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Preoperative Optimization in Total Knee Arthroplasty: Beyond Weight Loss

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ABSTRACT

Total knee arthroplasty is one of the most commonly performed orthopaedic surgeries worldwide. However, a significant number of patients experience post-operative complications and do not achieve satisfactory functional results after their surgical procedure. While obesity has been the main focus in pre-operative risk discussions for many years, more recent evidence indicates that there are several other modifiable factors which have equal to or greater prognostic value than obesity. This narrative review will synthesis current evidence on these same five key domains of optimization prior to surgery: glycemic control; nutritional status; physical conditioning; psychological readiness; and broader comorbidity management.

Diabetes mellitus and perioperative hyperglycemia consistently have higher rates of wound dehiscence, readmission and periprosthetic joint infection. Malnourishment before surgery (up to 40% of patients undergoing arthroplasty) individually increases the risk of early implant failure and wound complications. Structured prehabilitation programs enhance functional capacity in the weeks leading up to surgery and accelerate recovery following surgery. Benefits from prehabilitation are greatest among those with the lowest levels of functional ability at baseline. Depression, anxiety, kinesiophobia and unreasonable expectations by patients are among the strongest independent predictors of poor reported outcomes and patient dissatisfaction following surgery. Finally, both preoperative anemia and smoking each contribute to adverse outcomes as well as overall comorbidity burden.

The evidence supports moving away from weight-centred risk stratification towards a multidisciplinary approach to optimize all domains prior to surgery. Systematic screening for these

domains and targeted intervention may result in reduced complication rates and improved reported outcomes.

Keywords: Arthroplasty, Replacement, Knee, Glycemic Control, Malnutrition, Preoperative Exercise

1. Introduction

Total Knee Arthroplasty (TKA) is a very successful treatment option for advanced degenerative joint disease of the knee. An excess of 700,000 TKA's were completed last year in the U.S. alone, and it is anticipated that numbers will greatly increase in the years to come. While TKA generally produces good long term results in the vast majority of patients who undergo the procedure, there are many who suffer from adverse events (complications), extended rehabilitation periods, and less than satisfactory post-surgical functions. Identifying and correcting modifiable risk factors before surgery can be one of the most effective ways to improve the outcome of a TKA [1].

Obesity has traditionally been considered the major area of concern when it comes to optimizing patients before they go into surgery. However, there is now a substantial amount of research which indicates that numerous other factors carry just as much predictive value as obesity when it comes to preventing complications from developing after TKA such as periprosthetic joint infection (PJI), poor wound healing, extended hospital stays, and lower levels of patient satisfaction [2]. Many of these factors include uncontrolled glucose levels, inadequate nutrition, physical deconditioning, co-morbidities such as mental health issues, and lifestyle related factors such as smoking and anemia [3].

Diabetes Mellitus is among the most important preoperative risk factors when undergoing TKA. Both Type 1 and Type 2 Diabetes have both been found to be at a higher risk for developing surgical site infections, delays in wound healing, and total complication rates compared to individuals who do not have diabetes [4]. It is also clear that the connection between blood sugar control and the outcome of surgery is not just a yes/no issue. Even those who do not have diabetes can develop hyperglycemia during their perioperative period due to either being diabetic themselves or receiving corticosteroids during their perioperative period. Hyperglycemia has been proven to increase the risk of developing complications [5] [6]. Therefore, the need for more than just assessing a patient's hemoglobin A1c (HbA1c) level exists. More detailed assessments and treatments should be implemented [7].

Another factor that plays a critical role in determining the success of TKA is a patient's nutritional status. Malnutrition and low albumin levels have been correlated with impaired immune response, poor wound healing, and higher rates of infection and revision surgeries [8]. Although malnutrition and hypoalbuminemia are prevalent conditions within orthopedic populations, especially older adults, consistent application of nutritional screenings does not occur often enough in clinical practices.

Pre-operative physical deconditioning has been identified as a strong predictor of delayed functional recovery after TKA. Studies utilizing structured pre-habilitation programs using some form of exercise combined with educational materials have produced benefits demonstrating reduced length of hospital stay and accelerated return to function [9] [10]. Each individual component of preoperative muscle strength, aerobic capacity, and functional ability has been individually linked to postoperative functional outcomes.

