

Editorial: The Shortcomings and Harms of Using Hard Cutoffs for BMI, Hemoglobin A1C, and Smoking Cessation as Conditions for Elective Orthopaedic Surgery

Seth S. Leopold

Most orthopaedic surgeons I know pride themselves on engaging with their patients as individuals. Many bridle at the idea that trendy, shared decision-making models are somehow something new, as they feel they've been sharing decisions with their patients all along; I believe many of them are right about this. And yet some of those same surgeons adopt heavy-handed approaches that seem to misunderstand how surgical risk really works when they insist on binary cutoffs for parameters like BMI, hemoglobin A1C, and cigarette smoking as a condition to offer elective surgery to their patients.

When a surgeon unilaterally defines and applies such cutoffs in practice, by

definition shared decision-making cannot take place. When the risk factors only seem modifiable, but in fact are not (or when they are only minimally modifiable), the use of rigid thresholds may become coercive. For these and other reasons, orthopaedic surgeons should stop using hard cutoffs for parameters like BMI, hemoglobin A1C, and smoking in the context of deciding whether to offer a patient elective surgery.

The idea of using surgery as a "carrot" to nudge patients towards healthier behaviors—with the endpoint of offering an elective procedure the patient seeks as the inducement for efforts made—is entirely reasonable. When done with care and sensitivity, it

can be one portion of a healthcare partnership in which both parties take some responsibility for achieving a result that both will be pleased with.

But surgeons don't have to operate on anyone we don't want to treat, and increasingly we're being held to financial account for the complications that result from our elective procedures. I believe this combination can result in surgeons setting unrealistic or impossible health goals for patients who seek particular interventions, and withholding those interventions from patients when they inevitably (or nearly inevitably) fall short [9].

This strikes me as potentially coercive. It's also not well-supported by the available evidence.

A note from the Editor-in-Chief: In this month's Editorial, I offer my perspective on surgeons enforcing hard cutoffs for BMI, hemoglobin A1C, and smoking cessation as requirements for a patient to "qualify" for elective surgery. While discussing this subject with my editorial staff, it became clear that this is a topic—even more than most—about which well-meaning people can differ, perhaps dramatically. In this editorial, as always, I'll advance a point of view that I believe to be correct; however, because of the importance of this topic, CORR® will publish a Clinical Faceoff column next month covering some of these same themes, but giving opinions that diverge from mine, on some points dramatically so. This topic deserves broad engagement, and the editorial staff here and I hope this will promote a vigorous dialogue on this important topic in our letters-to-the-editor section. As always, we welcome your letters on this or any topic, which you can send to EIC@clinorthop.org.

The author certifies that neither he, nor any members of his immediate family, have any commercial associations (such as consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted article. All ICMJE Conflict of Interest Forms for authors and *Clinical Orthopaedics and Related Research*® editors and board members are on file with the publication and can be viewed on request.

The opinions expressed are those of the writers, and do not reflect the opinion or policy of *CORR*® or The Association of Bone and Joint Surgeons®.

S. S. Leopold Editor-in-Chief, *Clinical Orthopaedics and Related Research*®, Philadelphia, PA, USA

S. S. Leopold MD (✉) *Clinical Orthopaedics and Related Research*® 1600 Spruce St. Philadelphia, PA 19103 USA Email: sleopold@clinorthop.org

Editorial

It may be reasonable to ask a patient considering TKA who weighs 300 pounds to try to lose 50, or to ask a patient whose hemoglobin A1C is 8.5 to get it below 8, or to ask a patient who smokes cigarettes to quit. We know that doing so will decrease that patient's surgical risk, so giving that patient a chance to lose weight, improve his or her glycemic control, or quit smoking therefore makes sense. But insisting on achieving these conditions as a requirement for operating denies the patient the autonomy to decide how much risk (s) he is willing to take, and contradicts foundational principles of shared decision-making.

And importantly, the likelihood a patient will lose that kind of weight and keep it off is lower than the likelihood of remaining heroin-free using methadone [1, 10]. It's even harder if the patient is of limited means. Living in a food desert [11] may make weight loss of that magnitude impossible for many such patients. Poor access to care—from poverty, or a lack of adequate healthcare insurance—may render serious improvements in glycemic control unbelievably difficult to achieve and sustain [30]. It's worth noting that in some patients, forcing down the A1C or BMI may not be helpful (or even healthy) [8, 25]. The fact that the vast majority of people who try to quit smoking are unable to break the habit will come as a surprise to no one [26]; research suggests it's even harder for women than men, and for less-affluent patients than for those of greater means [12, 15]. For those reasons, forcing a patient to clear an unattainable bar as a condition to have elective surgery seems unfair, and may represent a kind of discrimination, which one surgeon defined as “patients who may be at a marginally higher risk [being] treated as a class instead of [as] individuals” [9].

