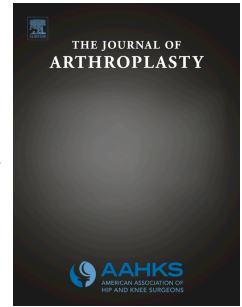


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Chad A. Krueger, MD, Samuel Rosas, MD, PhD, MBA, Dana Jacoby, MBA, Marney F. Reid



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Increased Time, Administrative Tasks, and Decreasing Reimbursements: Has Value-Based Care Contributed to Burnout Among Orthopaedic Surgeons?

Chad A Krueger, MD^a

Samuel Rosas MD, PhD, MBA^b

Dana Jacoby, MBA^c

Marney F. Reid^d

^a Department of Orthopaedic Surgery, Rothman Orthopaedic Institute, Philadelphia, PA

^b Department of Orthopaedics, Duke University Hospital, Durham, North Carolina

^c Vector Medical Group, LLC, Denver, Colorado

^d Marney Reid Consulting LLC, Cornelius, North Carolina

Corresponding Author:

Chad A Krueger, MD

Chad.Krueger@rothmanortho.com

925 Chestnut St, 5th Floor

Philadelphia, PA, 19107

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1 **Increased Time, Administrative Tasks, and Decreasing Reimbursements: Has Value-Based**
2 **Care Contributed to Burnout Among Orthopaedic Surgeons?**

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8 **Introduction**

9

10 Orthopaedic arthroplasty surgeons are at the center of one of the most expensive surgical
11 treatment strategies for a growing population of patients within the United States. This makes the
12 field of arthroplasty a prime place for cost containment efforts to be directed towards, which has
13 been comprised mostly of strategies labeled as "value-based care (VBC)." With VBC, all
14 healthcare parties involved have aimed to increase value while decreasing costs based on the
15 famous equation by Porter et al.: $\text{value} = \text{outcome}/\text{cost}$ [1]. This has led to many changes over
16 the past years that will be summarized here. Simultaneously, we aim to present how these
17 changes have led to increased surgeon burnout and how they are currently causing changes that
18 will affect patients and surgeons in years to come by imparting changes in practice that do not
19 appear aligned with value outcomes. Moreover, we aim to provide a review of changes that we
20 believe could improve surgeons' satisfaction by increasing their involvement in policy creation
21 and alteration that can lead to sustainable improvement in the field. There were two independent
22 authors who manually searched the literature by exploring PubMed and Google Scholar. Medical
23 Subject Heading (MeSH) terms involved the use of "burn out, value, arthroplasty, and
24 outcomes." We believe systemic changes that place surgeons in more relevant and policy-making
25 positions are more likely to align with the quadruple aim (i.e., "enhancing patient experience,
26 improving population health, reducing costs, and improving the work life of health care
27 providers") [2].

28

29 *Physician Burnout: A Rising Issue Facing Orthopaedic Surgeons*

30 Orthopaedic surgery is a demanding field characterized by long hours, high patient volume, and
31 complex cases. Numerous studies using the Maslach Burnout Inventory (MBI), the most studied
32 and validated burnout assessment scale, have documented the large prevalence, showing adverse
33 effects on mental and physical well-being, patient safety, and healthcare quality [3-6]. The
34 incidence of surgeon burnout has only increased over the years, and there does not appear to be a
35 cure [4, 7]. Furthermore, multiple studies have shown that orthopaedic surgeons have some of
36 the highest rates of suicide among medical specialties [8, 9]. It is also noted that this epidemic of
37 decreased mental health among surgeons is due to a multitude of factors [10]. Some of the most

38 cited include a growing patient population in both size and complexity, reductions in procedural
39 reimbursement, increasing patient demands, and increasing burden of administrative tasks [11,
40 12]. Other pressures include the shifts from fee-for-service into managed care contracts and VBC
41 programs that require an enormous effort to develop and implement [13, 14]. These VBC
42 programs require surgeons to spend time away from patient care and exponentially increase the
43 volume of administrative tasks directed by healthcare administrators and insurance companies
44 that do not directly engage in patient care - both of which are highly associated with burnout
45 [15]. Furthermore, the pressures that physicians face from health systems to provide high-quality
46 care with fewer resources and autonomy also increase the amount of emotional burden that
47 physicians face [15, 16]. These various stressors are all factors that likely lead to increased
48 burnout and, in some cases, a desire to leave medicine (Figure 1).