In addition to physical aspects of health, psychological factors are becoming increasingly recognized as contributors to TKA patient reported outcomes and satisfaction. Depression, anxiety, and maladaptive pain beliefs such as kinesiophobia and catastrophizing have all been identified as independent predictors of post-TKA patient reported outcomes and satisfaction [11]. The gap between what patients expect from their surgical outcome and what they actually achieve after surgery continues to be cited as one of the primary reasons why patients become dissatisfied with their post-TKA experiences. Thus, proper counseling of patients regarding what may occur after surgery is critical [12].

Other factors including, but not limited to, smoking, preoperative anemia, and overall burden of comorbidities are also contributing factors to outcomes following TKA. Comprehensive evaluation and optimization through a multidisciplinary approach of preoperative risk factors represent the best opportunity to positively impact safety and patient-centered outcomes for this diverse group of patients [13].

The goal of this narrative review was to provide an overview of current literature surrounding preoperative optimization strategies for TKA specifically focusing on areas outside of weight loss. We reviewed the underlying rationale supporting each strategy along with existing literature evaluating the effectiveness of each area, and we provided recommendations for

implementation. Future considerations for continued development in perioperative pathways are also discussed.

2. Methodology

A targeted, narrative literature search was performed utilizing both PubMed and MEDLINE databases. The search terms utilized include combinations of "Total Knee Arthroplasty," "Preoperative Optimization," "Glycemic Control," "Prehabilitation," "Malnutrition," "Psychological Factors," "Depression," "Anemia," and "Smoking." Included study types are randomized controlled trials, prospective and retrospective cohorts, systematic reviews, and meta-analyses that were published from January 2011 to March 2026. Studies are eligible for inclusion if they have information regarding modifiable preoperative risk factors and their relationship to postoperative outcomes in adults who are receiving primary Total Knee Arthroplasty (TKA). Case reports, non-English language publications, and editorial content that does not contain original data were excluded.

Articles of interest were identified through a combination of title and abstract screening, followed by a full-text evaluation of those studies that meet the inclusion criteria. Since this is a narrative review there was no formal quality assessment or risk-of-bias scoring utilized. However, when possible studies of higher quality (RCTs and meta-analyses) were preferred. The five thematic areas included in this review (physical conditioning, nutritional status, glycemic control, psychological factors, and comorbid condition management), were determined a priori due to their clinical significance as well as the existence of an adequate volume of research. In addition to identifying further relevant references, all reference lists of included articles were also screened for additional sources of interest.

3. Results

3.1. Glycemic Control and Metabolic Optimization

Glycemic dysregulation is one of the most widely studied modifiable risk factors in TKA and as such the literature supports that optimization thereof should be considered to be a cornerstone of pre-operative care. Compared with well-controlled or non-diabetic individuals, those diabetic patients with poor glycemic control - typically defined as an HbA1c value above 7.5–8.0 percent - have substantially higher rates of surgical site infection, PJI, wound dehiscence, readmissions and complications post-TKA [3]. Shohat et al. Conducted a retrospective analysis that found elevated pre-operative HbA1c levels were independently associated with increased

complication rates, lengths of stay and rates of 90-day readmission; therefore supporting the clinical significance of glycemic thresholds for patient selection and optimization [3].

HbA1c may not provide a sufficiently accurate representation of recent glycemic status. Fructosamine, which provides a reflection of mean blood glucose over approximately two-to three weeks, has emerged as a useful complementary biomarker, especially valuable in hemoglobinopathy patients and/or those expected to experience rapid changes in their glycemic state [14]. Tischler et al. showed that the choice of glucose-lowering medication regimen significantly influenced pre-operative fructosamine values; thus, it appears that fructosamine may be more actionable than HbA1c perioperatively in certain clinical scenarios [14].

