Orthopedic surgeons at the Center for Hip & Knee Surgery (CHKS) are shaping the future of joint replacement surgery for patients around the globe.

Orthopedists Robert Malinzak, MD, and Michael Berend, MD, led two recently completed studies that evaluated the use of mobile-bearing prosthetic implants in both primary (first) and revision total knee replacement surgeries. The studies are part of a partnership with Joint Replacement Surgeons of Indiana (JRSI) Research Foundation and Rose-Hulman Institute of Technology in Terre Haute, Indiana. Both CHKS and the JRSI Foundation are based at Franciscan St. Francis Health – Mooresville.

The results of the studies, which will affect orthopedic surgery for years to come, were published in peer-reviewed professional journals and presented at national conferences for orthopedic and biomedical engineering professionals.

"By sharing our findings with orthopedic professionals, we are changing the way total joint replacement surgery is performed in operating rooms around the world," Dr. Malinzak said. "The results of the research will allow orthopedic surgeons to make more informed decisions about implant design and surgical techniques, improving outcomes for patients."

In addition, sharing the information with biomedical engineering professionals allows implant manufacturers to apply the findings to implant design, which also will have a long-standing effect on the future of orthopedic surgery.

**Studies and results**

The two recent studies evaluated the use of mobile-bearing total knee replacements, a newer option than traditional fixed-bearing designs. The new design uses a loose plastic insert over the shinbone, rather than a fixed one, allowing the joint flexibility in movement and helping spread the stress on the joint more evenly over a larger surface area.

The design change is an effort to reduce the wear of the plastic component over time, a process that can lead to joint failure.

Until recently, few studies existed that supported the theoretical improvements of the mobile-bearing design. The findings of the CHKS and JRSI Foundation studies are critical for orthopedists across the world, providing scientific data to support the benefits of mobile-bearing design. Results show that:

- Compared with fixed-bearing designs, mobile-bearing implants reduce the torque (a twisting force that causes rotation) at the knee joint, reducing rotational strains on the bone.
- Because they reduce torque at the joint, they create less motion between the bone and the implant at the microscopic level. This reduces the risk of micro-damage to the bone that can cause instability and ultimately joint failure over time. The study also highlights the benefit of mobile-bearing designs in joints that might have compromised mobile-bearing designs in joints that might have compromised bone quality, such as in joint revision surgery.

**Collaborative research expands scientific thinking**

Rose-Hulman undergraduate biomedical engineering students, CHKS orthopedic surgeons and the JRSI Research Foundation staff are able to apply knowledge gained through years of vast clinical expertise, biomedical orthopedic research and engineering expertise to the study of the science and medicine behind implants used in hip and knee replacements.

The three organizations conduct their research at the Orthopaedic Biomedical Engineering Laboratory at Rose-Hulman, which is sponsored by the JRSI Foundation.

“Our unique partnership allows surgeons, engineers and engineering students to exchange information, educational opportunities and scientific thinking,” Dr. Malinzak said. “What we learn by working together helps us — and orthopedic surgeons everywhere — to continually improve our daily surgical practices and patient outcomes. Ultimately, that’s what our work is all about: improving joint replacement surgery so we can improve the quality of life for our patients.”

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Robert Malinzak, MD

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**LOCAL STUDIES HAVE WORLDWIDE IMPACT:**

Two studies expand scientific understanding of implant design

"By sharing our findings with orthopedic professionals, we are changing the way total joint replacement surgery is performed in operating rooms around the world,”

— Robert Malinzak, MD
Operation Walk travels to Nicaragua for surgery mission

The Operation Walk Mooresville medical and support team traveled to Managua, Nicaragua, Feb. 16 through 22 to perform life-changing surgery for patients suffering from immobility and joint pain.

As with every annual mission trip, the team provided hip and knee joint replacements and foot and ankle care for patients in the host country. On this trip, 115 surgeries were performed on 85 patients.

The team of 76 volunteers included surgeons, nurses, physical therapists and many others. Franciscan St. Francis Health physicians on this trip included orthopedic surgeons Michael Berend, MD, Robert Malinzak, MD, Wesley Lackey, MD, and Merrill Ritter, MD, as well as Jim Richardson, MD, an infectious disease specialist.

Drs. Berend, Malinzak and Lackey are surgeons with the Center for Hip & Knee Surgery at Mooresville, which was founded by Dr. Ritter, who also founded Operation Walk Mooresville.

The team brings the necessary equipment and donated supplies along with the expertise of the group to get this important mission accomplished.

Operation Walk is a private, not-for-profit, volunteer medical services organization dedicated to providing surgical treatment to help patients affected by diseases of the hip and knee joints regain mobility and quality of life. The organization typically focuses on developing countries, where individuals do not have access to such life-changing procedures as total joint replacement.

Operation Walk personnel evaluate, treat and see patients through discharge. Operation Walk surgeons also educate in-country orthopedic surgeons, nurses and other health care professionals on advanced surgical techniques and treatments.

“We feel we can help all of them make an impact on their environment and their communities,” said Amy Roberson, team coordinator and research director for the JRSI Foundation, Inc., based on the Mooresville campus.

“We are fortunate to have wonderful sponsors who make this possible, including Franciscan St. Francis – Mooresville and the Kendrick Foundation,” she said.