49

50 *The Rise in Value-Based Care Implementation*

51 The initial goal for the implementation of VBC programs was to improve patient outcomes while
52 decreasing overall costs. This was believed to promote more personalized and coordinated care,
53 improve efficiency, and decrease costs by eliminating variability in care [17]. Orthopaedic
54 surgery became impacted by these programs in 2009 with the Acute Care Episode (ACE) project,
55 a pilot of three hospitals implementing bundled payment models for total knee arthroplasty
56 (TKA) and total hip arthroplasty (THA)[18]. Around this time, Porter et al. also published their
57 highly cited article defining value as a change in healthcare quality over cost [19]. These VBC
58 models emphasized enhanced patient outcomes, efficiency, and patient satisfaction and
59 successfully reduced the episodic cost of care in certain orthopaedic conditions. These
60 adjustments were accomplished through oversight groups for quality, finance, and provider
61 incentive program committees [20]. Each committee developed and refined cost containment and
62 quality improvement strategies by optimizing and standardizing perioperative patient care and
63 reducing surgical implant costs.

64 The success of the ACE pilots led to other bundled payment programs, such as the Bundled
65 Payments for Care Improvement (BPCI) initiative and the Comprehensive Care for Joint
66 Replacement (CJR) [17, 18, 21]. These programs have proven effective and efficient for payers
67 to decrease care costs, yet their effects on the physician have not received much attention.

68 Furthermore, these programs seem to have increased the financial stresses of many surgeons and

69 surgical practices secondary to the financial benefits of the programs being heavily weighted to
70 payors and third parties - not the surgeons or surgical practices themselves [22]. The increased
71 focus on shifting healthcare away from a fee-for-service model and into VBC arrangements gave
72 birth to initiatives such as the Triple Aim and Quadruple Aims [23, 24]. Whereas the Triple Aim
73 (2008) only focused on patient care experience, quality outcomes, and cost reductions, the
74 Quadruple Aim (2014) identified the rise in physician burnout and added a fourth component
75 focusing on physician wellbeing [2, 25]. These later programs were only added at a time when
76 surgeon burnout was already a growing epidemic, according to the annual Medscape reports,
77 with a concomitant reimbursement decrease (Figure 2) [26-34].

78

79 *Key Elements for Successful VBC Implementation and Factors That Lead to Surgeon Burnout*

80 While a literature review found no studies directly correlating the intersection of surgeon burnout
81 and VBC implementation, qualitative data from multiple articles on infrastructure, workflow
82 changes, key stakeholders, and interdisciplinary team requirements to implement orthopaedic
83 VBC programs successfully was thematically analyzed [3, 4, 7, 8, 10, 26, 35-43]. Findings
84 pinpointed common themes between factors leading to surgeon burnout and VBC
85 implementation. Some of the key components required to implement VBC arrangements
86 successfully include quality metrics and performance standards: patient outcomes, readmission
87 rates, and adherence to clinical guidelines have become the main components that orthopaedic
88 surgeons are evaluated on. To meet these performance standards, healthy systems and physician
89 practices must invest in the infrastructure and human capital required for meticulous
90 documentation, multidisciplinary team coordination, and continuous quality improvement
91 efforts, leading to added administrative burdens and time pressures. These data points are not
92 only used by practices and surgeons to compare each other and continuously improve quality and
93 reduce costs to convene value-based care arrangements, but also by payers to decide
94 reimbursement rates and, in some cases, even penalties [39].

95

96 *Care Coordination and Integration*

97 The VBC programs emphasize care coordination and integration across the healthcare
98 continuum, requiring orthopaedic surgeons to collaborate closely with primary care providers,
99 physical therapists, and other specialists. While improved coordination can enhance patient

100 outcomes, it also introduces challenges related to increased communication, care transitions, and
101 workload management at a time when reimbursement continues to decrease[12, 33, 34].

102

103 *Risk-Based Contracts and Financial Incentives*

104 Participation in risk-based contracts and financial incentives tied to VBC outcomes incentivize
105 orthopaedic surgeons to focus on cost-effective care delivery and resource utilization. However,
106 navigating complex payment models that surgeons have not been trained on, managing financial
107 risk when many chose medicine to focus on patient care, and meeting budgetary constraints to
108 satisfy health system leadership can all create additional stress and uncertainty for the physicians
109 implementing these programs [44].

110

111 *Technology Adoption and Data Reporting*

112 The VBC initiatives often leverage technology for data collection, analytics, and reporting.

113 Orthopaedic surgeons are required to adapt their electronic health record systems, participate in
114 data reporting programs, and use data-driven insights to direct clinical decision-making. Again,
115 tasks that take surgeons away from their training focus and add more stress to the practice of
116 medicine. The learning curve associated with technology adoption and data management can also
117 contribute to burnout, especially among more tenured practitioners [41].