Insulin therapy management during the perioperative period has received increasing attention within recent randomized controlled trials. Tang et al., in a prospective RCT investigating basal-bolus insulin therapy in non-insulin dependent type 2 diabetic patients undergoing TKA demonstrated that structured perioperative insulin protocols provided reduced blood glucose variability and lower peak glucose values in comparison to standard sliding-scale management [15]. These data carry important implications regarding design of glycemic protocols for orthopedic units.

In addition to evaluating the usefulness of insulin therapy, enhanced recovery after surgery (eraser) protocols also include carbohydrate loading prior to surgery. Lai et al. evaluated the use of a carbohydrate drink protocol before TKA in type 2 diabetic patients. They found that early functional recovery was improved by attenuating postoperative insulin resistance without exacerbating hyperglycemia following surgery [16]. These findings suggest that when dosed and timed appropriately, carbohydrate loading can be safely applied to well-controlled diabetic TKA patients.

A further complexity in managing glycemic states during the perioperative period results from the widespread use of corticosteroids for multimodal analgesia and anti-emetic effects during TKA. Both systematic reviews and cohort studies confirm that administration of dexamethasone causes transient hyperglycemia post-surgery, with maximal elevations occurring between 12-and 24 hours following surgery [17]. Mou et al. investigated different dosing regimens of dexamethasone and found that lower doses were still effective for

controlling nausea and pain but produced less significant glycemic responses; thus suggesting that optimizing dosage may help mitigate the effect on at-risk patients [17].

Importantly, even though previously uncontrolled diabetes patients who participate in pre-operative diabetes optimization programs — achieving adequate glycemic control in the week(s) leading up to surgery — demonstrate similar rates of complications and perioperative glucose profiles than chronically well-controlled diabetic patients. Umelo et al. reported that five years post-optimization program completion, the group of previously uncontrolled diabetes patients exhibited similar rates of early complications and comparable perioperative glucose control to chronically well-controlled diabetic patients [18]. This finding emphasizes the clinical utility of preoperative diabetes optimization programs regardless of timing prior to surgery [18].

3.2. Nutritional Status and Malnutrition

Malnutrition is a common and under-diagnosed issue among those who are considering or have undergone orthopedic surgical procedures. Reported percentages of malnutrition in orthopedic surgical candidates vary from 10% to above 40%, depending on what type of screening method used and which group of people being assessed. Malnutrition can negatively impact recovery through several means. These include; poor functioning of the immune system, decreased collagen production, slower wound repair times, and less than adequate physiologic reserve [19]. Clinical impacts related to preoperative malnutrition in TKA have also been documented and include high incidence rates of wound complications, surgical site infections, extended length of stay in hospitals, and premature failure of prostheses [19].

For many years, serum albumin has been utilized as the most commonly employed indicator of nutrition status in orthopedic surgery. Hypoalbuminemia, defined as an albumin level of < 3.5 g/dL, has been shown to be an independent factor that correlates with increased post-operative complication rate after TKA [19] Aepala et al. found that low levels of preoperative albumin were associated with an increased risk of post-operative wound complications and deep infections after TKA. This association showed a dose-response relationship, where greater degrees of hypoalbuminemia correlated to greater degrees of post-operative complication severity [19]. Similar findings were published by Huang et al., which indicated that malnourished patients undergoing elective joint arthroplasty experienced significantly increased rates of wound infections, systemic complications, and in-hospital mortality compared to patients with good nutritional status [20].

In addition to serum albumin, researchers have evaluated other biochemical indicators including total lymphocyte counts, prealbumin, and transferrin levels as part of a comprehensive nutritional screening process for orthopedic patients. Cross et al. suggested a useful screening model utilizing serum albumin, total lymphocyte counts and BMI for identifying malnourished patients before they undergo elective arthroplasty [8]. Furthermore, systematic reviews confirm that malnutrition (defined by multiple nutritional assessment methods) is highly correlated with periprosthetic joint infection and surgical site infection (SSI) following total joint arthroplasty. Results from the meta-analysis indicate that there may be approximately a 2 to 3 fold increase in PJI/SSIs when comparing malnourished patients versus well-nourished control groups [21].