What's especially intriguing is that orthopaedic surgeons have not always seen these risk factors in such black-and-white terms. Focusing for a moment on the comorbidity that many surgeons (incorrectly) perceive to be the most modifiable, body weight, we find that journals used to be replete with articles suggesting that patients with obesity did well with interventions like lower-extremity arthroplasty [5, 24]. This is no longer the case. Since I assume we haven't gotten worse at these operations in the last decade or two, why the change? In the United States at least, I wonder whether the newer and more-severe approach may—at least in part—be attributable to the public reporting of complications and changes to payment models, specifically bundled payments, which leave the institution responsible for expenses in excess of those incurred as part of an uncomplicated recovery. This drives hospitals, practices, and surgeons to look for classes of patients—commonly, those with high BMI, but lately also those who smoke, those with certain medical conditions like incompletely controlled Type-II diabetes—who are easy to identify and keep out of the operating room.

Setting thresholds for surgery may, in uncommon instances, be reasonable. For example, if someone's limb is so large that the surgeon does not believe (s)he can safely perform a surgical approach, or accurately insert the hardware, then what we have is a technical problem that may reasonably preclude the intervention. But this is not the case in most patients with an elevated BMI, and certainly it does not apply at all where many other kinds of risk (like diabetes or smoking) are concerned. In those instances, setting thresholds that are in a practical sense impossible to achieve is unfair and makes no scientific sense.

Indeed, applying a binary cutoff to a risk factor that acts on a sliding scale misunderstands the very concept of risk. Focusing on those risk factors, as surgeons so commonly do, neglects the reality that many other risk factors—depression, anxiety, prior infection, among numerous others—carry a much greater likelihood of dissatisfaction or complications than might a BMI of 37 or a quarter pack a day of cigarettes [17, 21, 23]. Yet many surgeons push those other risk factors into the background.

In addition, applying binary thresholds to continuous variables like weight, glycemic control, or the number of cigarettes a patient smokes may (across a population) cause more harm than good. We don't know if weight reduction—whether through diet and exercise or through extreme means, like bariatric surgery—reduces surgical risk in the ways we hope it will [7, 14, 16, 22] and many patients are healthy at their high weights [6, 16]. There is strong evidence that the hemoglobin A1C is a terrible marker for post-operative complications [25], and we have no idea whether quitting smoking a month or two before surgery even reduces most kinds of risk; good evidence suggests it doesn't [13, 23].

By contrast, simple arithmetic suggests that even among patients with BMIs in excess of 35 (and probably even 40) the number of patients who would be helped by orthopaedic interventions like arthroplasty vastly surpasses the number who would be harmed, though that may be less clear among patients with what sometimes has been called superobesity (BMI \geq 50) [28]. The same applies to the other risk factors being discussed here. We also know that using arbitrary cutoffs for surgical decision making in terms of BMI, hemoglobin A1C, and cigarette smoking discriminate against

Editorial

less-affluent patients, against patients of certain races, and against women [27].

I don't believe that most surgeons would allow the financial responsibility imposed by a bundled-payment arrangement to keep them from offering a life-restoring intervention to an otherwise reasonable candidate. That being so, we must ask how or why other motives—beyond the financial—may drive surgeons to make coercive recommendations that deny patients autonomy over their bodies. The explanation I come back to most frequently is the natural human preference for self over other [2]. Most orthopaedic surgeons are men; obesity (particularly among those with lower-extremity arthritis) is more prevalent in women [18]. Most orthopaedic surgeons are white; poorly controlled diabetes is more common in patients of other races [4]. Most orthopaedic surgeons are affluent; cigarette smoking is more than twice as common in patients who live below the poverty level and nearly three times more common in those with less than a high school education than it is among college graduates, like surgeons [3].

