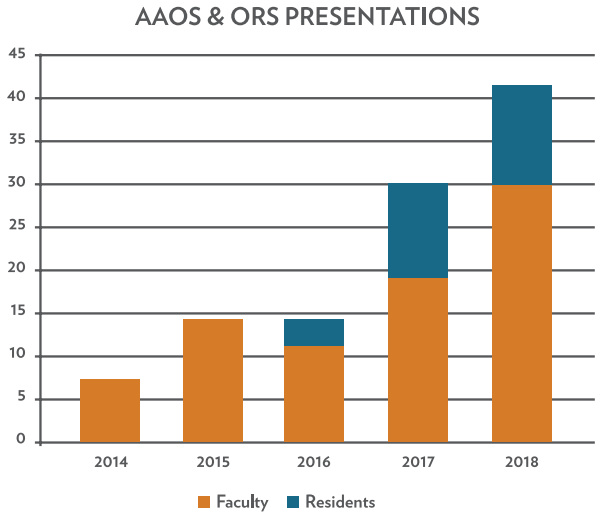
- Shoulder Arthroplasty Outcomes Registry
- Surgical Outcomes Registry
- Clavicle Characterization Study for Clavicle Fractures
- Technique on AC Joint Repair
- National Arthroplasty Utilization Analysis
- Finite Element Modelling of Reverse Shoulder Replacements
- Correlation of Radiographs and Clinical Outcomes Following Anatomic Shoulder Replacement
- Correlation of Radiographs and Clinical Outcomes Following Reverse Shoulder Replacement
- Risks of Shoulder Arthroscopy Prior to Shoulder Replacement
- Scapular Notching in Reverse Shoulder Replacement
- Clinical Outcomes Following Total Knee Replacement
- Clinical Outcomes Following Total Hip Replacement
- Comparison of Anatomic and Reverse Shoulder Replacement Outcomes
- Hybrid Cage Glenoids in Anatomic Shoulder Replacement
- Predictors of Postoperative Outcomes Following Reverse Shoulder Replacement
- Patient Reported Outcomes Comparing Bilateral Anatomic to Bilateral Reverse Shoulder Replacements

Education of learners at all levels is central to the academic mission

The MUSC Department of Orthopaedics and Physical Medicine sponsors an ACGME accredited five-year residency with four permanent residents per year along with a dedicated non-ACGME research resident who spends one year in the laboratory with a full-time commitment to basic science and clinical investigation. Graduate medical education efforts have been focused on residency education and no surgical fellowships are offered in the Department; however, this year marks our inaugural sponsorship of an interventional spine care fellowship in rehabilitation medicine under the direction of Dr. David O'Brien. Likewise, we enthusiastically support the development of medical student expertise in musculoskeletal physical diagnosis and nurture the interest of aspiring orthopaedic physicians from our College of Medicine. For the second year in a row, the Department sponsored 10 summer research fellowships for rising second year students, which is more than any other department on campus. Collectively, these are our educational endeavors of highest priority.

The scholarship of the residency program, mirroring that of the Department at large, marked an all-time high in 2018. For the fifth consecutive year, graduating residents continued a perfect 100 percent pass rate on the ABOS certifying examination. Academically, residents gave 18 presentations at the South Carolina Orthopaedic Association and 12 presentations at the Southern Orthopaedic Association annual meetings. Importantly, the residents gave 11 of 39 national presentations at the annual meetings of the American Academy of Orthopaedic Surgeons and the Orthopaedic Research Society, the two premier North American orthopaedic venues for peer reviewed presentations. Among notable achievements this year, Sophia Traven, MD, was recognized with the best poster award at the SC Orthopaedic Association, won the Harley and Betty Baxter travel award from the Southern Orthopaedic Association, and the resident research travel award from the Ruth Jackson Orthopaedic Society.

Additionally, the residents continued a prominent national and regional leadership presence among their peers in orthopaedics this year. John Palsis, MD, continued his service as the orthopaedic representative to the Organization of Resident Representatives of the Association of American Medical Colleges, while serving on the Academic Committee of the American Orthopaedic Association. Anthony Barcel, MD, and Phil Kirn, MD, were selected to represent MUSC's program at the Resident Leadership Forum of the AOA, and Sophia Traven, MD, was appointed as a resident member representing the U.S. Air Force on the Board of the Society of Military Orthopaedic Surgeons. Sophia and Anthony also received resident leadership scholarships from the South Carolina Orthopaedic Association. Brett Goodloe, MD, extended the community reach of our program by serving as the ambassador for pre-health students at the College of Charleston and the orthopaedic representative at the local CARES charity medical clinic in Charleston.



