



MARKET REPORT

RECOVERY REIMAGINED

Innovation in Total Knee Arthroplasty Post-Operative Recovery

A Sage Growth Partners Survey
Sponsored by Kinex

✕ KINEX

EXECUTIVE SUMMARY

Tech-enabled post-operative TKA recovery yields significant cost savings, boosts regimen compliance, and delivers added value to patients, providers, and payers.

Total joint arthroplasty is at an inflection point. Markedly improved by advances in implant engineering and surgical technique and now safely delivered on an outpatient basis, artificial joints are in greater demand than ever before. In this environment, orthopedic surgeons, and hospital and ambulatory surgery leaders are challenged with meeting unprecedented demand while simultaneously minimizing costs, preserving quality of care, and improving patient experience. Innovations in post-surgical rehabilitation offer great promise to patients, providers, and payers as they begin to migrate from fee-for-service to value-based care.

Changing demographics and the expectations of a growing senior population accustomed to active lifestyles are accelerating TKA demand. Additionally, advances in implant material technology, longevity, and improved surgical technique have helped streamlined procedures, resulting in more rapid and less painful recovery times, excellent mobility, and measurable improvements in quality of life. If current trends continue, **TKAs are predicted to spike by 182%** – about 1,921,000 annually in the United States – by 2030.

An increasing emphasis by all health care stakeholders on value (and most intensely cost) poses challenges to physicians, other practitioners, and health systems/hospitals accustomed to traditional clinical protocols. Payers and employers are seeking to reduce the total cost of care. Techniques include: **shifting sites of service** to lower cost settings such as **ambulatory surgery centers (ASCs)** and hospital outpatient departments (HOPDs), and establishing bundled payments and reference-based pricing. In an increasingly transparent and competitive market for TKA services, orthopedic surgeons, hospitals, health systems, and ASCs are fiercely competing on cost, quality, and patient satisfaction measures that cannot be optimized with legacy, unstandardized post-operative recovery methods. Providers utilizing standardized, evidence-based, high value post-acute TKA rehabilitation services can differentiate themselves in the market.

**TKAs ARE
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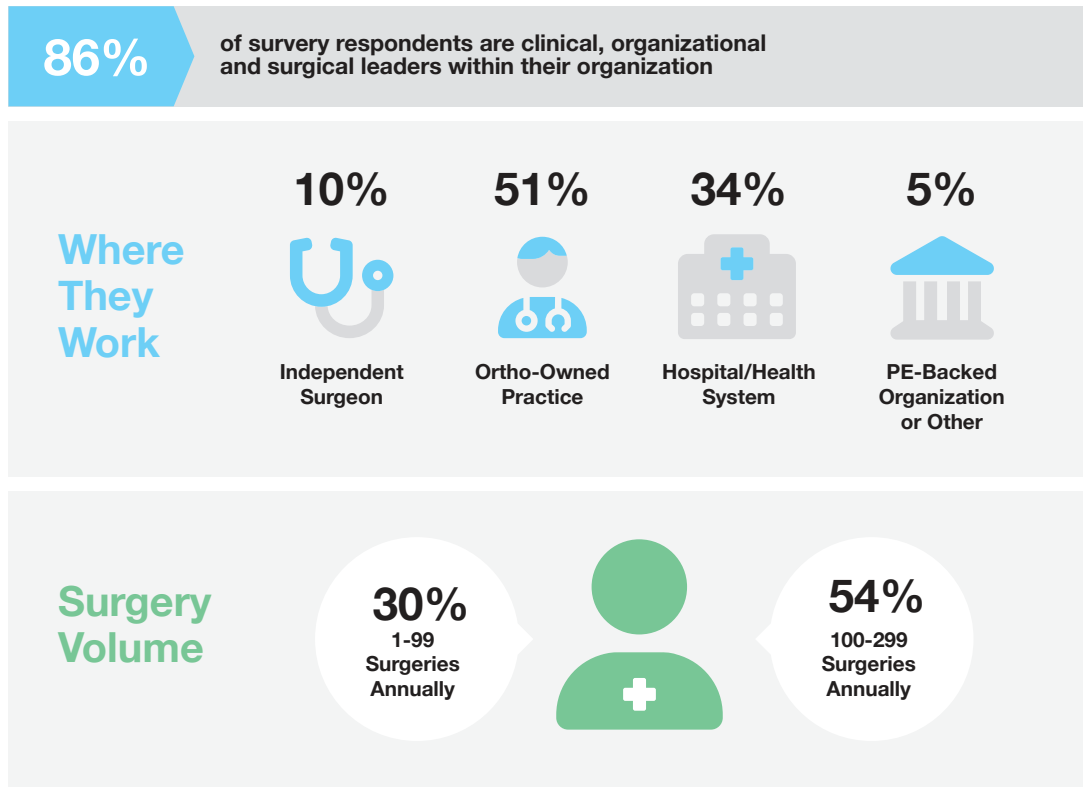
While clinical and administrative leaders are not generally aware of or satisfied with available TKA telerehabilitation solutions, viable options do exist. KinexCONNECT (KCK) is one such alternative that has shown early promise in terms of material realized cost reduction, equivalent clinical outcomes, and high patient satisfaction. The KCK and other non-traditional solutions should be considered as providers look to optimize their TKA offerings.

