Technology and the changing outcomes be associated with inferior Learning curve in robot-parameters at the beginning of a treatment process, which are input into a software programme. These surgeries don't. "The outcome from this, Theodore says, will be the ability to specify a set of patient parameters at the beginning of the treatment process, which will allow for more effective and accurate surgery."

He details a project being undertaken at Johns Hopkins, titled Spine Cloud, that is working towards this goal. "Spine Cloud is an advanced technology platform that uses machine learning algorithms to predict patient outcomes and guide surgical decision-making," he explains. "The platform will help surgeons to plan and execute their surgeries more accurately and efficiently, leading to better patient outcomes and reduced costs."

Beyond robotics, 3D printing is another area that Theodore sees advancing in the spinal surgery arena. "3D printing allows surgeons to create custom surgical instruments and implants that are tailored to the specific needs of each patient," he says. "This can lead to improved surgical outcomes and reduced complications."

Although cost is recognised as a barrier to wider adoption of robotics in spinal surgery, Theodore is optimistic about the future. "I believe that as these technologies become more accessible and affordable, they will be incorporated into the standard of care for spinal surgery," he says. "This will lead to improved outcomes and increased patient satisfaction."

"Spinal surgery meets engineering" is the trend he expects to see in the coming decade. "As we continue to see advancements in technology, we will see more integration of engineering and surgery," he says. "This will lead to more precise and effective surgical procedures, resulting in better patient outcomes."

Andreas Tessitore, M.D., of the Spine Institute in Charlotte, North Carolina, sees a bright future for robotics in spinal surgery. "Robotic systems are becoming more user-friendly and cost-effective," he says. "This will lead to increased adoption in the near future."

"When we start introducing drills to be able to cut bone and jig bone, that will be the next step. I will go to the manufacturers and say, 'you're doing it wrong! You need to make this thing easier to use and more cost-effective.'"

"Spinal surgery is moving quickly into endoscopy and this, in the very near future, is going to continue to change approaches to spinal surgery throughout the course of the next year."

Parajon, who specialises in minimally invasive surgery (MIS), believes that 3D navigation will play a key role in the future of spinal surgery. "The ability to guide surgical instruments with precision and accuracy will be critical in the future," he says. "This will allow surgeons to perform more complex procedures with reduced morbidity and quicker recovery times."

Robotic Spinal Instrumentation (EUROSPIN) study, involving 3,000 patients in 14 hospitals in Italy, is the largest study to date on the use of robotic technology in spinal surgery. The study found that robotic-assisted surgeries resulted in shorter hospital stays, reduced blood loss, and faster recovery times compared to traditional surgical techniques. The study's lead author, Margareta Nordin, concludes that "the results of this study demonstrate the potential of robotic technology to improve outcomes in spinal surgery."