MUSC residents gave 11 of 41 national presentations at the annual AAOS and ORS meetings.

The program also reached a new level of gender diversity. With nearly 20 percent of our current residents being female, MUSC is now among the most gender-diverse programs in orthopaedics nationally. We continue efforts to recruit and encourage young women into our specialty through participation in the Perry Initiative. Success in recruitment of women into the residency was recognized with a poster at the annual Group on Women in Medicine and Science (GWIMS) session of the AAMC meeting in Austin, Texas this year. This initiative, along with the close working relationship between faculty and residents, contribute to the strong camaraderie enjoyed by the program.

Formal lecture led by program director Dr. Lee Leddy and Dr. Zeke Walton (standing).

Dr. Sophia Traven PGY4, instructing young women in orthopaedic techniques as part of the Perry Initiative program at MUSC.

Residents enjoying an afternoon at the RiverDogs game with faculty member, Dr. Chris Gross.

RESIDENTS

PGY-5

William B. Ashford, MD
Georgetown University School of Medicine

David A. Barcel, MD
East Tennessee State University Quillen College of Medicine

Philip T. Kirn, MD, PharmD
Medical University of South Carolina

Patrick K. O'Callaghan, MD
Michigan State University

PGY-4

Jacob R. Braunstein, MD
Georgetown University School of Medicine

Evan L. Hanna, MD
Medical University of South Carolina

Justin M. Rabinowitz, MD
Rush Medical College

Ted S. Samaddar, MD
Mercer University School of Medicine

Sophia A. Traven, MD
University of Virginia

PGY-3

Andrew K. Ence, MD
University of Texas School of Medicine at San Antonio

Leah N. Herzog, MD
Drexel University College of Medicine

Lindsay T. Luce, MD
University of Queensland School of Medicine

Brian T. Sleasman, MD
Loyola University Chicago Stritch School of Medicine

PGY-2

Samuel AbuMoussa, MD
University of North Carolina at Chapel Hill School of Medicine

Alexander M. Chiaramonti, MD
Medical University of South Carolina

Jonathan B. Goodloe, MD
Virginia Commonwealth University School of Medicine

Adam T. Griffith, MD
Medical University of South Carolina

PGY-1

John A. Barcel, MD
East Tennessee State University Quillen College of Medicine

Ryan W. Horn, MD
New York Medical College

Katherine M. McGurk, MD
Georgetown University School of Medicine

George J. Wolf, MD
Medical University of South Carolina

RESEARCH RESIDENT

Phillip A. Westbrook, MD
Medical University of South Carolina

FELLOW

John M. Schmidt, MD
Instructor
Physical Medicine & Rehabilitation

RESEARCH FUNDING FY18

PRINCIPAL INVESTIGATOR	RESEARCH GRANT TITLE	SPONSOR
Emily Darr, MD	Long-Term Follow-Up in INSITE/SIFI LOIS	Si-Bone, Inc.
Emily Darr, MD	Investigation of Sacroiliac Fusion Treatment INSITE	Si-Bone, Inc.
Emily Darr, MD	Sacroiliac Joint Fusion with iFuse Implant System (SIFI) SIFI	Si-Bone, Inc.
Josef Eichinger, MD	Study 674 Biomechanical Evaluation of Insertional Torque and Compression of the Coracoid-Glenoid Construct with Varying Fixation Methods	Smith and Nephew
Richard Friedman, MD	A Randomized, Single-Blind, Active-Controlled, Dose-Ranging Study to Evaluate the Pharmacokinetics, Safety, and Efficacy of Local Administration of DepoTXA for Reduced Postsurgical Bleeding	Pacira Pharmaceuticals, Inc.
Richard Friedman, MD	Open label multi-center retrospective evaluation of total shoulder, hip, and knee arthroplasty clinical and radiographic outcomes.	Exactech, Inc.
Christopher Gross, MD	Predicting Collagen Turnover for Achilles Tendon Repair Across Diverse Loading Environments	American Orthopaedic Foot & Ankle Society (AOFAS)
Evan Hanna, MD resident research grant; V Pellegrini, MD, mentor	Inhibitory Effects of Cigarette Smoke on Endochondral vs Intramembranous Fracture Healing Pathways in a Bilateral Femur Fracture Late Effects on Fracture Union	Orthopaedic Trauma Association (OTA)
Evan Hanna, MD resident research grant; V Pellegrini, MD, mentor	Inhibitory Effects of Cigarette Smoke on Endochondral vs Intramembranous Fracture Healing Pathways in a Bilateral Femur Fracture Early Effects on Cell Mobilization	AO North America