To understand the various perspectives of orthopedic surgeons and organizational leaders at large practices and health systems with high TKA volume, healthcare consultancy Sage Growth Partners conducted a quantitative survey that received 189 responses in summer 2021. **The diverse respondent make-up was as follows:**

- » **Active Surgeons and Decision Makers:** 86% have a clinical, operational, and/or leadership role within his or her organization.
- » **Varied Practice Structures:** 51% physician-owned practices; 34% hospitals/health systems; 10% independent practitioners; 5% PE-backed organization or “other.”
- » **High-Volume TKA Experts:** 30% perform between 1-99 TKA surgeries annually; 54% perform between 100-299 TKAs annually.

This paper explores the respondents’ perspectives on TKA volume growth, site of service migration and other cost saving measures, organizational priorities, and innovations in post-operative recovery.

FIGURE 1



KEY FINDINGS

1

Alternatives to traditional post-acute care (PAC) are alluring as innovations can provide: material cost savings, equivalent or improved outcomes, greater patient convenience, improved patient compliance, and real-time patient monitoring.

2

When asked to reflect on the full episode of care, **respondents self-reported a troubling lack of visibility in tracking patient recovery** and difficulty managing episodic costs.

3

62% of orthopedic surgeons are supportive of telerehabilitation or would like to encourage its use among their patients.

- » The majority of respondents felt neutral toward or dissatisfied by their solutions' ability to perform in key areas: **ease of onboarding and training; ability to track patient recovery; and success promoting clinically equivalent outcomes.**

4

Most respondents expressed a desire to conduct remote patient monitoring, yet fewer than 15% report having the capability to perform remote objective assessments.

5

Digital solutions are valuable to providers beyond just cost savings. Expectations for ROI on a telerehabilitation / smart recovery device are moderate:

- » 40% expect modest financial improvements or breakeven financial performance.
- » 25% expect an ROI of one to two times.

6

Nearly half of all respondents shared the highest two overall strategic priorities for the next three years: **improve patient satisfaction (49.7%) and improve quality of care (49.2%).**

7

Despite indicating an ability to prevent poor outcomes, **more than 80% of surgeons** listed "improving clinical outcomes" as their highest near-term post-surgical strategic priority.

8

Other high priorities for post-operative rehabilitation reveal that **reducing costs is equivalent in strategic value** as driving service line volume:

- » 70.4% want to improve patient-reported outcomes and satisfaction.
- » 49.2% want to reduce costs of post-surgical rehabilitation.
- » 48.7% want to increase TKA volume.

THE FINANCIAL BURDEN OF RECOVERY

Clinical leaders and high-volume orthopedic surgeons self-report difficulty optimizing episodic profitability and minimizing PAC costs.

While TKAs are often considered routine, recovery pathways are unpredictable and can require costly rehabilitation services. As a result, **postoperative recovery is estimated to comprise 45% of any total episode's cost.** While providers are often laser focused on costs related to the surgical procedure, many are still not diligent about coordinating and managing PAC. This is an oversight in a world that continues to migrate to provider performance measures and sometimes pay based upon total cost of care results. Attention must be paid to optimizing the full episodic journey, especially the financial cost of patient recovery.