118

119 These components of VBC, while aimed at improving healthcare quality and efficiency, can
120 inadvertently intensify burnout among orthopaedic surgeons. The combination of increased
121 performance expectations, administrative complexities, care coordination challenges, financial
122 pressures, and technology demands can create a high-stress environment that predisposes
123 surgeons to burnout [45].

124

125 Many have published on the decreasing reimbursement rates among orthopaedic surgery
126 procedures, mainly due to the deflationary Medicare reimbursement rates. This is a known issue
127 in which different medical and surgical societies spend time and resources advocating against
128 government payors. What is more contributory to the increased burnout rates associated with a
129 decreasing reimbursement rate is the growing complexity of patients and the increasing
130 percentage of patients requiring revision surgery. Various authors have demonstrated that doing

131 revision arthroplasty incurs greater surgeon physical energy, costlier implants, increased
132 perioperative costs, and time. These increased requirements are reimbursed at a continuously
133 decreasing rate and at a significantly lower reimbursement rate for effort than primary THA or
134 TKA. This further adds pressure to the surgeons, who are already faced with multiple pressures
135 from payors, health systems, and patients themselves [42].

136

137 All these factors, combined with high patient volumes, labor-intensive procedures, long
138 operative hours, on-call responsibilities, and physical demands with increased patient complexity
139 and decreasing reimbursement, likely lead to increasing burnout rates. Additionally, the
140 implementation of VBC programs requires orthopaedic surgeons to adapt rapidly to the ever-
141 evolving practice paradigms and regulatory requirements, amplifying the risk of burnout.

142

143 *Could A Specialist-Led Care Practice Model Help Achieve the Quadruple Aim?*

144 We posit that a specialist-led model can help fight the incidence of surgeon burnout and
145 simultaneously maintain quality of care while reducing overall costs [46]. In this model,
146 surgeons (specialists) drive the direction of a practice or health system's efforts toward providing
147 more value for patients, and the "race to the bottom" payment concept is stopped. In most cases,
148 we believe that putting surgeons in a decision-making position can lead to more increased value
149 rather than simply decreasing disposable equipment costs.

150

151 Putting in the same infrastructure, systems, and human capital that current VBC models require
152 and placing surgeons at the head of the decision-making care continuum with a multi-
153 disciplinary support team empowers surgeons to highlight the bottlenecks that take place in the
154 preoperative, perioperative, and postoperative settings. By identifying and driving patient care
155 changes with reimbursement rewards for the extra care management time, we are confident the
156 goals of VBC programs can be accomplished while reducing the incidence of surgeon burnout.

157

158 An example of this is preoperative arthroplasty classes, most often provided by physical
159 therapists (PTs) [47]. Studies have shown that these visits help prepare patients for arthroplasty,
160 increase patient satisfaction, and may decrease office calls and communication requirements [48-
161 51]. While implementation of these classes creates a benefit to patient care, oftentimes they are

162 not reimbursed by payers and/or undergo insurance denial, and the costs are absorbed by the
163 health system or practice [43, 52, 53]. Thus, we believe that informed surgeons could help align
164 the financial incentives with these classes, which could lead to increased reimbursement for
165 those types of classes and for the PT that provides them, which would then most likely increase
166 patient engagement with these classes.

167

168 *Framework for a Specialist-Led Care Practice Model*

169 Surgeons and surgical practices are already implementing practices that follow the values of
170 VBC [36, 38, 54, 55]. Successful VBC programs have practices that properly indicate patients
171 for surgery and treat these patients based on well-established principles and techniques within
172 evidence-based medicine [56]. Surgeons and practices would also collect patient-reported
173 outcome measures to demonstrate the value of the care that they provide while recognizing the
174 limitations of these measures [57]. We see surgeons being more involved with governing bodies
175 like private insurance companies, the Centers for Medicare and Medicaid Services, and hospitals
176 in a way where surgeons can take part in the decision-making process that often leads to changes
177 in practice models. Surgeons in positions of power could explain to non-surgeons how simple
178 decisions can affect long-term patient care and costs. Physicians in this position of power could
179 help alter how payors value certain aspects of care to better fit the long-term costs of a patient's
180 care. Examples of this are putting surgeons in a decision-making position for the site of care of
181 their patients at the time of primary or revision THA or TKA for osteoarthritis (OA). Various
182 studies have shown that discharge-to-home patients tend to have fewer complications than
183 inpatient surgeries, yet this creates a heightened requirement of planning, executing, and
184 postoperative monitoring with these patients, who should be financially incentivized instead of
185 punished, as perioperative outcomes are better than those of patients performed as inpatients [58-
186 60]. Moreover, having specialists take part in the reimbursement discussion could affect how
187 evidence-based medicine practices are performed, like increasing the amount of physical therapy
188 (PT) before surgery versus injection of hyaluronic acid, which the American Academy of
189 Orthopaedic Surgeons (AAOS) does not support, yet it is commonly used nationwide [61].
190 Successful practices also incorporate a risk stratification component for patient selection [62].
191 Nonetheless, surgeons' preferences or case denominations as inpatient or outpatient are often
192 decided by insurance companies more than the physicians treating the patient. We promote a

