

Digital Health and Remote Technologies in Contemporary Surgical Rehabilitation

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DESCRIPTION

Surgical rehabilitation represents a critical yet often underappreciated continuum of care that bridges the gap between successful surgical intervention and the patient's return to meaningful daily function. While surgery may correct structural abnormalities, remove pathology, or restore anatomical alignment, true recovery is only realized when individuals regain mobility, independence and quality of life. Surgical rehabilitation encompasses a coordinated, patient centered process that begins even before the first incision and extends long after discharge from the hospital, emphasizing functional restoration, physical conditioning, psychological adaptation and social reintegration. The modern concept of surgical rehabilitation has evolved significantly alongside advances in surgical techniques. Minimally invasive procedures, enhanced recovery after surgery protocols, and improved anesthesia have reduced perioperative morbidity, but they have not eliminated the need for structured rehabilitation. On the contrary, faster surgical recovery often requires equally well designed rehabilitation strategies to prevent deconditioning, manage pain, and optimize outcomes. Rehabilitation is no longer viewed as an optional adjunct but as an integral component of surgical success, influencing both short-term recovery and long-term health trajectories.

Preparation for rehabilitation ideally begins in the preoperative phase. Prehabilitation programs, which include patient education, nutritional optimization, physical conditioning, and psychological counseling, have demonstrated benefits in improving postoperative outcomes. Patients who understand the rehabilitation process and actively participate in goal setting tend to exhibit better adherence and motivation during recovery. Following surgery, the immediate postoperative phase focuses on stabilizing the patient while initiating early rehabilitation measures. Early mobilization has emerged as a cornerstone of surgical rehabilitation, countering the adverse effects of prolonged bed rest such as muscle atrophy, venous thromboembolism, and pulmonary complications. Even simple

interventions like assisted sitting, breathing exercises, and gentle limb movements can have profound effects on recovery trajectories. Pain management plays a pivotal role during this phase, as poorly controlled pain can hinder participation in rehabilitation and contribute to chronic pain syndromes.

As recovery progresses, rehabilitation becomes more structured and goal-oriented. Physical therapy often forms the backbone of surgical rehabilitation, addressing strength, flexibility, balance, and coordination. The specific rehabilitation plan is tailored to the type of surgery performed, whether orthopedic, neurological, cardiovascular, or abdominal, as well as to individual patient factors such as age, comorbidities, and baseline functional status. Occupational therapy complements physical therapy by focusing on activities of daily living, enabling patients to regain independence in self-care, work-related tasks, and social participation. Technological innovations have increasingly shaped the landscape of surgical rehabilitation. Tele-rehabilitation platforms allow patients to engage in guided exercises, monitor progress, and communicate with healthcare providers remotely, expanding access to care and reducing barriers related to distance and mobility. Wearable devices provide real-time feedback on movement patterns, activity levels, and physiological parameters, enabling more personalized and adaptive rehabilitation programs. Virtual reality and robotic-assisted rehabilitation are also gaining traction, offering immersive and precise training environments that can enhance engagement and functional outcomes.

The role of interdisciplinary collaboration cannot be overstated in surgical rehabilitation. Surgeons, physiotherapists, nurses, occupational therapists, psychologists and social workers must work cohesively to deliver seamless care. Effective communication among team members ensures that rehabilitation goals align with surgical objectives and patient expectations. This collaborative approach also facilitates early identification and management of complications, reducing readmission rates and improving continuity of care.

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