PRINCIPAL INVESTIGATOR	RESEARCH GRANT TITLE	SPONSOR
Lee Leddy, MD	Transcutaneous Oxygen as a Predictor of Wound Healing Complications in Preoperatively Radiated Soft Tissue Sarcoma	Cleveland Clinic
Lee Leddy, MD	Incisional Negative Pressure Wound Therapy for Preoperatively Irradiated Lower Extremity Soft Tissue Sarcoma Wounds: A Prospective, Randomized Pilot Trial	KCI USA, Inc.
Vincent Pellegrini, MD	Comparative Effectiveness of Pulmonary Embolism Prevention after Hip and Knee Replacement (PEPPERJ: Balancing Safety and Effectiveness PCS-1402-09328	Patient-Centered Outcomes Research Inc. (PCORI)
Vincent Pellegrini, MD	Novel Anti-fibrotic Strategies in the Targeted Treatment and Prevention of Post- traumatic HO and Enhancement of Post-Traumatic Tissue Regeneration	Henry M. Jackson Foundation/ USAMRAA
Vincent Pellegrini, MD	Optimal Treatment of Malignant Long Bone Fracture: Influence of Method of Repair and External Beam Irradiation on the Pathway and Efficacy of Fracture Healing	DOD/PRMRP
Vincent Pellegrini, MD	Early Identification of Molecular Predictors of Heterotopic Ossification following Extremity Blast Amputation: Animal Model Correlation with Human Disease	DOD/PRORP
Jessica Thaxton, PhD	Hollings Cancer Center's NCI-funded K12 Paul Calabresi Clinical & Translational Oncology Training Program	NIH/NCI
Shane Woolf, MD	An Open-label Study to Assess the Safety of Repeat Administration of FX006 to Patients with Osteoarthritis of the Knee	Flexion Therapeutics, Inc.

FUNDING SOURCES

6 NEW GRANTS	FEDERAL/FOUNDATION	CORPORATE	TOTAL EXPENDITURES
$1,663,619	$2,424,762	$301,839	$2,726,601

DEPARTMENT LEADERSHIP

Dr. Charles Reitman and Dr. Vincent Pellegrini, Jr.

Dr. Lee Leddy

VINCENT D. PELLEGRINI, JR., MD

John A. Siegling Professor and Chair
Department of Orthopaedics and Physical Medicine
Adjunct Professor of Bioengineering, Clemson University

Dr. Vincent Pellegrini assumed the position of John A. Siegling Professor and Chair of the Department of Orthopaedics and Physcial Medicine in 2013 and in 2015 was appointed as the Chief of the Musculoskeletal Institute of MUSC Health.

He has served in national leadership positions as President of The Hip Society, President of the American Orthopaedic Association, and Chair of the Council of Faculty and Academic Societies of the Association of American Medical Colleges. He is past president of the Maryland Orthopaedic Association and past president of the Medical Staff of the University of Maryland Medical Center. He is a fellow of the American Academy of Orthopaedic Surgeons, and a member of the Orthopaedic Research Society, the Osteoarthritis Research Society, Hip Society, Knee Society, International Hip Society, American Association of Hip and Knee Surgeons, Association of Bone and Joint Surgeons, American Society for Surgery of the Hand, and the Council of Academic Societies of the Association of American Medical Colleges where he represents the specialty of orthopaedics. He has received numerous professional awards, including the North American Traveling Fellowship of the American Orthopaedic Association, the Sterling Bunnell Traveling Fellowship of the American Society for Surgery of the Hand, the John Charnley Award (twice) and the Stinchfield Award from the Hip Society, the Nicolas Andry Award from the Association of Bone and Joint Surgeons for career research contributions, and the Coventry Award from the Knee Society. Dr. Pellegrini served as deputy editor of the *Journal of Bone and Joint Surgery* from 2005 to 2010, is presently an examiner for the American Board of Orthopaedic Surgery, and a past member of the ACGME Residency Review Committee in Orthopaedic Surgery. He is a former member of the Board of Directors of the AAMC. His research is funded by the Department of Defense, the U.S. Army, and the Patient-Centered Outcomes Research Institute (PCORI); he has published extensively in the peer-reviewed literature and has been an invited lecturer internationally.