193 framework where surgeon preference for the designation of the location of surgery is considered
194 with high weight at the time of surgery location decision. This is not done to ‘lemon drop’ or
195 ‘cherry pick’, but to ensure patients are properly optimized prior to their surgery to maximize
196 their outcome. A very small number of patients make up a large percentage of costs of care, and
197 putting efforts into minimizing these outliers saves healthcare systems enormous amounts of
198 money [63]. Such efforts can be accomplished by using a nurse navigator system and utilizing
199 internal questionnaires to determine a patient’s health and risk status. This creates a common and
200 national universal language that is financially incentivized and in accordance with the quadruple
201 aims [64]. Such systems are not without fault, considering that practices and physicians may
202 have a limited scope of the patient’s active medical problems. However, these efforts have a
203 trickle-down effect of allowing demand-matching of patients for surgical facilities. In short, the
204 healthiest patients can typically be treated in lower-cost surgical centers, while the most
205 medically complex patients may need to be treated in tertiary care facilities [65]. Stratifying
206 patients in this manner allows patients to receive the level of care they may require while also
207 keeping facility costs as low as possible. Multiple studies have evaluated these practices and
208 found them to be successful at optimizing patient care and decreasing the costs associated with
209 care [37, 66]. By implementing these factors, facilities are able to continue to provide care for
210 almost all patients within their community while simultaneously optimizing the costs associated
211 with such care [40].

212

213 *Conclusion*

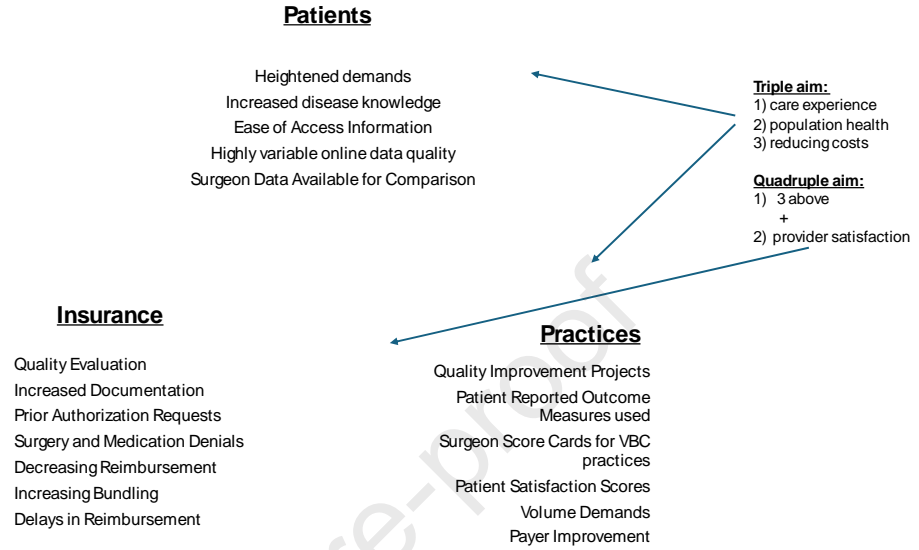
214 It is important to recognize that surgeon burnout is continuing to rise at the same time value-
215 based care initiatives are putting increased burdens on physicians. While studies looking at a
216 direct cause and effect between the two facts do not yet exist, the factors listed above suggest
217 that, at the very least, an association between the two factors is likely. As more and more
218 healthcare decisions are directed by payors, administrators, and third parties that do not interact
219 directly with patients, it is easy for surgeons to feel that the goals of the care they provide are
220 ever-changing, increasingly complex, and designed to diminish their work. Implementing
221 solutions in today’s healthcare climate is a tremendous challenge. However, if surgeons can
222 regain control of their practices and work to develop specialist-led care that provides all of the
223 value of third-party programs, then perhaps we can take a step forward toward reducing burnout

224 by giving the care and responsibility back to healthcare specialists who have trained on and
225 directly cared for patients.

