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# The Ethics of Bundled Payments in Total Joint Replacement: "Cherry Picking" and "Lemon Dropping"

*Casey Jo Humbyrd*

## ABSTRACT

The Centers for Medicare & Medicaid Services has initiated bundled payments for hip and knee total joint replacement in an effort to decrease healthcare costs and increase quality of care. The ethical implications of this program have not been studied. This article considers the ethics of patient selection to improve outcomes; specifically, screening patients by body mass index to determine eligibility for total joint replacement. I argue that this type of screening is not ethically defensible, and that the bundled payment program as structured is likely to lead to unfair restrictions on who receives total joint replacements.

## INTRODUCTION

Healthcare costs are increasing in the United States, from \$1.4 trillion in 2000 to \$3.2 trillion in 2015.<sup>1</sup> The continuing increase in healthcare costs has led policy makers to seek innovative cost-containment solutions.

The fee-for-service payment model has been targeted as a cause of the steady rise in healthcare spending because it provides an incentive to pro-

vide more, rather than better, care.<sup>2</sup> Although many physicians are offended by the notion that they might shirk their fiduciary responsibilities to patients in pursuit of profits, studies report that fee-for-service incentivizes physicians to provide nonbeneficial treatments, especially compared with other models of care, such as capitation.<sup>3</sup>

In an effort to address healthcare costs, a new care model has been introduced: bundled payments.<sup>4</sup> With bundled payments, a lump sum is paid for an episode of care, and the health system is then responsible for all follow-up care. If the care costs less than the bundle, the health system profits. However, if the costs are greater than the bundled payment, the health system absorbs the loss. The Centers for Medicare & Medicaid Services (CMS) has adopted the bundled payment model for numerous diagnoses and procedures, including replacement of hip and knee joints with artificial joints.<sup>5</sup> In theory, this is a rational solution because the bundled payment model eliminates the incentive to overtreat that is inherent in the fee-for-service model, while it emphasizes the coordination of postoperative care. However, the bundled payment model introduces new, perverse incentives: specifically, to select patients who are at low risk for costly intraoperative and postoperative complications.

In this article, I explore one particular mechanism for selecting patients: screening by body mass index (BMI). Bundled payments for total joint replacement, as currently designed, will likely lead

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to major restrictions regarding who has access to surgery. Total joint replacement is a high-value intervention that dramatically improves patients' well-being.<sup>6</sup> Modifications to the bundled payment structure should be considered to avoid systematic exclusion of obese patients.

### **THE UTILIZATION AND VALUE OF TOTAL JOINT REPLACEMENT**

Total joint replacement is a widely implemented procedure. More than 7.5 million Americans are living with artificial joints, and more than one million total joint replacements are performed in the U.S. annually.<sup>7</sup> The frequency of the procedure continues to grow, with a 134 percent increase in the number of total knee replacements from 1999 to 2008.<sup>8</sup>

Hip and knee replacements lead to significant improvements in health-related quality of life.<sup>9</sup> The value of total joint replacement has been documented extensively. In countries that use quality-adjusted life years to calculate the value of a procedure, hip and knee replacements are considered high-value procedures and are commonly performed.<sup>10</sup> The author of a seminal study in the 1980s concluded that coronary artery bypass grafting was less cost-effective than total hip replacement, when assessed using quality-adjusted life-year value metrics in the United Kingdom.<sup>11</sup>

### **BUNDLED PAYMENTS**

CMS is one of the major payers for total joint surgeries because of the age of most patients who require the surgery. The CMS website states: "Hip and knee replacements are the most common inpatient surgery for Medicare beneficiaries and can require lengthy recovery and rehabilitation periods. In 2014, there were more than 400,000 procedures, costing more than \$7 billion for the hospitalizations alone."<sup>12</sup> To control costs, CMS began experimenting with alternative payment models,<sup>13</sup> culminating in the introduction of the Comprehensive Care for Joint Replacement Model. On 1 April 2016, CMS began mandating bundled payments for total joint replacement in 67 metropolitan statistical areas in the U.S.<sup>14</sup> Although all of the institutions within the captured region were required to be paid through the bundled payment program, there were no Medicare requirements regarding the design and implementation of the program.

