KINEX Whitepaper

KinexCONNECT improves patient experience and therapy compliance during recovery from total knee replacement

Focus groups conducted by Kinex Medical Company and HealthFactors.

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Opportunity

Telemedicine visits are expected to hit 80 MILLION by 2022

The occurrence of total knee replacement (TKR) procedures is growing rapidly and related factors, such as the changing demographic for TKR, have made managing costs and utilization of this procedure a priority for healthcare experts. When you consider that TKR procedures are projected to increase by 673% by 2030[1] and that the age range for patients receiving this treatment is dropping from 68 years to 65.0 years[2], it becomes clear that the American healthcare marketplace is facing both a challenge and a significant opportunity.

The opportunity lies in part in the growth and expansion of virtual care. Recent reports show that the number of telemedicine visits is expected to hit 80 million by 2022[3] as patients become more receptive to and comfortable with virtual care. In addition, 65% of patients said they would be willing to see their primary care provider through a telehealth visit and 52% of adults said they would be willing to conduct a post-surgical visit remotely[4]. This growth is being driven in part by changing payment models from the Center for Medicare and Medicaid Services (CMS), which are focused on reducing expenditures and improving quality of care, as well as regulations stemming from the Affordable Care Act that are designed to improve access to care for patients in rural communities or those with limited access to in-person care.

Consider the goal of the Triple Aim in health care, the growth of the CQO (Cost/Quality/Outcomes) Movement, and the rise of new payment models, like value-based payments. In addition, the Comprehensive Care for Joint Replacement (CJR) model and Bundled Payments for Care Improvement (BPCI) Advanced, are all examples of initiatives that are based on a shared philosophy: Improving access to care, delivering a more favorable patient experience, and making it easier for patients to comply with rehabilitation protocols can improve outcomes and ultimately lower costs related to complications and readmissions.

[1] The American Academy of Orthopedic Surgeons. www.orthoinfo.aaos.org.

[2] The American Joint Replacement Registers--the first 5 years. Arhtroplasty Today, June 2017.

[3] Number of telehealth visits in the United States from 2013 to 2022 (in millions). https://www.statista.com/statistics/820756/number-of-telehealth-visits-in-us/

[4] The top 10 questions physicians ask about telehealth. Healthcare IT News, Feb. 2, 2016. https://www.healthcareitnews.com/news/top-10-questions-physicians-ask-about-telehealth

Solution

A smooth and efficient rehab process is a win-win for everyone. Roughly 50% of people still get their health coverage through their employer and another 35% receive benefits through Medicare or Medicaid[5], and predictability in cost and outcomes is a top concern for plan sponsors and employers.

However, data shows that the average person takes three to six months to recover from a TKR, and the standard phased-in re-entry to work typically occurs over several weeks[6]. In some cases, the person being impacted by this lengthy recovery time could be a 50-year-old woman who undergoes TKR herself or the adult daughter who is caring for an elderly parent who is recovering from surgery. In either and all cases, this can put a burden on a family's finances, their work productivity, and their personal support system, not to mention their emotional well-being.

Traditional, in-person physical therapy has been the mainstay of TKR recovery for years, a home-based recovery using virtual physical therapy and CPM has the potential to streamline the rehab process and timeframe, ease the burden on family members and caregivers, improve compliance and outcomes, and reduce healthcare spending. Consider the following findings:

- In a study of 103 TKR patients, outcomes in knee flexion and extension was found to be similar between patients who underwent traditional, inpatient therapy and those who completed therapy at home using a CPM device. Meanwhile, the cost for the CPM machine group was $10,582 ($286 per patient), and the cost for traditional physical therapy in a clinic setting was $23,994 ($558 per patient).[7]
- A recently published literature review and meta analysis of five unique studies involving 752 patients showed no significant clinical benefit to inpatient or clinic-based physical therapy after TKR versus home-based physical therapy.[8]
- More than half the cost of total joint replacements is estimated to be incurred in the post-operative period, making home-based therapy a more cost-effective option.[9]

In addition to the published literature, Kinex Medical Group and HealthFactors conducted three separate focus groups with 12 patients from the Midwest who had used the KinexCONNECT CPM device to complete their prescribed physical therapy. The average age of the participants was 69 and the majority (10) were female. Approximately half of the participants lived in urban areas and half were in rural communities.

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[5] Health Insurance Coverage of the Total Population. Kaiser Family Foundation. https://www.kff.org/other/state-indicator/total-population/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D

[6] How much time will I have to be off work for a total knee replacement surgery? www.Bonesmart.org

[7] Home continuous passive motion machine versus professional physical therapy following total knee replacement. Journal of Arthroplasty. https://www.researchgate.net/publication/13483187_Home_continuous_passive_motion_machine_versus_professional_physical_therapy_following_total_knee_replacement

[8] Assessment of outcomes of inpatient or clinic-based vs. home-based physical therapy after total knee arthroplasty. JAMA Network Open;2(4):e192810. doi:10.1001/jamanetworkopen.2019.2810

[9] After knee or hip replacement, no place like home. New York Times, April 24, 2017. https://www.nytimes.com/2017/04/24/well/live/after-knee-or-hip-replacement-no-place-like-home.html

The purpose of the focus groups was to gather patient feedback related to:

- **Patient outcomes and feedback.** Overall, the experience for patients using the KinexCONNECT device was positive, and all said they would use the device again, if needed. In particular, KinexCONNECT made the rehab process easier and, in the eyes of the patients, more successful in the following ways:

- **Improved Range of Motion (RoM).** Patients who were high utilizers (> 75% of prescribed days) of the KinexCONNECT device saw more improvement in Range of Motion measures than those with low utilization (<51% of prescribed days). More specifically, average best max flexion for high utilizers was 118 compared to low utilizers who recorded an average of 90.