While there is some heterogeneity in research findings supporting preoperative nutritional interventions for patients undergoing TKA, the evidence collectively supports the use of targeted supplementation in malnourished individuals. Targeted oral protein supplementation, optimized vitamin D levels, and iron supplementation have all demonstrated potential benefits in decreasing postoperative complication rates and enhancing wound healing [8]. Cross et al. demonstrated that nutritional supplementation in malnourished TKA candidates resulted in better postoperative functional outcomes and lower wound complication rates. However, it should be noted that the timing, content and duration of nutritional supplementation protocols remain to be standardized [8].

Validated screening tools such as the Malnutrition Universal Screening Tool (MUST), the Mini Nutritional Assessment (MNA), and the Nutritional Risk Screening 2002 (NRS-2002) provide a practical approach to systematically assessing the nutritional needs of patients before they undergo orthopedic surgery. Unfortunately, despite their existence and validation, routine nutritional assessments are infrequently implemented in orthopedic clinics. Routine nutritional assessments could be integrated into standardized preoperative optimization pathways and would likely enhance outcomes for TKA patients if supported by multidisciplinary dietetic services.

3.3. Physical Conditioning and Prehabilitation

While preoperative physical conditioning (often referred to as "prehabilitation") is often defined as an exercise program before surgery, it is generally described as a structured exercise program over the course of several weeks or months leading up to a surgical procedure to improve the

patient's overall physiological reserve so they can recover from their operation. The basis for using prehabilitation in TKA are clear; patients who undergo TKA frequently enter the operating room with significant impairments in function such as quadriceps weakness, decreased aerobic capacity, decreased range of motion and/or decreased postural stability, and these impairments negatively impact their recovery trajectory if they are not treated prior to entering the OR [10].

Wang et al. performed a systematic review and meta-analysis to evaluate the effect of preoperative rehabilitation on the outcome of patients undergoing TKA and total hip replacement. The results of this pooled analysis showed that preoperative rehabilitation resulted in statistically significant improvement in muscle strength and functional ability in patients with TKA when measured at rest prior to surgery. This improved muscle strength and functional ability also allowed for quicker attainment of the functional requirements for discharge after surgery. Improvement in muscle strength and functional ability due to prehabilitation was greatest in those patients with the least amount of baseline functional ability. Thus, this study highlights the importance of identifying high risk candidates for rehabilitation and providing them with access to rehabilitation services prior to surgery [10].

Moyer et al. evaluated the effectiveness of preoperative exercise/education programs for patients undergoing TKA through a comprehensive meta-analysis. The data analyzed from this meta-analysis indicated that participation in a structured preoperative exercise/education program significantly reduced the average length of hospitalization for patients undergoing TKA, and significantly reduced the proportion of patients requiring in-patient rehabilitation following surgery. Exercise/education programs that included both resistance training and aerobic conditioning produced larger treatment effect sizes than did unimodal exercise programs [9].

The systematic review by Pozzi et al. evaluated controlled studies of physical training post-TKA to provide an overview of the interaction between preoperative and postoperative conditioning. This study demonstrated that the patients exhibiting superior functional outcomes postoperatively were those with higher quadriceps strength prior to TKA. Further, this study supported the idea that preoperative status is the major factor contributing to postoperative trends [22]. For example, there was strong evidence to indicate that preoperative quadriceps strength is one of the most powerful predictors of functional improvement at both six and twelve months post-TKA.

A recently published, large cohort study using population based data from the All of Us Research Program (Zhang et al., 2026), evaluated the influence of physical activity level immediately preceding TKA on recovery trajectories. In this study, it was found that individuals reporting high levels of moderate- to vigorous-intensity physical activity during the year prior to undergoing surgery had significantly improved recovery rates of their pain-free walking abilities and better self-assessment ratings of quality of life at twelve month follow up than less active cohorts [23]. Collectively, these findings suggest that recommending participation in some form of structured physical training as part of standard preoperative education could be beneficial regardless of whether or not a patient completes a formalised prehabilitation program. The ongoing PROTEKT randomised clinical trial (Ljung et al., 2026) will evaluate the effect of formally conducting a pre-replacement prehabilitation program prior to undergoing TKA on postoperative self-reporting assessments of patient awareness and perception of joint function, functional enablement and knee function. Although no final results have been completed, the design of this trial represents increasing agreement among researchers that formal prospective assessment of the effects of prehabilitation warrants increased emphasis and incorporation of standardised patient-centred outcome measures into future research examining prehabilitation [24].