The program was designed as a cost-saving and quality-improvement measure. If hospitals deliver care at costs below the bundled payment, they are

allowed to keep the difference. The quality improvement is proposed to occur because hospitals will be incentivized to prevent costly postoperative complications such as pneumonia, deep vein thrombosis, and re-admissions. This contrasts with the fee-for-service model, in which complications could increase the hospital's profits because a prolonged stay and additional treatment increase the hospital's reimbursement.

Cost savings go directly to the hospitals. However, gainsharing agreements are possible between the hospitals and physicians, whereby the profits from decreased costs and increased profits are shared by both physicians and hospitals.<sup>15</sup> The relationship between physician compensation and hospital profit varies by individual contract.

To ensure quality improvement, CMS also created incentive payments for higher quality care.<sup>16</sup> Hospital care is assessed through two metrics. One metric is postoperative complications such as infections and readmissions within 90 days of surgery, and this is measured through risk-stratified complication rates using the National Quality Forum score. The second metric is patient satisfaction scores obtained through the Hospital Consumer Assessment of Healthcare Providers and Systems survey.<sup>17</sup> Some employment contracts tie the physician's compensation, at least in part, to the hospital's outcome scores.<sup>18</sup>

During the Comprehensive Care for Joint Replacement Model trial, CMS and orthopedic advocacy groups discussed adding risk stratification for patient morbidities to the payment structure because patients with pre-existing risk factors are likely to have more complications and incur higher health care costs than those without such risk factors. In the final rule, there was no substantial risk stratification. Instead, there were two tiers for payment based on the following diagnosis-related groups (DRGs): DRG 469 is joint replacement without major complication or comorbidity, and DRG 470 is joint replacement with major complications or comorbidities. These are broad categories, and Medicare is particular with its documentation of a major complication or comorbidity (MCC). Many diseases, which increase patients' complexity (for example, chronic kidney disease) are considered a complication or comorbidity (CC), not an MCC. A CC alone would not qualify a patient for DRG 470.

Before implementation of the planned payment structure, orthopedic surgeons expressed concerns. To quote: "Alternative payment models in total joint replacement incentivize cost effective healthcare delivery and reward reductions in length of stay

(LOS), complications, and readmissions. If not adjusted for patient comorbidities, they may encourage restrictive access to healthcare.”<sup>19</sup> This has been described as physicians “cherry picking or lemon dropping” patients.<sup>20</sup>

#### COMPLICATIONS AND COSTS OF TOTAL JOINT REPLACEMENT IN OBESE PATIENTS

An extensive body of research compares outcomes after total hip and knee replacements on the basis of BMI. According to the Workgroup of the American Association of Hip and Knee Surgeons Evidence Based Committee, a BMI of 40 appears to represent an inflection point, above which patients have much greater risk of complications.<sup>21</sup> Compared with normal-weight patients, the risk of infection is twice as high in patients with a BMI of 35 to 39.9 and four times as high in patients with a BMI greater than 40.<sup>22</sup> Another study of patients who underwent primary hip or knee replacement found a 0.36 percent infection rate for patients with normal BMI, compared with 4.7 percent for patients who were morbidly obese.<sup>23</sup> Infection is a devastating complication in total joint replacement. Depending on the extent of the infection, the patient may undergo multiple revision surgeries, long-term intravenous antibiotic treatment, and multiple hospitalizations. Obese patients also have higher rates of hospital readmission compared with normal-weight patients. Reasons for readmission include infection, blood clots, pneumonia, and cardiac issues.<sup>24</sup> A study of patients who underwent total hip replacement found that the readmission rates were 13 percent among 39 morbidly obese patients and 2.7 percent among 186 normal-weight patients ( $p = 0.005$ ).<sup>25</sup> Morbidly obese patients who underwent total hip replacement had higher odds of readmission (odds ratio = 1.74; 95 percent confidence interval: 1.25-2.43; compared with non-obese patients).<sup>26</sup> Another study found that in total knee replacement, the hazard ratio for readmission was 1.27 (95 percent confidence interval: 1.22-1.32) for morbidly obese patients compared with non-obese patients.<sup>27</sup>

The overall costs of joint replacement are higher for obese patients because of their higher rates of readmission and infection. Per five-unit increase in BMI beyond 30 kilograms per square meter, hospital costs increased by approximately \$500 for primary total hip replacement,<sup>28</sup> and \$250 to \$300 for primary total knee replacement.<sup>29</sup> Therefore, a patient with a BMI of 45 would be anticipated to incur \$1,500 in additional costs for hip replacement and \$750 to \$900 in additional costs for knee replace-

ment, compared with costs for a normal-weight patient.