226

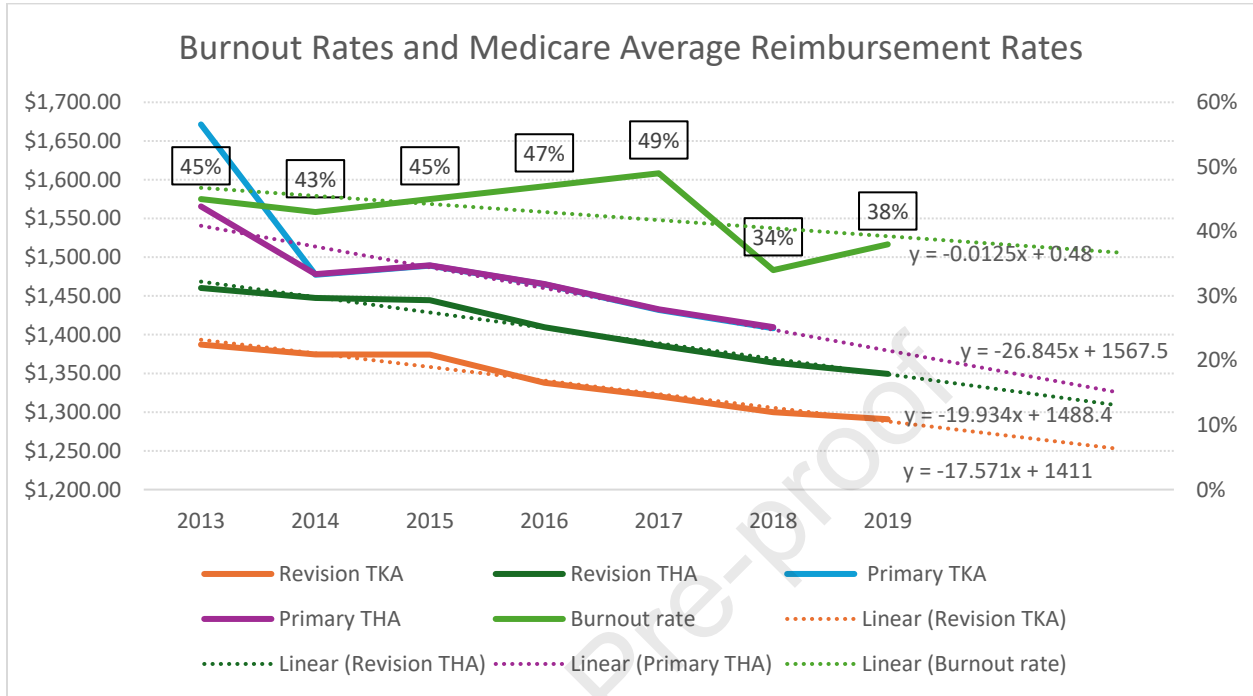
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227 **Figures**
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229 Figure 1.
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233 Figure 2.
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237 **References**

- 238 1. Porter ME. What is value in health care? *N Engl J Med* 363(26): 2477, 2010
- 239 2. Bodenheimer T, Sinsky C. From triple to quadruple aim: care of the patient requires care of
240 the provider. *Ann Fam Med* 12(6): 573, 2014
- 241 3. Verret CI, Nguyen J, Verret C, Albert TJ, Fufa DT. How Do Areas of Work Life Drive Burnout
242 in Orthopaedic Attending Surgeons, Fellows, and Residents? *Clin Orthop Relat Res* 479(2): 251,
243 2021
- 244 4. Lu S, Mc Colgan R, Nguyen J, Kelly BT, Fufa DT. Worsening Burnout in Orthopedic
245 Surgeons Since 2019 and Key Areas of Work life Drivers. *HSS Journal*® 0(0):
246 15563316241242129,
- 247 5. Shoman Y, Marca SC, Bianchi R, Godderis L, van der Molen HF, Guseva Canu I.
248 Psychometric properties of burnout measures: a systematic review. *Epidemiol Psychiatr Sci* 30:
249 e8, 2021
- 250 6. Tingle C. The toll of perfectionism: Burnout in orthopedics. In: *Healio Orthopedics*.
251 [https://www.healio.com/news/orthopedics/20230117/the-toll-of-perfectionism-burnout-in-](https://www.healio.com/news/orthopedics/20230117/the-toll-of-perfectionism-burnout-in-orthopedics)
252 [orthopedics](https://www.healio.com/news/orthopedics/20230117/the-toll-of-perfectionism-burnout-in-orthopedics): Healio. 2023
- 253 7. Daniels AH, DePasse JM, Kamal RN. Orthopaedic Surgeon Burnout: Diagnosis, Treatment,
254 and Prevention. *J Am Acad Orthop Surg* 24(4): 213, 2016
- 255 8. Elkbuli A, Sutherland M, Shepherd A, Kinslow K, Liu H, Ang D, McKenney M. Factors
256 Influencing US Physician and Surgeon Suicide Rates 2003 to 2017: Analysis of the CDC-
257 National Violent Death Reporting System. *Ann Surg* 276(5): e370, 2022
- 258 9. Pulcrano M, Evans SR, Sosin M. Quality of Life and Burnout Rates Across Surgical
259 Specialties: A Systematic Review. *JAMA Surg* 151(10): 970, 2016
- 260 10. Walker S, Goldstein R. Surgeon Wellness and Burnout: Current Concept Review. *Journal of*
261 *the Pediatric Orthopaedic Society of North America* 1(1), 2019