CHARLES A. REITMAN, MD

Professor
Vice Chair, Department of Orthopaedics and Physical Medicine
Co-Director, Spine Center

Dr. Charles Reitman attended physical therapy school at the University of California, San Francisco and was in private practice in Sacramento for 12 years. He then attended medical school at Baylor College of Medicine,

where he also completed his residency and fellowship training and accepted a faculty position at Baylor. In 2003 he became Chief of Orthopaedic Surgery at the trauma center, Ben Taub Hospital, and was the director of the resident education program for 13 years. Dr. Reitman was also the acting Chair of Orthopaedic Surgery and the Vice Chair and Medical Director at Ben Taub. Currently he is professor and Vice Chair of the Department of Orthopaedics and Physical Medicine at MUSC, and Co-Director of the MUSC Spine Center. He has expertise in complex cervical spinal disorders, spine tumors, spine infections, spinal deformities including scoliosis and kyphosis, degenerative conditions of the spine, spine fractures and spinal cord injury, and spinal disorders related to complications from injury as well as surgery.

Dr. Reitman is a past president of the Houston Orthopaedic Society, a member of the American Orthopaedic Association, and was elected to the board of directors of the North American Spine Society where he currently serves as the research council chair.

Dr. Reitman has numerous publications in the peer-reviewed orthopaedic literature. His primary interest is in cervical biomechanics and stability. He is a reviewer for *Spine* and *The Spine Journal*, and deputy editor for *Spine for Clinical Orthopaedics and Related Research*. He is a member of the Board of Directors, North American Spine Society and Council Director, Administration and Development, North American Spine Society.

LEE R. LEDDY, MD, MSCR

Associate Professor
Director, Orthopaedic Residency Program

Dr. Lee Leddy did his undergraduate work at Emory University where he received his BS in biological science while lettering on the varsity basketball team. He then received his MD from the University of Florida College of Medicine in Gainesville, Florida. He went back to Emory University to complete his internship and residency in the Department of Orthopaedic Surgery. He joined MUSC in 2009 after completing a fellowship in orthopaedic oncology at Emory University where he helped establish the sarcoma program and is currently the leader of the Sarcoma Disease Focus Team at Hollings Cancer Center.

Dr. Leddy currently serves as the residency program director for the Department of Orthopaedics and Physical Medicine. He is actively involved in both clinical and basic science research and collaborates in the Sarcoma Immunotherapy Lab.

As a member of the Department, Dr. Leddy's primary focus is providing excellent care to patients with benign and malignant bone and soft tissues tumors in children and adults, metastatic bone cancer, fracture care, and primary and revision hip and knee replacements.

Among other positions, he is a Fellow and Program Mentor at the American Academy of Orthopaedic Surgeons, President of the Musculoskeletal Oncology Research Initiative (MORI), and Vice President of the Charleston Orthopaedic Society. He also serves on numerous editorial boards.

ADMINISTRATION LEADERSHIP

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PHILANTHROPY

Origins of the John A. Siegling Professorship & Chair

When Charleston native Dr. John A. Siegling returned to the Holy City in 1942, he could not have predicted that it would lead to a more than four-decade-long career at the Medical University, resulting in an orthopaedic chair endowment named in his honor.

Dr. Siegling's career in medicine began in 1932 when he earned his degree from the Medical University, then known as the Medical College of South Carolina in Charleston. After a year of internship at Roper Hospital, he joined the Medical University as an instructor in pathology. Shortly afterwards, he entered the field of orthopaedic surgery, training for two years as an assistant resident at the University of Chicago Clinics and for one year at the Children's Orthopaedic Hospital at the University of Chicago.