In most markets individual surgeons, even within the same group or health system, vary significantly in terms of prescribed TKA rehabilitation protocols. These can include various combinations of physical therapy (PT) – home, hospital, or outpatient clinic based – home health, skilled nursing facility (SNF) services, or inpatient rehabilitation facility (IRF) services. While some variation in rehabilitation protocols is warranted based on patient specific characteristics – such as age, fitness level, or co-morbidities – much cannot be explained by these factors. As an example, costs for a 90-day TKA care episode vary widely, with average Medicare expenditures varying by geographic area **from \$16,500 to \$33,000.**

High quality rehabilitation services are essential to avoid post-surgical complications that can lead to expensive

interventions such as readmissions. Joint stiffness affects **one to seven percent of TKA patients** and may require additional examination, imaging, manipulation, and if stiffness is present past three months, revision. One study analyzed average Medicare payments for total joint replacements. While the average cost per 90-day care episode was \$26,000, complicated outlier episodes cost as much as \$75,000, nearly **three times more.** Although the incidence of TKA readmissions is low, **these few high-cost cases can dramatically reduce provider profitability and harm quality of care metrics.**

POST-OPERATIVE RECOVERY IS ESTIMATED TO COMPRISE 45% OF ANY TOTAL EPISODIC COST.

FIGURE 2

| |  Independent Surgeon |  Ortho-Owned Practice |  Hospital |  Health System |
|--------------------------------|---|---|--|---|
| Average TKA/Year | 100 ¹ | 1,000 ² | 3,500 ³ | 18,900 ⁴ |
| Annual PT Costs ^{5/6} | \$180,000 | \$1,800,000 | \$6,300,000 | \$34,020,000 |
| Annual Spend KCK ⁷ | \$49,500 | \$495,000 | \$1,732,500 | \$9,355,500 |
| Annual Savings w KCK | \$130,500 | \$1,305,000 | \$4,567,500 | \$24,664,500 |

1. Average surgeon performs 100 TKAs per year 6. Average number of PT sessions: 18 7. Average cost of KCK per patient: \$495

While traditional, in-person PT has long been the conventional choice for TKA recovery, it can be expensive with **12 to 20** (or more) visits utilized per episode. Innovations in postoperative rehabilitation now offer providers compelling PT substitutes that can be delivered in patients' homes, by a device, and include remote monitoring and data collection capabilities. These alternatives **have been proven clinically equivalent** for

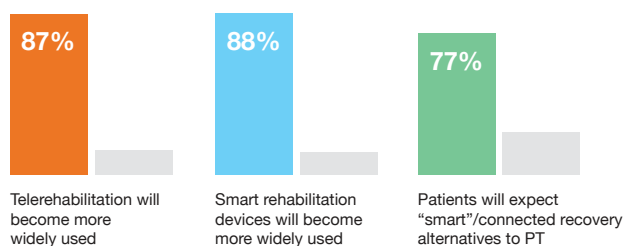
many patient subgroups, and satisfaction is often higher due to increased convenience: patients are not required to travel to PT offices, adhere to specific in-home PT appointment scheduling, and are contacted should they exhibit signs of non-compliance or complications. These telerehabilitation solutions are especially compelling for elderly and/or rural patients for whom travel represents a significant barrier to PT access.

A TECH DISCONNECT: THE NEED IS UNDERSTOOD, BUT ADOPTION IS LACKING

While the majority of respondents (62%) are supportive of telerehabilitation and would like to encourage its use, they have not embraced existing solutions.

FIGURE 3

The majority of respondents believe telerehabilitation is the way of the future.



Existing Provider Awareness is Low While Interest Is High

Orthopedic surgeons and clinical leader respondents believe telerehabilitation and connected devices will soon play a critical role in post-operative rehabilitation protocols: nearly 80% believe that patients will come to expect innovative rehabilitation options within the next five years.

Despite clearly understanding the imperative, adoption of telerehabilitation tools remains low, as fewer than 15% of respondents report using a digital device to collect remote objective assessments and track post-TKA recovery progress.

Awareness of existing solutions was low, suggesting that there is an opportunity to educate the market about the relative benefits of recovery innovation. Moreover, brand recognition even for offerings from some of the largest industry players, is extremely low. When asked if they recognized solutions in a list, the majority of respondents answered "not familiar," with answers ranging from 50-81% unfamiliar.