3.4. Psychological Factors and Patient Expectations

The psychological aspect of preoperative optimization of patients undergoing Total Knee Arthroplasty (TKA) has gained popularity in recent years due to growing research indicating that psychological issues are some of the best predictors of what patients will experience after their surgery. Studies have documented that preoperative depression, anxiety, fear of movement (kinesiophobia), exaggerated thinking about the risks of surgery (pain catastrophizing), and unrealistic expectations from surgery all predict lower functional results, increased post-operative pain, and decreased patient satisfaction [11].

The adverse effects of depression on the result of TKA occur through several different mechanisms including: impaired ability to modulate pain; decreased adherence to prescribed rehabilitation programs; alteration in how the brain processes pain signals; and loss of interest in recovering from the surgery [25]. Goh et al. using large cohorts of TKA patients, demonstrated that preoperative depression was strongly associated with poor KOOS and WOMAC scores at one-year post-operatively and with high levels of patient dissatisfaction [25]. However, if the depression was effectively treated before surgery, there was a notable

narrowing of this outcome gap, supporting a causal relationship and potentially providing a window of opportunity for treatment to improve the outcome of TKA.

In addition to depression, anxiety and elevated levels of catastrophizing related to pain have been repeatedly identified as other psychological risk factors that are negatively correlated with outcomes after TKA. Harmer et al. demonstrated that both depression and anxiety were independently associated with increased risk for Periprosthetic Joint Infection (PJI); revision surgery; and reoperation after total joint arthroplasty, providing clear implications for surgical risk assessment [26]. Collectively, these studies suggest that in addition to affecting functional recovery, psychological disorders may affect the body's response to injury through biological mechanisms (e.g. immune dysfunction and altered wound healing).

Another area within psychology is related to preoperative patient expectations, which represents another important aspect of psychology in the context of TKA. Tilbury et al. demonstrated that many TKA patients enter surgery with unrealistic expectations regarding the amount of pain relief or improvement in function that can be achieved with TKA. Additionally, the authors noted that unfulfilled expectations represent the major source of dissatisfaction after surgery [12]. For example, those patients who expect complete cessation of pain or to return completely to competitive athletic activities were much more likely to express dissatisfaction at one year despite good objective surgical results. Scott et al. also described gender; young age; and preoperative depression as characteristics of patients who would hold unrealistic expectations and subsequently experience dissatisfaction [27].

Structured educational programs, group sessions, or multimedia tools can be effective in improving patient satisfaction after TKA by educating patients regarding realistic expectations based upon actual outcomes from previous patients. Such educational programs are cost-effective; easily implemented across a variety of practice settings; and can be incorporated into existing protocols for preoperative preparation of patients. Bourne et al. noted that approximately 20% of TKA patients reported being dissatisfied with their surgical results at one year, and unfulfilled expectations represented the single most frequent reason for dissatisfaction, illustrating the scope of this issue and the potential for benefit from interventions directed toward addressing this issue [28]

3.5. Comorbidities and Lifestyle Optimization

Beyond the domains mentioned above, several additional comorbidities and lifestyle factors independently modulate the risk of complications as well as the quality of outcomes following total knee arthroplasty. Consequently, a full preoperative optimization approach must encompass systematic assessment and management of these factors within the broader surgical preparation pathway [29].

Preoperative anemia is also among the most clinically significant and frequently overlooked modifiable risk factors in TKA. Its prevalence in the TKA population varies between 15% to more than 30%. It has been associated with higher post-operative infection rates, prolonged length of stay in the hospital, need for allogeneic blood transfusion and impaired functional recovery after TKA [**30**]. Harris et al. demonstrated that preoperative anemia was an independent risk factor for increased complications and mortality following TKA whether or not any post-opearive transfusions were administered [6]. These findings support the implementation of routine preoperative hemoglobin screening and iron status assessment with timely iron supplementation, erythropoietin-stimulating agents or investigation of underlying causes as indicated.