Surgeons routinely allow patients with “modifiable” conditions—like depression or anxiety—the right to choose surgery, despite the fact that the odds ratios associated with postoperative complications in patients who have depression or anxiety are comparable to or greater than those commonly observed in patients with obesity, smoking, or diabetes [17, 21, 23]. But patients with depression and anxiety “look like us.” Those conditions are as common in the affluent as in the resource-constrained, while smoking, incompletely controlled diabetes, and obesity are not. Considerable evidence suggests that providers perceive patients with obesity to be lazy, weak-willed, undisciplined, or worse, and that these stereotypes

adversely affect both medical decision-making and patient-provider interactions [19], resulting in poorer health. And I have not seen cutoffs used to restrict patients with low BMI from elective procedures like arthroplasty—surgeons like thin—despite convincing evidence that patients with low BMI are at greater risk for death after elective and urgent hip surgery than are those with normal or elevated BMI [29].

It is human nature for the self to keep the other at arm's length. But we must not allow this normal tendency to influence the surgical recommendations we make. One way to mitigate it is to consciously avoid structures that nudge us towards unfair decisions. Rather than setting arbitrary, coercive thresholds for surgical interventions—particularly unrealistic ones for risk factors that only seem modifiable but in fact usually are not [10, 20, 26, 30]—surgeons should engage patients in a fair conversation about risk and reward.

References

1. Amato L, Davoli M, Perucci CA, Ferri M, Faggiano F, Mattick RP. An overview of systematic reviews of the effectiveness of opiate maintenance therapies: available evidence to inform clinical practice and research. *J Subst Abuse Treatment*. 2005; 28:321-329.
2. Ben-Ner A, McCall BP, Massoud S, Wang H. Identity and self-other differentiation in work and giving behaviors: Experimental evidence. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=927433. Accessed September 10, 2019.
3. Centers for Disease Control and Prevention. Cigarette smoking and tobacco use among people of low socioeconomic status. Available at: <https://www.cdc.gov/tobacco/disparities/low-ses/index.htm>. Accessed August 12, 2019.
4. de Rekeneire N, Rooks RN, Simonsick EM, Shorr RI, Kuller LH, Schwartz AV, Harris TB. Racial differences in glycemic control in a well-functioning older diabetic population: Findings from the health, aging and body composition study. *Diabetes Care*. 2003;26:1986-1992.
5. Deshmukh RG, Hayes JH, Pinder IM. Does body weight influence outcome after total knee arthroplasty? A 1-year analysis. *J Arthroplasty*. 2002;17:315-319.
6. Gruberg L, Weissman NJ, Waksman R, Fuchs S, Deible R, Pinnow EE, Ahmed LM, Kent KM, Pichard AD, Suddath WO, Satler LF, Lindsay J Jr. The impact of obesity on the short-term and long-term outcomes after percutaneous coronary intervention: The obesity paradox? *J Am Coll Cardiol*. 2002;39:578-584.
7. Inacio MC, Paxton EW, Fisher D, Li RA, Barber TC, Singh JA. Bariatric surgery prior to total joint arthroplasty may not provide dramatic improvements in post-arthroplasty surgical outcomes. *J Arthroplasty*. 2014;29:1359-1364.
8. Jackson CL, Yeh HC, Szklo M, Wang NY, Dray-Spira R, Brancati FL. Body-mass index and all-cause mortality in us adults with and without diabetes. *J Gen Intern Med*. 2014;29:25-33.
9. Kolata G. Why do obese patients get worse care? Many doctors don't see past the fat. *New York Times*. September 25, 2016. Available at: <https://www.nytimes.com/2016/09/26/health/obese-patients-health-care.html>. Accessed August 19, 2019.
10. Kraschnewski JL, Boan J, Esposito J, Sherwood NE, Lehman EB, Kephart DK, Sciamanna CN. Long-term weight loss maintenance in the United States. *Int J Obes*. 2010;34:1644-1654.
11. Leopold SS. Editor's Spotlight/Take 5: Eligibility criteria for lower extremity joint replacement may worsen racial and socioeconomic disparities. *Clin Orthop Relat Res*. 2018;476:2297-2300.
12. Leventhal AM, Bellow MS, Galstyan E, Higgins ST, Barrington-Trimis JL. Association of cumulative socioeconomic and health-related disadvantage with disparities in smoking prevalence in the United States, 2008 to 2017. *Jama Intern Med*. 2019;179:777-785.
13. Lugg ST, Tikka T, Agostini PJ, Kerr A, Adams K, Kalkat MS, Steyn RS, Rajesh RS, Bishay E, Thickett DR, Naidu B. Smoking and timing of cessation on postoperative pulmonary complications after curative-intent lung cancer surgery. *J Cardiothorac Surg*. 2017;12:52.
14. Martin JR, Watts CD, Taunton MJ. Bariatric surgery does not improve outcomes in patients undergoing primary