TODAY, FEWER THAN 15% OF SURGEONS REPORT USING A SMART DEVICE TO TRACK THEIR PATIENTS POST-TKA RECOVERY PROGRESS.

Anecdotal patient feedback or in-person assessment can be imprecise or unreliable. Lack of reliable patient progress data upon which to base appropriate interventions leads to unnecessary variations in episodic cost and quality of care. This can be particularly challenging for providers participating in value-based care programs.

Despite the clear need, only 13.8% of surgeons reported collecting remote, objective data using a digital or “smart” service – a disconnect from the surgeon’s self-reported desire to improve recovery visibility and minimize postoperative complications and episodic costs.

Potential Reluctance, Barriers to Adoption

Barriers to telerehabilitation adoption vary by organization type and perceived functionality. Interestingly, respondents with telerehabilitation reservations overwhelmingly operated within practices that do not participate in alternative payment models. As the percentage of revenue sourced from value-based care models increased, so did respondents’ support of telerehabilitation devices.

Despite **peer-reviewed studies** that assert consistently high-quality outcomes for **web-based** and **at-home** telerehabilitation solutions, perception lags. Orthopedic surgeons report misgivings around clinical equivalency and a desire to utilize existing rehabilitation protocols. Based on this sentiment, telerehabilitation solutions that demonstrate clinical equivalency will have a competitive advantage.

When asked to describe their hesitation surrounding telerehabilitation, providers most often mentioned lack of familiarity, concerns about patient compliance, and issues related to tech literacy:

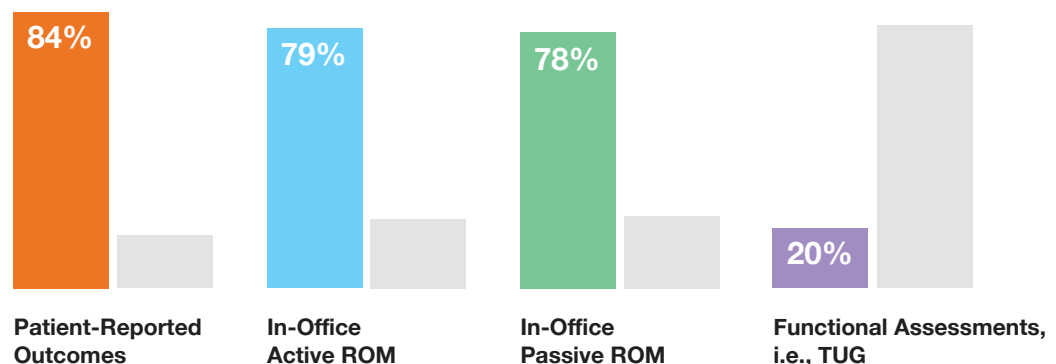
- » “I am not familiar with it, and I prefer that my patients see a therapist.”
- » “Teletherapy is a relative unknown.”
- » “Patient compliance. I am not sure if patients are motivated enough to do therapy on their own.”
- » “We have a lot of old folks who struggle with technology.”

Reluctance toward innovation may also be tied to moderate levels of success with existing telerehabilitation solutions. Notably, respondents seek solutions that support their most important strategic goals: improving patient satisfaction, reducing complications, and lowering costs. Specifically, they would be interested in telerehabilitation solutions that offer data tracking, patient monitoring, ease of implementation, and demonstrate clinical equivalency to standard rehabilitation protocols.

As migration to outpatient care and home rehabilitation accelerates, remote patient monitoring and data collection with on-demand reporting will become essential. With less in-person contact, these features will empower providers, and health plans to intervene timely, minimize complications and reduce overall episode costs.

FIGURE 4

When asked how they typically collect data to track post-TKA recovery, the majority of respondents selected traditional in-office or low visibility options:



THE PROMISE OF TELEREHABILITATION

Telerehabilitation expands patient access, boosts compliance, and improves satisfaction to achieve optimal TKA outcomes while mitigating costs.