Smoking is also a modifiable lifestyle factor with documented adverse effect on TKA results. Singh et al. conducted a systematic review examining the impact of smoking on results after knee and hip arthroplasty, showing that current smokers experience a greatly increased rate of wound complications, deep infections, revision surgery and general morbidity [31]. These mechanisms are multifaceted including vasoconstriction-mediated tissue hypoxia, impaired collagen synthesis, attenuated immune response and increased thromboembolic risk. Smoking cessation counselling and support should be considered part of the optimization process prior to surgery. This may best occur at least six to eight weeks before the surgery.

The overall comorbidity burden of TKA candidates has been quantified by using various scoring systems such as the Charlson Comorbidity Index (CCI) and the physical status classification by the American Society of Anesthesiologists (ASA). Courtney et al. analyzed a national arthroplasty database and found that higher comorbidity burden was independently associated with increased rates of major and minor complications following outpatient total joint arthroplasty [32]. These findings support stratified risk counselling and individualized optimization strategies based on comorbidity profile instead of a one-size-fits-all approach.

Optimization of specific comorbidities including hypertension, obstructive sleep apnea, hypothyroidism, and chronic kidney disease, has also been associated with improved TKA outcomes in observational studies; however, high-quality prospective data remain limited [33]. Sigurdaardottir et al. prospectively evaluated the effect of a structured preoperative modifiable risk factor optimization program on surgical site infections following total joint arthroplasty and found a statistically significant reduction in superficial surgical site infections in patients who finished the optimization protocol compared to matched controls [29]. This prospective evidence provides valuable support for the use of formal, multi-disciplinary optimization programs in clinical practice.

Gronbeck et al. offered a practical framework for risk stratification in primary TKA identifying the most clinically actionable preoperative risk factors and proposing a systematic approach to their management [13]. Their work emphasized that optimization should be individualized, time-sensitive, and coordinated across surgical, anaesthetic, and rehabilitation teams to maximize efficiency. Therefore, an integrated team-based approach to preoperative optimization - including internal medicine, endocrinology, dietetics, physiotherapy and psychology as appropriate - is now generally accepted by leading arthroplasty organizations as best practice.

4. Discussion

Evidence supporting the components of preoperative optimization in total knee arthroplasty (TKA) show that the preoperative optimization of patients undergoing TKA encompasses a number of dimensions beyond weight loss. Glycemic control, nutritional status, fitness, psychological readiness, and management of comorbidity all have independent effects on the likelihood of developing complications and influencing patient-reported outcome measures. Each component has specific interventional possibilities in the preoperative period [7, 1].

Of the domains assessed, glycemic optimization has the most substantial evidence base and the greatest clinical applicability. There is considerable consensus among surgeons regarding the relationship between hemoglobin A1c (HbA1c) levels and increased risks of infection of prosthetic joints and wound complications; therefore, numerous hospitals have established HbA1c levels >7.5 – 8.0% as formal eligibility criteria for elective TKA [3]. Emerging data demonstrating that fructosamine is a more sensitive and timely measure of glycemic control

than HbA1c indicate that glycemic monitoring needs to evolve beyond a single HbA1c value. Implementation of structured insulin treatment plans and effective management of corticosteroid-induced hyperglycemia provide two examples where enhanced implementation of perioperative care could result in significant declines in complication rates [15, 34].

There has been increasing recognition of the importance of the relationship between nutrition and surgical outcomes in orthopedics. Despite the high incidence of malnutrition in individuals being evaluated for TKA, there is no universal application of systematic nutritional screening and subsequent nutritional intervention [20, 21]. Systematic incorporation of validated nutritional screening instruments into the evaluation process prior to TKA with prompt initiation of dietetic services if deficiencies are found would be a viable means of enhancing current preoperative care pathways without adding to costs [19]. The long term advantages of nutritional optimization, which include fewer wound complications, shorter hospital lengths of stay, and longer implant durability support the establishment of separate preoperative nutritional services.

