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Editors' Introduction: Rethinking the "One-Size-Fits-All" Approach in Spine Surgery

PAUL PARK, MD¹ AND PHILIP K. LOUIE, MD²

¹*Semmes Murphey Clinic, University of Tennessee Health Science Center, Memphis, TN, USA;* ²*Department of Neurosurgery, Center for Neuroscience and Spine, Virginia Mason Medical Center, Seattle, WA, USA*

Although the "one-size-fits-all" mentality may enhance the standardization of different areas of medicine, this concept must be carefully reconsidered in the surgical treatment of spinal disease. The diversity of spinal pathologies, differences in symptomatology for similar spinal conditions, patient-specific factors such as comorbidities, and multiple treatment options of mixed efficacy all impact the effort to standardize treatment. As a consequence, outcomes in spinal surgery can be inconsistent, and increasing acknowledgment of these issues has spawned the growth of personalized medicine with the hopes of improving outcomes. As we anticipate a health care landscape that introduces widespread performance-based reimbursements, there is a growing emphasis on providing individualized decision-making and surgical solutions. This includes the entire episode of spine care from preoperative optimization to customization of intraoperative implants as well as postoperative pain management and recovery.

For spinal surgery, personalized medicine in the preoperative phase can involve optimization of nutrition and bone health as well as computer-assisted preplanning of the surgery. With current technology, preplanning now allows for the production of patient-specific implants. Three-dimensional custom-printed implants tailored to an individual patient's anatomy and biomechanical requirements can allow for minimal removal of surrounding structures and preservation of normal anatomy during implantation. This could optimize fusion and radiographic alignment. In the intraoperative phase, enabling technologies such as navigation and robotics can accurately place instrumentation to maximize safety and efficacy while minimizing radiation

exposure to the surgeon and staff. Alternatively, three-dimensional-printed guides specific to each patient's anatomy could be used. In the postoperative phase, pain management could consist of personalized therapies and medications specific to each patient's individual characteristics, including genetic predisposition.

In this special issue of the *International Journal of Spine Surgery*, a variety of articles focusing on personalized medicine in spinal surgery have been carefully collated. These articles highlight recent advancements in enabling technologies and optimization strategies that form the basis of contemporary personalized medicine within spinal surgery. As spine care advances, the role of personalized medicine in spinal surgery will likely become more pervasive with the ultimate goal of improving outcomes.

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Corresponding Author: Philip K. Louie, Department of Neurosurgery, Center for Neuroscience and Spine, Virginia Mason Medical Center, 1100 Ninth Ave, Seattle, WA 98101, USA; louie.philip@gmail.com

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