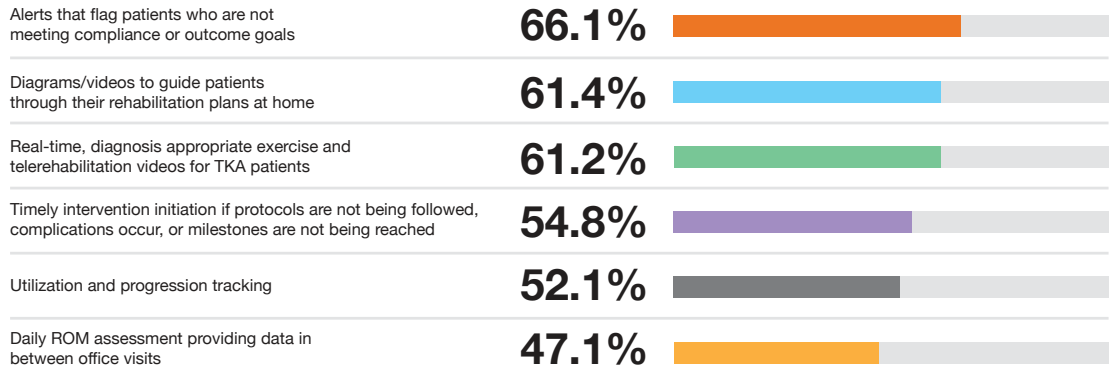
While market adoption for telerehabilitation solutions may continue to be uneven, it represents a meaningful opportunity to improve post-operative recovery and provide new visibility into the patient’s recovery journey. In-person patient access for frequent rehabilitation services such as PT continues to be challenging for rural patients, and this issue has been exacerbated by the pandemic for all patients. This is especially true for the elderly and those with compromised immune systems;

for these individuals, smart telerehabilitation solutions are more convenient, safe, and likely efficacious.

When asked about features they would most like within a smart telerehabilitation device, respondents overwhelmingly requested functionality that allows for improved patient compliance and progress monitoring, home-based recovery plans, and real-time ROM assessments.

FIGURE 5

Most wanted features in smart telerehabilitation devices:



The KinexCONNECT is intriguing to me. I’m all for cost savings in medicine. If something can eliminate the need for costly PT and dragging patients in person, it is certainly an interesting concept. Checking in on their data once a week would be in service of a greater good.

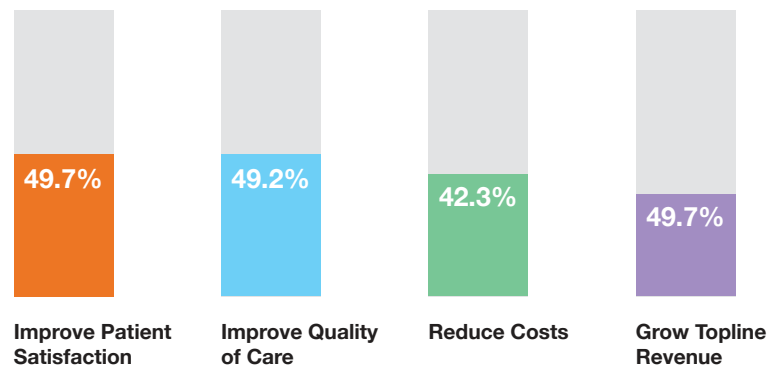
– Chief of Joint Replacement at NE Regional Hospital, Chief of Surgery at Private PE-Backed Practice

TELEREHABILITATION BENEFITS CLOSELY ALIGN WITH PROVIDERS' TOP STRATEGIC PRIORITIES

Post-surgical rehabilitation protocols rely heavily upon consistent movement, pain management, and management of patient expectations. Telerehabilitation supports these tactics, and compliant patients are satisfied while realizing high quality, cost effective outcomes. As evidenced by survey responses below, these objectives align with providers' strategic priorities:

FIGURE 6

Top four organization strategic priorities for organizations over the next one to three years:



More specifics from respondents regarding these strategic priorities include:

1 PATIENT SATISFACTION

Orthopedic surgeons and hospital leaders list improving patient satisfaction as a key short-term strategic objective. Telerehabilitation and connected devices promote standardized recovery protocols and reduce unnecessary care variation.

Additionally, surgeons report noting reactions of “surprise and delight” in patients who are presented with innovative solutions designed to help them recover more comfortably and efficiently. Being able to rehabilitate at home, regardless of pandemic concerns, creates significant improvement in patient satisfaction.

A 2020 Marwood Group report reveals that:

- » **50-87% of respondents** expect that having access to patient progress data would help reduce cost of care.
- » **73-95% of respondents** expect real-time reported outcomes would assist in prescribing recovery regimens.