Prehabilitation is an area with considerable promise and scalability to apply in optimizing patients for TKA. While the literature base is relatively immature, as evidenced by heterogeneity among the studies limiting the ability to draw definitive conclusions from meta-analysis, there is considerable evidence suggesting that structured exercise programs administered 6 – 12 weeks prior to TKA can positively affect preoperative functional status and contribute to faster recovery postoperatively [9, 10]. Future trials such as PROTEKT and other prospective studies will help define parameters regarding optimal program design, intensity and patient population suitability for prehabilitation. Additionally, digital health platforms and at-home prehabilitation programs may increase access and compliance.

Recognition of psychological comorbidities as major factors affecting the outcomes of TKA provides important implications for both patient selection and the perioperative management of TKA. In contrast to depression and anxiety being considered contraindications to TKA, these conditions should be viewed as opportunities to actively manage them in the preoperative period [11, 26]. Validation of a variety of psychological screening tools such as the PHQ-9 and GAD-7 can be easily incorporated into preoperative assessment clinics. Similarly, referrals to cognitive behavioral therapy, mindfulness-based interventions or medication for mood disorders when applicable can significantly improve patient-reported outcomes [27].

Expectation management requires particular mention due to its high impact potential as a practical, low-cost method for improving outcomes. High percentages of patients dissatisfied with their TKA due to having unmet expectations – despite achieving objective success with their procedure — present a potentially avoidable source of patient morbidity [28, 12]. Therefore, preoperative educational programs educating patients about realistic expected improvements in function, timeframes for recovery from TKA, and residual limitations following TKA should become standard practice.

Going forward, integration of preoperative optimization methods into Enhanced Recovery After Surgery (ERAS) protocols presents a rational approach to providing preoperative optimization through multiple modalities using a standardized approach [35]. ERAS pathways have demonstrated reduced length of stay, decreased opioid consumption and lower postoperative complication rates following TKA. Therefore, extension of their scope to include systematic preoperative optimization represents an incremental progression [36, 18]. Application of risk stratification models utilizing large datasets and machine learning algorithms may also enable refinement of individual level recommendation for optimization based upon risk profiles thereby allowing for optimized individualized perioperative care.

This review has several limitations. As a narrative review, it is susceptible to biases in selecting literature included in this review. Also, because of heterogeneity among the study designs, subjects studied and outcome measurements used among the selected literature, it was difficult to compare results directly. Finally, although strong evidence exists for some of the domains reviewed (e.g., psychological optimization), little high quality prospective evidence exists specifically addressing TKA populations for some domains (e.g., nutritional supplements). Many recommendations were made based on evidence from other surgical disciplines. Therefore, these evidence deficits represent priority areas for future investigation.

5. Conclusions

Beginning with the development of multi-dimensional approaches to preoperative preparation prior to undergoing TKA; (i.e., optimizing blood glucose levels; assessing and addressing nutritionally-related deficiencies; maximizing an individual's overall level of fitness; enhancing their psychological readiness for surgery; and identifying and managing all possible comorbidities) the body of literature clearly supports that improving each of these factors improves surgical outcomes and increases an individual’s level of satisfaction after the

procedure. In addition, the literature supports the fact that developing a well-defined pre-surgical pathway which incorporates structured assessments of modifiable risks may result in decreased complication rates and enhanced post-operative recovery. The literature suggests that moving away from using solely body mass index as the primary metric when determining whether an individual is at an increased risk for complications during and after TKA, toward implementing holistic, multi-disciplinary pathways designed to optimize health across the entire spectrum of potential risk factors, would be a reasonable transition based on existing data and should become more common in clinical practices. Therefore, continued support for future studies which assess the efficacy of utilizing standardized pre-surgical optimization protocols to establish evidence-based criteria to guide decision-making regarding what constitutes optimal timing for the initiation of interventions aimed at reducing the likelihood of complications during and/or after TKA will be critical in transitioning this paradigm into meaningful practice changes.

Disclosure

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