- 262 11. Beschloss A, Mueller J, Caldwell JE, Ha A, Lombardi JM, Ozturk A, Lehman R, Saifi C.
263 Comparison of medical comorbidities in Medicare patients treated by orthopaedic surgeons and
264 neurosurgeons throughout the USA. *Bone Jt Open* 1(6): 257, 2020
- 265 12. Lopez CD, Boddapati V, Neuwirth AL, Shah RP, Cooper HJ, Geller JA. Hospital and
266 Surgeon Medicare Reimbursement Trends for Total Joint Arthroplasty. *Arthroplast Today* 6(3):
267 437, 2020
- 268 13. Marrache M, Harris AB, Puvanesarajah V, Raad M, Hassanzadeh H, Srikumaran U, Ficke JR,
269 Levy JF, Jain A. Hospital Payments Increase as Payments to Surgeons Decrease for Common
270 Inpatient Orthopaedic Procedures. *J Am Acad Orthop Surg Glob Res Rev* 4(4), 2020
- 271 14. Pollock JR, Moore ML, Haglin JM, LeBlanc MP, Rosenow CS, Makovicka JL, Deckey DG,
272 Hassebrock JD, Bingham JS, Patel KA. Between 2000 and 2020, Reimbursement for
273 Orthopaedic Foot and Ankle Surgery Decreased by 30. *Arthrosc Sports Med Rehabil* 4(2): e553,
274 2022
- 275 15. Schneller ES, Wilson NA. Professionalism in 21st century professional practice: autonomy
276 and accountability in orthopaedic surgery. *Clin Orthop Relat Res* 467(10): 2561, 2009
- 277 16. Hatton R. 'Autonomy will be nonexistent': The future of orthopedic surgeon independence.
278 In: *Becker's Orthopedic Review* [https://www.beckersspine.com/orthopedic/57065-autonomy-](https://www.beckersspine.com/orthopedic/57065-autonomy-will-be-nonexistent-the-future-of-orthopedic-surgeon-independence.html?oly_enc_id=2837F1763601I4G)
279 [will-be-nonexistent-the-future-of-orthopedic-surgeon-](https://www.beckersspine.com/orthopedic/57065-autonomy-will-be-nonexistent-the-future-of-orthopedic-surgeon-independence.html?oly_enc_id=2837F1763601I4G)
280 [independence.html?oly_enc_id=2837F1763601I4G](https://www.beckersspine.com/orthopedic/57065-autonomy-will-be-nonexistent-the-future-of-orthopedic-surgeon-independence.html?oly_enc_id=2837F1763601I4G): Beckers Spine. 2023
- 281 17. Services CfMM. Value-Based Care. In: CMSgov.
282 [https://www.cms.gov/priorities/innovation/key-concepts/value-based-](https://www.cms.gov/priorities/innovation/key-concepts/value-based-care#:~:text=Health%20equity%20is%20achieved%20when,inclusing%20those%20from%20underserved%20populations.)
283 [care#:~:text=Health%20equity%20is%20achieved%20when,inclusing%20those%20from%20un-](https://www.cms.gov/priorities/innovation/key-concepts/value-based-care#:~:text=Health%20equity%20is%20achieved%20when,inclusing%20those%20from%20underserved%20populations.)
284 [derserved%20populations.:](https://www.cms.gov/priorities/innovation/key-concepts/value-based-care#:~:text=Health%20equity%20is%20achieved%20when,inclusing%20those%20from%20underserved%20populations.) Centers for Medicare & Medicaid Services
- 285 18. CMS.gov. Bundled Payments for Care Improvement Initiative (BPCI). In: CMSgov.
286 [https://www.cms.gov/newsroom/fact-sheets/bundled-payments-care-improvement-initiative-](https://www.cms.gov/newsroom/fact-sheets/bundled-payments-care-improvement-initiative-bpci)
287 [bpci](https://www.cms.gov/newsroom/fact-sheets/bundled-payments-care-improvement-initiative-bpci): CMS. 2016