Surgery also takes longer for obese patients compared with non-obese patients. Reported increases in operative time range from 22 to 32 minutes for total hip replacement<sup>30</sup> and seven minutes for total knee replacement.<sup>31</sup> Although longer operative time is not a complication *per se*, it is important to understand that surgeons are paid by the number of surgeries they perform, rather than the duration of surgery. By performing longer surgeries on obese patients, surgeons ultimately lose money by decreasing the number of surgeries they can perform in a day.

These costs to the physician and treating institution, as well as the predicted increase in complications, create major disincentives to caring for obese patients. The higher rates of complications and readmissions associated with obese patients will negatively affect the treating institutions' CMS quality scores, with resulting decreased reimbursement for the hospital and possibly for the physician. Further, operative time is longer for obese patients compared with non-obese patients, and this may decrease the surgical volume of the surgeon. Finally, there is a documented increase in hospital costs for joint replacement surgery in obese patients, which will negatively affect the hospital's bottom line and any related gainsharing agreements with surgeons.

#### ETHICS, OBESITY, AND CMS BUNDLING FOR JOINT REPLACEMENT

Current CMS bundling policy creates major incentives for physicians to avoid performing total joint replacement for obese patients. The goals of bundled payments are to reduce costs and improve quality, not to limit access to joint replacement for certain patients. The American Association of Hip and Knee Surgeons encourages weight loss in obese patients before joint replacement surgery, but recommends against using BMI as a strict cutoff.<sup>32</sup> However, early evidence indicates that physicians are using BMI as a cutoff to determine whether a patient is eligible for total joint replacement. In a survey of 700 hip and knee surgeons, 62 percent reported using BMI scores as a cutoff for eligibility; there was no consistency to the BMI score used. Additionally, 42 percent of surgeons who used a BMI cutoff said they had done so because they were worried about their performance scores or those of their hospitals.<sup>33</sup> The question is: When, if ever, is it appropriate for surgeons to refuse to provide surgery to obese patients?

There are good *prima facie* reasons to do these surgeries, because people in pain will benefit greatly.<sup>34</sup> Therefore, refusing to perform the surgery requires justification. The stated reasons for not operating on patients with high BMI include the deleterious effect on quality scores, the increase in risks to the patient, and concerns about costs. The following justification for this approach seems to be consequentialist in nature: more patients can be treated because of fewer complications, lower costs, and shorter surgical times. These factors result in more patients undergoing total joint replacement with an overall increase in positive outcomes. More patients receive care when surgeons operate only on healthy, low-cost patients.

This reasoning is sound only if consequence is defined by maximizing the number of patients who receive care. However, this is not how healthcare works; indeed, healthcare exists to support the needs of those who are sick, appreciating that they require more care than those who are healthy. Other consequences should be considered. Maximizing the overall good from surgery would entail including patients with the greatest disease burden who would potentially benefit the most. There is an association between obesity and demand for total hip and knee replacement.<sup>35</sup> The Canadian Joint Replacement Registry showed a greater need for total knee replacement among obese patients compared with normal-weight patients: need is 8.5 times higher in patients with BMI of 30 to 34.9, it is 19 times higher in patients with a BMI of 35 to 39.9, and it is 33 times higher in patients with BMI greater than 40.<sup>36</sup> Obese patients are, on average, a decade younger than normal-weight patients when they seek hip and knee replacement surgery, which potentially yields more years of improved quality of life after surgery.<sup>37</sup>