Editorial

- total knee arthroplasty. *Bone Joint J.* 2015;97-B:1501-1505.
15. Memon A, Barber J, Rumsby E, Parker S, Mohebati L, de Visser RO, Venables S, Fairhurst A, Lawson K, Sundin J. What factors are important in smoking cessation and relapse in women from deprived communities? A qualitative study in southeast England. *Public Health.* 2016; 134:39-45.
 16. Myers J, Lata K, Chowdhury S, McAuley P, Jain N, Froelicher V. The obesity paradox and weight loss. *Am J Med.* 2011;124:924-930.
 17. Pan X, Wang J, Lin Z, Dai W, Shi Z. Postoperative pain-related symptoms and complications in patients undergoing primary total knee arthroplasty in the United States. *J Arthroplasty.* [Published online ahead of Print May 28, 2019]. DOI: [10.1016/j.arth.2019.05.035](https://doi.org/10.1016/j.arth.2019.05.035).
 18. Peters SAE, Muntner P, Woodward M. Sex differences in the prevalence of, and trends in, cardiovascular risk factors, treatment, and control in the United States, 2001 to 2016. *Circulation.* 2019; 139:1025-1035.
 19. Phelan SM, Burgess DJ, Yeazel MW, Hellerstedt WL, Griffin JM, van Ryn M. Impact of weight bias and stigma on quality of care and outcomes for patients with obesity. *Obesity Rev.* 2015;16:319-326.
 20. Pollack P. Do blanket BMI restrictions harm arthroplasty patients? Available at: <https://www.aaos.org/News/DailyEdition2017/Wednesday/005/?ssopc=1>. Accessed August 12, 2019.
 21. Schwartz FH, Lange J. Factors that affect outcome following total joint arthroplasty: A review of the recent literature. *Current Rev Musculoskelet Med.* 2017; 10:246-355.
 22. Severson EP, Singh JA, Browne JA, Trousdale RT, Sarr MG, Lewallen DG. Total knee arthroplasty in morbidly obese patients treated with bariatric surgery: A comparative study. *J Arthroplasty.* 2012; 27:1696-1700.
 23. Sørensen LT. Wound healing and infection in surgery. the clinical impact of smoking and smoking cessation: A systematic review and meta-analysis. *Arch Surg.* 2012;147:373-383.
 24. Suleiman LI, Ortega G, Ong'uti SK, Gonzalez DO, Tran DD, Onyike A, Turner PL, Fullum TM. Does BMI affect perioperative complications following total knee and hip arthroplasty? *J Surg Res.* 2012;174:7-11.
 25. van den Boom W, Schroeder RA, Manning MW, Setji TL, Fiestan G-C, Dunson DB. Effect of A1C and glucose on post-operative mortality in noncardiac and cardiac surgeries. *Diabetes Care.* 2018; 41:782-788.
 26. Volpp KG, Troxel AB, Pauly MV, Glick HA, Puig A, Asch DA, Galvin R, Zhu J, Wan F, DeGuzman J, Corbett E, Weiner J, Audrain-McGovern J. A randomized, controlled trial of financial incentives for smoking cessation. *N Engl J Med.* 2009; 360:699-709.
 27. Wang AY, Wong MS, Humbyrd CJ. Eligibility criteria for lower extremity joint replacement may worsen racial and socioeconomic disparities. *Clin Orthop Relat Res.* 2018;476:2301-2308.
 28. Workgroup of the American Association of Hip and Knee Surgeons (AAHKS) Evidence Based Committee. Obesity and total joint arthroplasty: A literature based review. *J Arthroplasty.* 2013;28:714-721.
 29. Zhang JC, Matelski J, Gandhi R, Jackson T, Urbach D, Cram P. Can patient selection explain the obesity paradox in orthopaedic hip surgery? An analysis of the ACS-NSQIP registry. *Clin Orthop Relat Res.* 2018;476:964-973.
 30. Zhang X, Bullard KM, Gregg EW, Beckles GL, Williams DE, Barker LE, Albright AL, Imperatore G. Access to health care and control of ABCs of diabetes. *Diabetes Care.* 2012;35:1566-1571.