- 288 19. Porter ME, Lee TH. From volume to value in health care: the work begins. *Jama* 316(10):
289 1047, 2016
- 290 20. Umar Ghilzai OEH, Janis Coffin DO, FAAFP, FACMPE. Value-based care and orthopedic
291 surgery: Past, present and future. In: *Medical Group Management Organization*.
292 [https://www.mgma.com/articles/value-based-care-and-orthopedic-surgery-past-present-and-](https://www.mgma.com/articles/value-based-care-and-orthopedic-surgery-past-present-and-future)
293 [future](https://www.mgma.com/articles/value-based-care-and-orthopedic-surgery-past-present-and-future): Medical Group Management Organization. 2021
- 294 21. Kim H, Ibrahim SA. The Comprehensive Care for Joint Replacement Model—Potential
295 Implications for Equity. *JAMA Health Forum* 3(12): e224459, 2022
- 296 22. Krueger CA, Yayac M, Vannello C, Wilsman J, Austin MS, Courtney PM. Are We at the
297 Bottom? BPCI Programs Now Disincentivize Providers Who Maintain Quality Despite Caring
298 for Increasingly Complex Patients. *J Arthroplasty* 36(1): 13, 2021
- 299 23. The Triple Aim: Care, Health, And Cost. *Health Affairs* 27(3): 759, 2008
- 300 24. Dowd BE, Laugesen MJ. Fee-for-service payment is not the (main) problem. *Health Serv*
301 *Res* 55(4): 491, 2020
- 302 25. Berwick DM, Nolan TW, Whittington J. The Triple Aim: Care, Health, And Cost. *Health*
303 *Affairs* 27(3): 759, 2008
- 304 26. Peckman C. Physician Lifestyles -- Linking to Burnout: A Medscape Survey. In: *Medscape*
305 *Orthopedics*.
306 [https://www.medscape.com/features/slideshow/lifestyle/2013/public?icd=login_success_email_](https://www.medscape.com/features/slideshow/lifestyle/2013/public?icd=login_success_email_match_norm)
307 [match_norm](https://www.medscape.com/features/slideshow/lifestyle/2013/public?icd=login_success_email_match_norm). 25. 2013
- 308 27. Peckham C. Medscape Physician Lifestyle Report 2014. In: *Medscape Orthopedics*.
309 <https://www.medscape.com/features/slideshow/lifestyle/2014/public/overview>. 22. 2014
- 310 28. Peckham C. Medscape Physician Lifestyle Report 2015. In: *Medscape Orthopedics*.
311 <https://www.medscape.com/slideshow/lifestyle-2015-overview-6006535#25>. 25. 2015

- 312 29. Peckham C. Medscape Lifestyle Report 2016: Bias and Burnout. In: Medscape Orthopedics.
313 <https://www.medscape.com/slideshow/lifestyle-2016-overview-6007335#3>. 25. 2016
- 314 30. Peckham C. Medscape Lifestyle Report 2017: Race and Ethnicity, Bias and Burnout. In:
315 Medscape Orthopedics.
316 <https://www.medscape.com/features/slideshow/lifestyle/2017/overview#page=3>. 28. 2017
- 317 31. Peckham C. Medscape National Physician Burnout & Depression Report 2018. In:
318 Medscape Orthopedics. [https://www.medscape.com/slideshow/2018-lifestyle-burnout-](https://www.medscape.com/slideshow/2018-lifestyle-burnout-depression-6009235#26)
319 [depression-6009235#26](https://www.medscape.com/slideshow/2018-lifestyle-burnout-depression-6009235#26). 27. 2018
- 320 32. Leslie Kane M. Medscape National Physician Burnout, Depression & Suicide Report 2019.
321 In: Medscape Orthopedics. [https://www.medscape.com/slideshow/2019-lifestyle-burnout-](https://www.medscape.com/slideshow/2019-lifestyle-burnout-depression-6011056#6)
322 [depression-6011056#6](https://www.medscape.com/slideshow/2019-lifestyle-burnout-depression-6011056#6). 29. 2019
- 323 33. Mayfield CK, Haglin JM, Levine B, Della Valle C, Lieberman JR, Heckmann N. Medicare
324 Reimbursement for Hip and Knee Arthroplasty From 2000 to 2019: An Unsustainable Trend. *J*
325 *Arthroplasty* 35(5): 1174, 2020
- 326 34. Acuña AJ, Jella TK, Samuel LT, Schwarzkopf R, Fehring TK, Kamath AF. Inflation-Adjusted
327 Medicare Reimbursement for Revision Hip Arthroplasty: Study Showing Significant Decrease
328 from 2002 to 2019. *J Bone Joint Surg Am* 103(13): 1212, 2021
- 329 35. Services CfMM. Strategies for Success in Bundled Payments. In.
330 [https://www.cms.gov/priorities/innovation/media/document/bpcia-strategies-success-infographic:](https://www.cms.gov/priorities/innovation/media/document/bpcia-strategies-success-infographic)
331 CMS. 3. 2023
- 332 36. Zygorakis CC, Valencia V, Moriates C, Boscardin CK, Catschegn S, Rajkomar A, Bozic KJ,
333 Soo Hoo K, Goldberg AN, Pitts L, Lawton MT, Dudley RA, Gonzales R. Association Between
334 Surgeon Scorecard Use and Operating Room Costs. *JAMA Surg* 152(3): 284, 2017
- 335 37. Yayac M, D'Antonio N, Star AM, Austin MS, Courtney PM. Demand Matching and Site of
336 Care: High-Cost Facilities Do Not Improve Short-term Quality Metrics Following Total Hip and
337 Knee Arthroplasty. *Orthopedics* 45(1): 19, 2022