The foundation of refusal of surgery to obese patients has also been grounded in the language of nonmaleficence because of the increased surgical risks for obese patients. Nonmaleficence can be framed in two ways. First, it can be understood as the premise that physicians should never harm a patient intentionally. However, surgeons routinely risk harm for the sake of benefit, so this framing is not a practicable argument. Second, nonmaleficence can be considered part of the consequentialist calculus, whereby one should promote good and avoid evil. Using this definition, the argument to limit surgery to non-obese patients is as follows: although joint replacement is a high-value proposition, the risks are so substantial that including obese patients is, on balance, more harmful than beneficial. I find this argument unpersuasive. There is no evidence that

the increased risks of surgery are substantial enough to outweigh the tremendous potential benefits. In fact, there is mounting evidence to the contrary. Obese patients who undergo knee replacement have greater functional improvement than non-obese patients.<sup>38</sup> I am not arguing that all patients who desire elective joint replacement should undergo surgery, ignoring the risks. Rather, I think there is evidence that many patients with a BMI greater than 40 may receive greater benefit than harm from total joint replacement, and the argument of nonmaleficence should be made on a case-by-case basis.

The argument about a patient's best interests is even less persuasive when considering an individual patient as opposed to the general population. We would normally advocate that it is for the patient to determine (using information that the physician provides) whether the risks of surgery are worth the benefits. Respect for patients' autonomy would conventionally be the overriding ethical principle. Patients, regardless of their BMI, should ultimately decide whether to proceed with surgery in the context of shared decision making with their surgeons, provided they are appropriate candidates and understand the risks. An additional concern related to using BMI to determine eligibility is that such screening may occur before an office visit, by the scheduler or other administrative personnel, and obese patients may be redirected to non-operative careproviders or denied a visit altogether. In this situation, patients' autonomy is diminished further by a failure to have surgery as a considered option.

Other incentives for refusing surgery to patients must be part of this discussion. These incentives include increased reimbursement, decreased complications, and less work caring for non-obese patients compared with obese patients. Consideration of these motivations leads to the uncomfortable intuition that refusing surgery is unethical because rejecting surgery for a patient aligns too closely with self-interest. In using self-interest as a justification for denial of treatment, surgeons fail to uphold their fiduciary responsibility to their patients.

Unconscious biases about obese patients may adversely affect clinical decision making.<sup>39</sup> There is a stigma attached to obesity because many consider it, unlike other health conditions, modifiable.<sup>40</sup> The belief that a patient's BMI is mostly under his or her control is inaccurate.<sup>41</sup> It can be quite difficult for patients to lose weight,<sup>42</sup> and it may be unreasonable to require weight loss as a condition for surgery. Additionally, weight loss through bariatric surgery does not appear to decrease complication rates for hip and knee replacement.<sup>43</sup> Misconceptions re-

garding the ability of patients to lower their BMI are another reason to reconsider refusals for joint replacement.

Although consequentialist- and justice-based arguments would support access to these valuable interventions for obese patients, there are additional good, moral reasons to be concerned with BMI cut-offs. Obesity is associated with racial and economic disparities.<sup>44</sup> Refusing to operate on obese patients will disproportionately affect poor and minority populations, further exacerbating justice-based concerns. Minority patients are already less likely to receive total joint replacement, as documented extensively in the literature.<sup>45</sup> White patients are almost twice as likely as Black patients to undergo knee replacement, and this disparity continues to grow.<sup>46</sup> Using BMI as a screening tool will worsen the already marked differences in access to total joint replacement.

### LOOKING FOR SOLUTIONS

Using BMI as a screening tool for total joint replacement eligibility raises multiple ethical issues. There is the potential to exacerbate population-based inequalities and to deny high-quality treatment to those in pain. Incentives encourage hospitals and physicians to act in their economic self-interests rather than in patients' best interests.

Although a comprehensive analysis of policy options is beyond the scope of this article, I recommend greater stratification of patients according to risk factors in the payment algorithm. The extensive research on joint replacement outcomes can be used to inform this risk stratification and to determine appropriate compensation on the basis of the higher anticipated costs of caring for obese patients. Although there could be bureaucratic debates in determining how nuanced the risk stratification should be, additional strata could be identified and would likely decrease the accessibility problem for obese patients.

One option for stratification is to calculate the risk of infection or death related to total joint replacement using the American Joint Replacement Registry Risk Calculator.<sup>47</sup> Although this article has focused on obese patients, there are many other subtypes of patients who may be denied surgery because of risks. For example, a patient with end-stage renal disease on dialysis has a much higher risk of infection than a morbidly obese patient.<sup>48</sup> Tiered payments based on risk stratification could remove the financial disincentive for treating higher risk patients, provided the compensation matches the risk.