2 PATIENT COMPLIANCE

Individual providers and systems alike report feeling disconnected from the 80% of patients who are discharged same day post-surgery. They desire greater visibility into patient progress and compliance and timely notifications to prevent or address complications. In addition to these benefits, smart telerehabilitation devices allow surgeons to provide video-based exercises that help patients struggling with stiffness in the first three months of recovery. At-home rehabilitation also helps patients feel a greater sense of ownership in their recovery, can improve adherence to recovery protocols, and yield equivalent outcomes to traditional in-person regimens.

3 QUALITY OUTCOMES

Traditional PAC rehabilitation protocols vary widely and unnecessarily, increasing the risk of providers failing to achieve episodic cost of care goals. With consistent, standardized, monitored, and measured approaches, telerehabilitation solutions can promote high degrees of flexion and improved TUG scores for TKA patients. This promotes higher value care and improved provider metrics as measured by quality-based care programs.

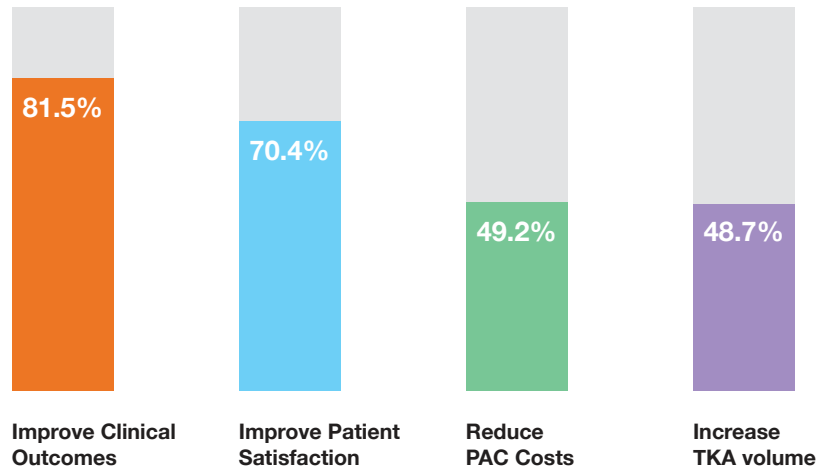
4 EPISODIC COST SAVINGS & ROI

40% of respondents only expect modest financial improvements or breakeven financial performance, and 25% expect a reasonable ROI of one to two times investment; telerehabilitation can deliver above and beyond these modest expectations.

Since telerehabilitation solutions substitute for more costly in-person rehabilitation services, while delivering clinically equivalent outcomes, ROI is immediately and easily realized.

FIGURE 7

Top four organizational strategic priorities specific to post-TKA rehabilitation in the next one to three years:



73-95% OF RESPONDENTS EXPECT REAL-TIME REPORTED OUTCOMES WOULD ASSIST IN PRESCRIBING RECOVERY REGIMENS.



THE KINEXCONNECT DELIVERS ON SURGICAL & CLINICAL LEADERS' STRATEGIC PRIORITIES

Provider organizational leaders and high-volume orthopedic surgeons are keenly focused on mitigating episodic costs, while maintaining or improving clinical quality and improving patient satisfaction. Alternatives to traditional post-surgical rehabilitative care, like the KinexCONNECT (KCK), can help deliver on these goals.

For providers, payers, and systems engaged in value-based care contracts, investing in additional tools or resources may be cost-prohibitive. The KCK requires no upfront provider investment. After providers order the KCK, Kinex specialists process the paperwork digitally and collaborate with payers on pre-authorization. Once device approval is received and the patient is discharged, a Kinex technician delivers the KCK to the patient's home. This individual configures, fits, and educates the patient about the KCK.

Throughout recovery, Kinex staff act as an extension of the provider practice or health system, monitoring patient progress, regimen compliance, and, when necessary, trigger timely intervention and support. After four to six weeks, a Kinex technician returns to collect the device from the recovering patient, who demonstrates clinically expected flexion and mobility. Removed from the administrative details of coordination and billing, payers and providers realize satisfied, healing, patients and reduced episodic costs.

