

Improving patient outcomes following total joint arthroplasty: is there an app for that?

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Patient activation, defined as an individual's knowledge, skill and confidence in managing their health and healthcare, is recognised as a critical aspect of high-quality, patient-centred and safe healthcare.¹ In 2004, Judith Hibbard and colleagues published their seminal work on the development of a validated, objective measure of patient activation.¹ The Patient Activation Measure (PAM) was designed to assess patient self-reported knowledge, skills and confidence for managing one's health or chronic illness. The original 22-item PAM was subsequently shortened to a 13-item version and was found to be both reliable and valid for assessing patient activation.² Patient activation has the potential to reduce healthcare costs, optimise healthcare utilisation, enhance population health by encouraging healthy behaviours and improve patient outcomes and satisfaction.^{3–5}

Total knee arthroplasty (TKA) represents an important opportunity to study the effectiveness of patient activation. Historically, up to 15%–20% of patients remain dissatisfied following a total joint arthroplasty (TJA).^{6,7} This is especially true of patients undergoing TKA and remains a troublesome challenge for orthopaedic surgeons and their patients.⁸ To date, it remains unclear why some patients remain unsatisfied with their knee function following TKA, despite having technically successful surgeries when examined from the surgeon's perspective. Previous attempts to address the subgroup of dissatisfied patients undergoing TKA through modifications to implant design and alterations in surgical technique have generally failed. Focus then shifted to patient characteristics, with some evidence that patient factors such as mental health scores and patient expectations are predictive of postoperative

patient satisfaction.^{9–12} It stands to reason that interventions designed to improve patient activation may modify the risk of poor patient experience.

While promising, the literature investigating patient activation in orthopaedics is scarce and represents opportunity for scientific evaluation.^{13,14} Identifying patients with low patient activation may allow orthopaedic surgeons to predict patients at risk of poor outcomes and develop mitigation strategies. Activated patients may have more realistic expectations following surgery, and therefore better patient-centred outcomes such as satisfaction, pain scores and knee function.^{15,16} Furthermore, greater patient activation may lead to improvements in coping and self-care strategies used by patients as they navigate the recovery process. The early postoperative period following TKA can be challenging, as patients must cope with significant pain and swelling while also actively engaging in an aggressive physiotherapy programme in order to ensure a positive long-term functional outcome. Better patient activation and coping skills during this phase of recovery can be a useful strategy.

The use of technology such as an interactive multimedia intervention is appealing due to ease of application and feasibility in busy settings such as outpatient clinics or fast-paced inpatient wards. A common concern for patients undergoing TKA is the fear of being unable to cope with pain once they return home.¹⁷ It has been shown that higher preoperative patient activation scores correlate with better postoperative patient-reported outcomes in patients undergoing TJA, including pain scores.¹³ However, it is not yet entirely clear how and to what extent patient activation can be modified.



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In this issue of *BMJ Quality and Safety*, McDonall *et al* describe the impact of a bedside multimedia intervention for patients undergoing TKA.¹⁸ The authors report better pain scores, length of stay, knee function and satisfaction with care for patients exposed to the intervention (a multimedia presentation using text, sound, graphics and animations to provide information tailored to each day of recovery) through a portable tablet device. Interestingly, the study showed that PAM scores actually decreased during the inpatient stay, although to a lesser degree in those patients who were exposed to the intervention, returning to baseline levels by 4 weeks postdischarge. This raises new questions regarding the impact of interventions limited to the inpatient setting on patient activation. The utility of tools such as web-based platforms and mobile apps to improve patient activation remains unclear, particularly in the inpatient setting.¹⁹ Furthermore, while additional supports provided during the inpatient stay may provide marginal improvements in patient experience and/or activation, the true challenge for improving postsurgical recovery lies in the immediate postdischarge period.²⁰ It is in the early days after hospital discharge that surgical patients feel most adrift, not knowing what to expect as part of the 'normal' recovery. Many wonder if pain, swelling and other symptoms experienced represent part of the usual recovery process or herald the onset of a worrying complication.

If technological interventions are able to improve the transition from inpatient to outpatient care following surgery, they can enhance patient experience and activation and even impact healthcare utilisation. Campbell *et al* recently demonstrated that automated text messages sent to patients undergoing TJA can improve time spent on home exercises, enhance patients' mood, decrease narcotics use and minimise calls to the surgeon's office.²¹ Additionally, patient activation may reduce unnecessary emergency department visits and decrease morbidity through early and accurate identification of postoperative complications. With the increasing and now ubiquitous use of smartphones and tablet computers in the general population for fitness, meditation and other lifestyle improvements, these platforms provide an excellent opportunity for physicians to engage with patients. Harnessing such technologies has been shown to be beneficial for both patients and providers in the postsurgical period by reducing the need for inpatient follow-up visits while also being cost-effective.²² Mobile apps have demonstrated impact in chronic disease management by improving patient activation and blood pressure and glycaemic control.^{23 24} Interestingly, negative mobile app studies seem to suggest that when technologies are used as a passive educational intervention, patient activation may suffer.^{25 26}

One possible key ingredient to successful patient activation is the engagement of the healthcare team

that is facilitated through mobile technology. Where these technologies were used as tools to facilitate greater communication and interaction, patient activation has been shown to be increased and outcomes improved.^{23 24 27} In the way that surgical checklists are believed to be necessary but not sufficient to reduce adverse events,²⁸ technological interventions may be effective only if implemented in a manner that improves a patient's connexion with the healthcare team. Technology alone, such as an app that can only be accessed during a hospital stay, is unlikely to result in sustained increases in patient activation as patients will present with different needs during subsequent stages of recovery (eg, post-discharge). Through a qualitative study of user needs related to TKA, van Kasteren *et al* showed that information and communication needs indeed change throughout the TKA 'journey', concluding that opportunities to leverage technological solutions are therefore dependent on both the patient's stage of recovery as well as the specific goal of the intervention.²⁹ Indeed, the need for clinicians to deliver the 'right information at the right time' was a key finding of the study by van Kasteren *et al*, which also concluded that digital technology could facilitate improved communication from patients to clinicians.²⁹ In summary, users of technology to promote patient activation must recognise the need to actively integrate patients into the healthcare team as well as to inspire them to take control of their own care.

Mobile apps and other technological interventions also must have clear goals if they are to be used successfully; and these goals are likely to differ for different patient populations and disease processes. As the study by van Kasteren *et al* showed, interventions that are found to be successful for inpatients may be quite different from those that have utility for patients who are either preparing for or recovering from surgery at home.²⁹ Additional research is needed to determine the key interventions required to successfully increase patient activation at each stage in a patient's journey, beginning with the decision to undergo surgery and ending once maximal recovery has been achieved. Educational interventions may be more important prior to surgery while daily reminders, symptom tracking and automated triggers resulting in contact with a member of the care team may be most helpful in the early postoperative period. In addition to tailoring the type of intervention, personalisation has also been shown to be a key feature of the so-called 'persuasive eCoaching' interventions (ie, interventions designed to motivate groups of people to alter their behaviours and attitudes).³⁰ Personalising the timing, content and type of digital technology intervention depending on patient factors may therefore lead to greater improvements in outcomes such as patient activation and self-efficacy following TKA. Improving patient activation clearly holds promise for improving outcomes related to modifiable patient factors, and harnessing

mobile technologies to achieve this goal may be the path forward. The key to success will likely be tailoring interventions to meet the specific needs of individual patients at different stages in the TKA journey.

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