- **Relaxation.** Patients reported that the device helped them "relax through the pain" so they could complete their exercises and, in some cases, even sleep better during recovery. Studies have shown that quality of sleep and sleep disturbances after surgery can influence a person's sensitivity to pain, the length of their hospital stay, their emotional health, and for TKR patients, sleep disturbances have been connected to functional limitations three months post surgery.[10]

- **Ease of use.** Patients reported that the device was easy to use and that the video content, progress reports, and ability to contact a physician kept them more engaged with their therapy and alleviated concerns over the speed of Range of Motion recovery and the intensity of pain.

- **Personal support.** Patients appreciate the support from the Kinex technicians who deliver the device and tablet and who teach patients and their family caregivers how to use the device to complete their recovery. Patients also highlighted the follow-up calls from Kinex as their therapy progressed to ensure that things were going smoothly and that information they received after their procedure had been retained.

- **Best of both worlds.** While most patients in the focus groups were skeptical about at-home therapy at first, once they began using the device they felt it was a good complement to in-person therapy. Patients who lived in rural communities credit their successful recovery in large part to KinexCONNECT and the virtual care experience, which gave them confidence that they were taking the correct steps and that they had a direct line to help, if needed. Patients also expressed appreciation for the flexibility that virtual therapy afforded them and their families during their recovery period.

- **Standalone Virtual Rehab.** Three out of 12 patients relied exclusively on the exercise videos and physician protocols for physical therapy. They had equivalent clinical outcomes to those who used both in-person PT and virtual rehab and stated that the biggest benefit was access to on-demand therapy without being constrained by transportation and physical therapy clinic schedules.

- **Healthcare provider feedback.** To understand the provider perspective as it relates to the effectiveness of CPM, Kinex Medical also conducted one-on-one interviews with physicians and physician's assistants who work in orthopedic clinics and orthopedic hospitals and conduct on average more than 100 TKR procedures a year. All providers had recently used the KinexCONNECT device as part of the rehabilitation protocol for patients. During the course of these interviews, providers indicated that:

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[10] Su, X. Wang, D. Improve postoperative sleep: What can we do? Current Opinion in Anesthesiology. February 2018. https://journals.lww.com/co-anesthesiology/Fulltext/2018/02000/Improve_postoperative_sleep___what_can_we_do_.15.aspx

CPM with Remote Patient Monitoring capabilities has the potential to streamline clinical workflows by addressing frequently asked patient questions remotely through a connected CPM device, rather than generating calls or visits to a clinic or urgent care. In fact, CPM with connected capabilities has been shown to deliver cost savings, as indicated by research like the VERITAS[11] study, which showed providers who used a connected RPM platform as part of TKR therapy saved an average of $2,745 per patient over traditional in-patient therapy. The ability of RPM to deliver savings and comparable clinical outcomes as compared to in-person therapy is driven by the fact that patients receive a higher degree of monitoring with RPM, which enables a 24/7 connection to their care providers instead twice-a-week PT sessions.

During virtual care sessions, patients can receive coaching on active exercises and get answers to questions about their recovery progress. This along with the patient reported outcomes surveys that KinexCONNECT delivers, enables earlier and more cost-effective intervention by a healthcare provider and can help avoid ER visits, rehospitalizations and subsequent manipulations. Real-time feedback of adherence to active exercises has been shown to improve compliance with at-home therapy because patients are more likely to adhere to their care plan which increases self-efficacy.[12]

Case in point, patient participants in the KinexCONNECT focus groups indicated that they benefited from knowing that they were continuously being monitored by a surgeon while recovering from the TKR in the comfort of their home. In addition, the surgeon's personal video discharge instructions stored on the tablet provided much-needed re-assurance that they were working correctly to regain the Range of Motion and that it was important to move forward despite severe pain.

The takeaway

Providing patients with at-home exercises following a TKR (as well as other musculoskeletal injuries or conditions) is a fundamental element of rehabilitation.[13] Involving patients in tracking and reporting their completion of exercises through connected monitoring technologies has been found to increase their sense of self-efficacy along with the amount of time they spend on at-home exercises.[14] The KinexCONNECT CPM therapy approach enables total virtual care for rehab after TKR and supports patient adherence and improved outcomes by creating a continuous connection between patients and their care rehabilitation team, allowing therapists to monitor patients through Patient Reported Outcomes and Range of Motion data that indicates the trajectory of the patient's recovery and identifies potential pitfalls. The ease of use and ability to relax through the pain also has the potential to improve compliance and overall outcomes.

[11] "Duke confirms cost savings from physical therapy via telehealth." mHealth Intelligence, October 15, 2018. https://mhealthintelligence.com/news/duke-affirms-costs-savings-from-physical-therapy-via-telehealth

[12] Bassett SF. Bridging the intention-behaviour gap with behaviour change strategies for physiotherapy rehabilitation non-adherence. N Z J Physiother. 2015 Nov 11;43(3):105–111. doi: 10.15619/NZJP/43.3.05.http://onlinelibrary.wiley.com/resolve/openurl?genre=article&sid=nlm:pubmed&issn=1195-1982&date=2015&volume=22&issue=2&spage=130. [CrossRef] [Google Scholar] [Ref list]

[13] Adherence to home exercise programs. Physopedia. https://www.physio-pedia.com/Adherence_to_Home_Exercise_Programs

[14] Argent R., Daly A., and Caulfield B. Patient involvement with home-based exercise programs: Can connected health interventions influence adherence? JMIR Mhealth Uhealth. March 2018. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5856927/