Dr. Siegling completed his orthopaedic training in 1937 and practiced in Urbana, Illinois until 1942, when he rejoined the Medical University of South Carolina as an assistant professor of orthopaedic surgery. For the next 42 years, he devoted his life to training young orthopaedic surgeons in South Carolina. He was especially interested in treating physically disabled children, traveling often to Ladson and Orangeburg to see them – an interest that originated from his childhood, when, at the age of three, he himself was afflicted with polio.

From a young age, Dr. Siegling refused to believe he had a handicap and insisted on walking without a cane or assistance of a wheelchair. "He never let anything keep him from doing anything he wanted to do," said his daughter Missy Blocker. "And he encouraged children to do the same. Don't give up. Keep trying. Do what you can do."

It was this same conviction and hard work that he demonstrated as a child that followed him into adulthood, and his career success as one of Charleston's first orthopaedic surgeons and a leader throughout the field.

Now, more than three quarters of a century later, the John A. Siegling Professor & Chair of MUSC's Department of Orthopaedics and Physical Medicine, established in 2006, continues to honor the man who was widely recognized as one of South Carolina's more renowned educators in the field of orthopaedic surgery, having trained a goodly portion of the state's orthopaedic surgeons.

Dr. John A. Siegling

Dr. Siegling's daughter and fellow family members worked closely with MUSC's Development Office beginning in 1990, to help establish the fund that honored their well-loved father and husband. Through contributions from the Siegling family, MUSC faculty and staff, and former residents of Dr. Siegling's, the endowed orthopaedic professorhip became a reality within a few short years.

"I wanted to make sure it was established because it was something that my father always wanted. It was important to him," said Mrs. Blocker. "And, so we gave to make it a reality. And we continue to give every year."

Over the course of his medical career, Dr. Siegling established several residents' funds with his own private donations, helping many orthopaedic residents purchase books, attend conferences and continue their medical education through various opportunities. The creation of the professorship by his family after his passing in 1990 was a

Dr. Langdon A. Hartsock and Dr. Vincent D. Pellegrini, Jr. past and present John A. Siegling Professors and endowed chairs, respectively.

natural next step in giving back to the medical community and honoring his years of service to the hospital.

Since its funding, two orthopaedic surgeons have held the position of the John A. Siegling Professor and Chair, Langdon A. Hartsock, MD (2006-2013) and Vincent D. Pellegrini, Jr., MD (2013-Present), and represents one of the highest honors an educator or researcher can receive.

In 2013, the decision was made to attach the Siegling designation to the sitting active chair of the Department of Orthopaedics and Physical Medicine. As such, funding from the endowment provides critical monetary support for the academic activities of the chair, including research and resident education.

To learn more about the Dr. John A. Siegling Professor and Chair, please call 843-792-2677 or email giving@musc.edu.

Giving to MUSC Foundation

For more than 190 years, the Medical University of South Carolina has worked to educate the healthcare professionals of the future, save lives, conquer illness and end human suffering, in turn empowering people to make the most of the precious few days that make up a lifetime. MUSC operates under a three-part mission of cutting-edge research, compassionate patient care and world-class education. To accomplish our goals, it relies upon the generous support of thousands of alumni, patients, like-minded citizens and friends of the University, businesses and foundations – donors who share our belief in the paramount importance of better health. As a state institution with limited resources, our excellence as a leader in health care for our state and region is only made possible through philanthropy.

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One of MUSC's most important responsibilities is to train the next generation of health care providers. Private gifts provide scholarships, equipment and teaching materials, classroom and laboratory renovations, expanded educational opportunities for students and alumni, emergency loans, student travel and student research

For more information about giving to the MUSC Foundation, please call 843-792-2300 or email giving@musc.edu.

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Faculty = Bold / *Residents = Italics*

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FACULTY BY SERVICE

ADULT RECONSTRUCTION AND TOTAL JOINT REPLACEMENT

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Harry A. Demos, MD
Associate Professor

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ACKNOWLEDGMENTS

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Design
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With thanks to the faculty, residents, and staff who enthusiastically brought their passion to work in the Department each day and contributed their time and effort to provide content for this report.

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