




## What is new in Orthopaedics?

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New technology in orthopedics, leading to innovative solutions and improved patient outcomes. Various cutting-edge technologies are revolutionizing orthopedic surgery ie. Smart Implants and Wearable Technology, 3D printing, telehealth, Artificial Intelligence, Digital Templating, Online-based Orthopedic Visits, Picture Archiving and Communication System (PACS), Computer-Assisted Surgery (CAS), Deep Learning and Generative AI, big data, Augmented Reality, ambulatory surgery centers (ASCs), Virtual Care Technology, robotics, Biological Treatments and Patient-Specific Implants.

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Innovative implants and wearable devices are new trends in orthopedics. These devices are equipped with sensors that can monitor patient movement, load distribution, and implant performance. Real-time data collected from these devices can help surgeons assess postoperative progress, optimize rehabilitation, and customize treatment plans to suit individual patients. (1)

The rise of telemedicine has also given a cutting edge in orthopedics. Online-based orthopedic visits allow patients to consult with orthopedic surgeons remotely, reducing the need for in-person appointments. Telemedicine can be particularly beneficial for follow-up visits, postoperative care, and initial consultations, making healthcare more accessible and convenient to the patients. (1)

Artificial intelligence (AI) is transforming various aspects of orthopedics care. AI algorithms can analyse large amount of patient data to identify patterns, predict outcomes, and assist in treatment decision-making. AI-powered tools can support preoperative planning, risk assessment, and personalized rehabilitation protocols, leading to improved patient outcomes and optimized resource utilization. (1)

Digital templating involves the use of advanced imaging technology and software to plan accurately and size orthopedic implants. This technology in prosthetics has greatly influenced the field of orthopedics, leading to innovative solutions and improved patient outcomes. (1)

PACS, or Picture Archiving and Communication System, is already a reality in many hospitals. It can quickly be resumed as a cloud-based solution, like Google Drive or iCloud. PACS connects imaging technologies and those who need to access the images collected. This makes it instant and eliminates the need for physical files. With PACS, orthopedics surgeons can quickly retrieve historical images, compare current and past scans, and make more informed decisions. This efficiency is crucial in time-sensitive situations, such as trauma cases, where rapid and accurate diagnoses are vital. PACS has several benefits for the institution and clinical communication. (2)

Computer Assisted Surgery, or CAS is a technology used to support a surgical procedure. This technology integrates computer algorithms with surgical instruments, offering guidance and feedback throughout the operation. From joint replacements to spinal surgeries, CAS enhances surgical precision, reducing the margin of error and improving overall outcomes. Surgeons receive continuous updates and recommendations based on real-time data, ensuring that each step aligns with the pre-operative plan. As a practical example, orthopedic surgeons might use navigation technologies during spine surgery to achieve precise viewing, tracking, and angling. A CAS might start even before entering the operations room, taking full advantage of imaging technologies and preoperative orthopedics technology. (2)

In the rapidly advancing field of orthopedics, the convergence of Deep Learning (DL) and Generative Artificial Intelligence (AI) is reshaping preoperative planning with its speed and accuracy.

This integration brings forth a shift in the way surgeons prepare for and execute orthopedic surgeries, leveraging the capabilities of AI to enhance precision and tailor interventions to individual patients. DL plays a pivotal role in preoperative planning by revolutionizing the analysis of medical imaging. Trained on extensive datasets of orthopedic images, DL algorithms excel in recognizing subtle anomalies, fractures, and intricate structural variations. This empowers surgeons with a deeper understanding of a patient's musculoskeletal condition, enabling more accurate preoperative assessments. Generative AI takes personalization in preoperative planning to a new level. By analyzing a patient's unique anatomical features, movement patterns, and medical history, Generative AI algorithms can generate simulations predicting the outcomes of different surgical approaches. Surgeons can then explore various scenarios and craft a surgical plan that aligns with the individual characteristics of the patient. (2)

In the landscape of orthopedic technology, Big Data plays a pivotal role in driving evidence-based decision-making. Often synonymous with Data Science, Big Data empowers orthopedics professionals by providing comprehensive and actionable insights. Big Data supports various orthopedics technologies discussed earlier, including Deep Learning e Generative AI, and Augmented Reality. Big Data can analyze vast datasets to uncover valuable insights. Orthopedic professionals can analyze trends, treatment outcomes, and patient demographics, leading to more personalized and effective interventions. Moreover, the integration of Big Data in orthopedics enables predictive analytics, helping healthcare providers anticipate potential complications, optimize resource allocation, and streamline workflow efficiency. This proactive approach contributes to the overall improvement of patient care and the effectiveness of orthopedic interventions. (2)