Specific benefits of the KCK include:

Guaranteed cost savings: The KCK immediately reduces the need for traditional PT (either home or outpatient), which results in a savings of \$1,000 – \$1,200 per case (net of KCK cost).

Clinical equivalency: Early studies indicate that active and passive ROM coupled with a telerehabilitation device provide clinically equivalent results to traditional, in-person PT sessions.

Increased patient satisfaction: The KCK improves overall patient satisfaction via convenient, high-touch customer service, and remote rehabilitation exercise video instruction. Additionally, patients recognize the KCK as a leading-edge technology solution. The surgeon and the health system may accrue “halo effect” benefits by being perceived as innovative and patient-centric.

Empowered providers who have visibility into the recovery journey: The KCK collects, stores, and reports on utilization data to improve compliance, measure outcomes, and decrease overall episodic costs.

- » Customized reporting helps providers monitor patient recovery. Preloaded outcome tools allow Kinex to collect and report data to providers, hospitals, private insurance companies, governmental payers, etc.
- » When patients are not compliant or complication warning signs arise, the KCK monitoring, communication, and notification processes enable clinical interventions that reduce complications, including readmissions. Kinex staff provide a first point of contact to re-engage patients, reduce burden on clinical teams, and escalate as appropriate. While these savings are difficult to quantify except over large populations, they represent a meaningful benefit.

Increased reach and access to care for remote or elderly populations: Travel can be difficult or nearly impossible for those with challenging work schedules, childcare obligations, patients who are reliant on others for travel, or located in rural or remote communities. The KCK can improve compliance amongst cohorts that may be more likely to quit PT before the recommended number of visits due to travel and coordination.

Convenient Technology: It is exciting for patients to engage with technology from the comfort of their own home. The KCK allows for 24/7 access to recovery technology, so individuals can engage in rehabilitation at a pace that is comfortable for them. The KCK may also help increase member health plan satisfaction due to perceived investment in lower cost, quality, high-tech care.

CONCLUSION: THE FUTURE OF RECOVERY

Increased popularity of TKA, higher volumes, and new financial arrangements for healthcare stakeholders necessitate improvements and advances in post-TKA rehabilitation protocols.

As the volume of TKA surgeries, and associated PAC costs, continue to increase, orthopedic surgeons, clinical leaders, health systems, and payers are seeking innovative ways to contain episodic costs, improve the patient experience, and standardize recovery pathways to prevent costly revisions, readmissions, and other complications.

Providers will be expected to optimize, standardize, and benchmark their PAC protocols, which has historically been difficult with limited post-discharge visibility and traditional PT regimens. Innovative forms of postoperative recovery solutions, such as the KinexCONNECT, can empower stakeholders with a new ability to influence, monitor, and oversee the patient recovery journey – while saving money. By embracing new forms of PAC, stakeholders will now be able to strike that critical balance: preserving the profitability of their fee for service arrangements and optimizing profitability of VBC arrangements while maintaining consistently high safety and quality outcomes – regardless of where the procedure is performed.

I think telerehabilitation has stickiness post-COVID. You – or your staff – can conduct as many touch points as you'd like. COVID has proven we can do a lot of post-operative care on a virtual basis.

– **Orthopedic Surgeon,**
National Network of Physician-Led Practices



ABOUT KINEX MEDICAL COMPANY

Kinex Medical Company is a leading provider of orthopedic specialty medical equipment for acute, post-acute, and in-home rehabilitation following injury or surgery. The KCK is a total knee replacement telerehabilitation solution that utilizes real-time data to improve patient compliance and satisfaction, maintain or improve clinical outcomes, and decrease costs. The solution pairs active and passive motion with an intuitive Android tablet that displays customizable dashboards and content. Surgeons can select from a library of pre-loaded custom exercise videos and illustrations to recommend recovery protocols and improve patient accountability. The tablet controls the device while it collects, stores, and reports utilization and outcome data.

The KCK's comprehensive solution acts as a substitute for some or all post-operative rehabilitation services, most importantly PT. In qualified cases, it can reduce the number of post-operative PT visits by 10-12, resulting in a cost savings of \$1,000 or more per episode. Moreover, real-time compliance and intervention features can reduce readmissions, manipulations, and other undesirable and costly clinical complications.

To learn more about Kinex Medical and the KCK, visit [KinexMedical.com](https://www.KinexMedical.com) or **Contact Us** today.