

# Enhancing Recovery After Total Knee Arthroplasty

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## KEYWORDS

• Rapid recovery • Total knee arthroplasty (TKA) • Rehabilitation protocol

## KEY POINTS

- Efforts to identify and correct modifiable risk factors should be undertaken before elective total knee arthroplasty (TKA).
- There is adequate evidence to support the use of multimodal pain management protocols in TKA, although debate exists over the optimal regimen.
- The advent of tranexamic acid has reduced the transfusion rate and associated complications after TKA.
- There is no consensus regarding the type, appropriate frequency, duration, or intensity of physical therapy protocols after TKA.

## INTRODUCTION

Rapid or enhanced protocols to improve recovery after total knee arthroplasty (TKA) have evolved in response to efforts to improve patient satisfaction, the advent of bundled care, and the increasing practice of “fast-track” and outpatient total joint arthroplasty (TJA). The increasing demand and volume of TKAs performed have created pressure from payer sources to provide high-quality outcomes at low cost. The sharing of costs with physicians and the opportunity to share cost savings have incentivized physicians to improve preoperative, intraoperative, and postoperative care strategies. Multiple specialties, including orthopedic surgeons, anesthesiologists, and physical therapists, have contributed to improving the standard of care in “fast-track” elective TKA to make it a safe and effective procedure, even when performed in the outpatient setting. Despite these efforts, there continues to be room for improvement in patient satisfaction after TKA. Although TKA is a

successful operation for most patients, there is a significant portion of patients who remain unsatisfied. In a survey of 1712 TKA patients, only 89% reported willingness to undergo another TKA,<sup>1</sup> and overall satisfaction was a modest 81%. A multicenter study examining patient satisfaction in young patients found that newer knee designs have not resulted in improved patient satisfaction in younger patients.<sup>2</sup>

## PATIENT OPTIMIZATION

Recognizing which patients are at risk for adverse outcomes after TKA is the first step in preventing them. Optimizing modifiable risk factors is imperative for success, and surgery may need to be delayed until many are corrected. Routine preoperative medical evaluation by primary care specialists is valuable in identification of many of these risk factors. Although the following risk factors are discussed individually, many patients will present with a combination of these medical comorbidities.

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### Psychological

Inferior outcomes have been reported with decreased mental composite scores because of conditions such as depression and anxiety.<sup>3</sup> These patients may benefit from additional efforts in preoperative education and in postoperative rehabilitation. Providing additional attention to these patients through more frequent postoperative phone calls and office visits to provide psychological support can be beneficial.

### Obesity

Body mass index (BMI) greater than 30 is associated with increased length of stay (LOS) and increased likelihood of discharge to a rehabilitation facility.<sup>4</sup> In a large database study of morbidly obese patients, BMI greater than 40 was associated with an increase in complications, mortality, and resource use, but with a relatively modest effect size when controlled for comorbid conditions.<sup>5</sup>

### Anemia

Preoperative anemia should be screened for and corrected, if possible, before elective TKA. It has been associated with increased transfusion rate, infection risk, increased LOS,<sup>6,7</sup> and an increased risk of mortality.<sup>8</sup> Perioperative allogenic transfusions have also been associated with an increased infection rate in TKA<sup>9</sup> in patients with increased infection risk factors such as diabetes and obesity. A multicenter study in Europe conducted in 2015 determined that strategies to identify and treat anemic patients were still underutilized.<sup>10</sup>

### Diabetes Mellitus

Diabetic patients are at increased risk of infection after TJA, especially those with poor glycemic control. These subjects are at increased risk of surgical and medical complications and have a higher mortality risk and increased LOS.<sup>11</sup> The investigators recommend monitoring HgbA1c as a marker of long-term glucose control, which should ideally be less than 8.<sup>12</sup> Early postoperative glucose management, which was first identified as an important part of preventing infection in cardiac and general surgery,<sup>13</sup> is important, even in nondiabetics. Glucose should be monitored postoperatively with a goal of 110 to 140 g/dL.<sup>14</sup>

### Tobacco Use

Smokers are at a higher risk of multiple complications after surgical procedures, including the need for mechanical ventilation, wound healing problems, infection, and cardiac complications.<sup>15</sup> Smoking cessation 4 to 6 weeks before operative intervention is recommended to decrease

complications.<sup>16</sup> A 2010 *Cochrane Review* showed that interventions including behavioral support and nicotine replacement therapy (NRT) can be effective in reducing postoperative morbidity.<sup>17</sup> Obtaining a cotinine level preoperatively is one method to monitor compliance, but for patients on NRT (who would test positive for nicotine byproducts), checking an expired carbon monoxide breathing test has been described.<sup>15</sup>

### Malnutrition

Malnutrition places patients at higher risk of wound complications, infection, and medical complications after TKA.<sup>18</sup> Markers indicating malnutrition are total lymphocyte count less than 1500 cells/mm<sup>3</sup>, albumin of less than 3.5 g/dL, and transferrin levels less than 200 mg/dL.<sup>19</sup> As noted by Huang and colleagues,<sup>18</sup> obese patients are often paradoxically malnourished, and this should be addressed before elective TKA.

## PREOPERATIVE EDUCATION

There are conflicting data in the literature regarding whether preoperative education is a useful intervention for TKA patients. Noble and colleagues<sup>20</sup> found that patient satisfaction was highly correlated with whether preoperative expectations had been met. Culliton and colleagues<sup>21</sup> found no difference in patient satisfaction in regard to preoperative expectations, but did find that postoperative expectations were correlated to satisfaction, and recommend continuing patient education through the postoperative period. However, in a 2014 *Cochrane Review*, no significant differences were demonstrated in regard to outcomes (either pain, function, health-related quality of life, or complications) when preoperative education was evaluated. It was recognized that preoperative education may be useful in certain populations; those with depression or anxiety, and to correct unrealistic expectations.<sup>22</sup> Given the potential benefits of preoperative education, the negligible potential for harm, low cost, and in light of the decreasing hospital LOS, the investigators think that the importance of preoperative education will increase because patients spend less time being monitored and educated in the hospital.

## INTRAOPERATIVE CONSIDERATIONS

### Minimally Invasive Surgery

Minimally invasive surgery (MIS) TKA techniques have been proposed to offer benefits of less blood loss, reduced pain, and faster recovery.<sup>23</sup>

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