One steadily increasing trend in orthopedics is the use of augmented reality (AR). AR helps surgeons get more information pre-op and post-op, helping surgeons make more informed decisions. AR is already in use in many places across the country for total hip, knee and shoulder replacements, as well as certain spinal procedures. (3)

Recent years have seen an overall trend towards higher utilization of ambulatory surgery centers (ASCs), and migrating more approved procedures to them. In fact, a study recently published in the Journal of Bone and Joint Surgery found an 8.8% increase in annual procedure volume for orthopedic procedures performed at ASCs in the Medicare population from 2012–17. ASCs provided a cost-effective alternative for orthopedic procedures. Certain subspecialties became more comfortable performing procedures in ASC settings out of necessity. After hospitals banned elective inpatient procedures, spine surgeons at one ASC in New York<sup>3</sup> tried procedures such as single-level discs and laminectomies in outpatient settings for the first time and indicated they would be comfortable doing so again without a mandatory 23-hour stay. (4)

Patient interest and expectations will be key factors for practices to consider when deciding whether to continue offering virtual care options after the national emergency.

Patients from geographically isolated areas, where there are fewer care options, may benefit long-term from telehealth availability. One study conducted on search volume determined that patient interest in orthopedic telehealth services was already growing prior to the pandemic, and that "interest appears to be on track to remain elevated for years to come." (3)

According to the providers surveyed, most responded that virtual care options were here to stay and planned to incorporate them into their practices moving forward. In fact, some orthopedic surgeons are now of the opinion that digital transformations in healthcare now make outpatient procedures preferable. However, uncertainty regarding virtual care reimbursement policies creates a challenge in terms of confidently developing a longer-term plan for overall financial wellness. (4)

The integration of robotics and navigation systems in orthopedic surgery has elevated precision and accuracy to unprecedented levels. Robotic-assisted procedures enable surgeons to create personalized surgical plans based on a patient's unique anatomy, leading to more tailored and effective treatments. These robotic systems assist surgeons in performing complex tasks with enhanced control and dexterity, reducing the risk of errors and optimizing implant placement in joint replacement surgeries. Navigation technology, on the other hand, provides real-time, 3D imaging during surgery, aiding surgeons in making informed decisions and achieving better outcomes. (5)

Biological treatments, such as platelet-rich plasma (PRP) and stem cell therapies, have gained popularity in orthopedic surgery. PRP, derived from a patient's blood, contains growth factors that promote tissue healing and regeneration. Stem cell therapies use the body's own cells to stimulate tissue repair, particularly in conditions like osteoarthritis and soft tissue injuries. These regenerative approaches offer a more natural and potentially longer-lasting solution for orthopedic conditions, reducing the need for invasive procedures and enhancing the body's own healing capacity.

Patient-Specific Implants-Orthopedic surgeons can now utilize patient-specific implants (PSIs) that are tailor-made for an individual's unique anatomy. Advanced imaging and computer-assisted design allow for the creation of implants that fit the patient's joint or bone precisely. PSIs provide better stability, reduce the risk of implant-related complications, and result in improved post-operative function and comfort. The recent advancements in orthopedic surgery have reached in a new era of personalized and precise care for patients with musculoskeletal conditions. From minimally invasive techniques to robotics, 3D printing, and biological treatments, orthopedic surgeons now have multiple tools to enhance patient outcomes and improve quality of life. As technology continues to evolve, we can look forward to further innovations in orthopedics, ensuring that patients receive the best possible care and regain their mobility and independence with greater ease than ever before. (5)

## References

01. <https://www.uteshiyamedicare.com/8-latest-trends-in-orthopedic-technology>
02. <https://blog.peekmed.com/orthopedic-technology>
03. <https://www.modmed.com/resources/blog/what-s-new-in-orthopedics>
04. <https://www.exer.ai/posts/trends-in-orthopedics>
05. <https://www.eliteorthopaedic.com/blog/revolutionizing-orthopedic-surgery-recent-advancements-for-better-outcomes>

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