A concern with such a system is that the nuances and complexities of different conditions would be reduced to a percentage and would not capture the complexities of patient care. Rigorous programmatic design could address these concerns.

The former administrator of CMS, Donald Berwick, was famously critiqued for his statement, "The decision is not whether or not we will ration care, the decision is whether we will ration with our eyes open."<sup>49</sup>

The bundling of healthcare services presents an issue for those who wish to ration with their eyes open. As currently structured, the bundled payment system is likely to exacerbate healthcare disparities as physicians perform more joint replacements on the lowest risk patients and limit the provision of these treatments to higher risk patients. Risk stratification or new incentives within bundled payments would better support the goal of rationing with our eyes open.

### CONFLICTS OF INTEREST

The author has no conflicts of interest to report. No funding was received in support of this work.

### NOTES

1. Kaiser Family Foundation, Peterson-Kaiser Health System Tracker, 2017, <http://www.healthsystemtracker.org/interactive/health-spending-explorer/?display=U.S.%2520%2524%2520Billions&service=All%2520Types%2520of%2520Services>.

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3. D.M. Eddy, "Balancing cost and quality in fee-for-service versus managed care," *Health Affairs* 16, no. 3 (1997): 162-73; H.D. Miller, "Reducing costs requires end to fee-for-service," *Modern Healthcare* 44, no. 23 (2014): 25; P.R. Orszag and P. Ellis, "The challenge of rising health care costs—a view from the Congressional Budget Office," *New England Journal of Medicine* 357, no. 18 (2007): 1793-5. These conflicts of interest are complicated further when physicians have an ownership stake in equipment or facilities. For example, a 2013 study found that knee magnetic resonance imaging (MRI) examinations ordered by physicians who have a financial interest in the imaging equipment being used are more likely to be negative than those ordered by physicians with no financial stake in the process. There is an inherent conflict of interest when the physician both orders and then performs with fee collection on the acquisition of MRIs. The increased rate of nega-

tive MRIs when such conflicts of interest exist seems to suggest that financial incentives to prescribe, consciously or not, tend to lead to overprescribing, and this is not an isolated example. R. Pear, "Doctors who profit from radiation prescribe it more often, study finds," 2013, <http://www.nytimes.com/2013/08/19/us/doctors-who-profit-from-radiation-prescribe-it-more-often-study-finds.html>.

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11. Williams, "Economics of coronary artery bypass grafting," see note 6 above.

12. CMS, "Comprehensive Care for Joint Replacement Model," 2017, [innovation.cms.gov/initiatives/cjr](http://innovation.cms.gov/initiatives/cjr).

13. It is worth noting that bundled payments for total joint replacement are not limited to Medicare. Many private insurers are also using bundled payment structures to fund total joint replacement. I focus on Medicare because of the large number of Medicare beneficiaries, as well as the compulsory nature of the program.

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15. D.R. Dirschl et al., "AOA Symposium. Gainsharing in orthopaedics: Passing fancy or wave of the future?" *Journal of Bone and Joint Surgery* 89, no. 9 (2007): 2075-83; W.L. Healy, "Gainsharing: A primer for orthopaedic surgeons," *Journal of Bone and Joint Surgery* 88, no. 8 (2006): 1880-7; D.A. Sharan et al., "Current issues in health policy: a primer for the orthopaedic surgeon," *Journal of the American Academy of Orthopaedic Surgeons* 15, no. 2 (2007): 76-86. Of note, the legality of gainsharing has been questioned by the U.S. Office of Inspector General, and the explicit allowance of gainsharing in the bundled payment

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28. Maradit Kremers et al., "Prevalence of Total Hip and Knee Replacement in the United States," see note 7 above.

29. H.M. Kremers et al., "The effect of obesity on direct medical costs in total knee arthroplasty," *Journal of Bone and Joint Surgery* 96, no. 9 (2014): 718-24.

30. Hanly et al., "Morbid Obesity in Total Hip Arthroplasty," see note 25 above; D.T. Ward et al., "Complications of Morbid Obesity in Total Joint Arthroplasty: Risk

Stratification Based on BMI," *Journal of Arthroplasty* 30, supp. 9 (2015): 42-6.

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