- 338 38. Winegar AL, Jackson LW, Sambare TD, Liu TC, Banks SR, Erlinger TP, Schultz WR, Bozic
339 KJ. A Surgeon Scorecard Is Associated with Improved Value in Elective Primary Hip and Knee
340 Arthroplasty. *J Bone Joint Surg Am* 101(2): 152, 2019
- 341 39. Travers V. Burnout in orthopedic surgeons. *Orthopaedics & Traumatology: Surgery &*
342 *Research* 106(1, Supplement): S7, 2020
- 343 40. Parikh N, Woelber E, Bido J, Hobbs J, Perloff J, Krueger CA. Identification of Surgeon
344 Outliers to Improve Cost Efficiency: A Novel Use of the Centers for Medicare and Medicaid
345 Quality Payment Program. *J Arthroplasty*, 2024
- 346 41. Khan MT, Mitchell N, Assifi MM, Chung M, Wright GP. Surgeon burnout and usage of
347 personal communication devices: examining the technology “empowerment/enslavement
348 paradox”. *Journal of Surgical Research* 285: 205, 2023
- 349 42. Hughes D, Hanson MN, Alseidi A, Romanelli J, Vassiliou M, Feldman LS, Asbun H. Factors
350 influencing surgeon well-being: qualitatively exploring the joy of surgery. *Surgical endoscopy*
351 37(8): 6464, 2023
- 352 43. Grosso MJ, Courtney PM, Kerr JM, Della Valle CJ, Huddleston JI. Surgeons' Preoperative
353 Work Burden Has Increased Before Total Joint Arthroplasty: A Survey of AAHKS Members. *J*
354 *Arthroplasty* 35(6): 1453, 2020
- 355 44. Kamath AF, Courtney PM, Bozic KJ, Mehta S, Parsley BS, Froimson MI. Bundled payment
356 in total joint care: survey of AAHKS membership attitudes and experience with alternative
357 payment models. *The Journal of Arthroplasty* 30(12): 2045, 2015
- 358 45. Wolfe JD, Epstein AM, Zheng J, Orav EJ, Joynt Maddox KE. Predictors of Success in the
359 Bundled Payments for Care Improvement Program. *J Gen Intern Med* 37(3): 513, 2022
- 360 46. Rana AJ, Springer BD, Dragolovic G, Reid MF. A Specialist-Led Care Model: Aligning the
361 Patient and Specialist for the Greatest Impact. *J Arthroplasty* 38(9): 1639, 2023

- 362 47. Marques CJ. CORR Insights®: Preoperative Physical Therapy Education Reduces Time to
363 Meet Functional Milestones After Total Joint Arthroplasty. *Clin Orthop Relat Res* 476(1): 49,
364 2018
- 365 48. Moulton LS, Evans PA, Starks I, Smith T. Pre-operative education prior to elective hip
366 arthroplasty surgery improves postoperative outcome. *International Orthopaedics* 39(8): 1483,
367 2015
- 368 49. Soeters R, White PB, Murray-Weir M, Koltsov JCB, Alexiades MM, Ranawat AS.
369 Preoperative Physical Therapy Education Reduces Time to Meet Functional Milestones After
370 Total Joint Arthroplasty. *Clin Orthop Relat Res* 476(1): 40, 2018
- 371 50. Jones ED, Davidson LJ, Cline TW. The Effect of Preoperative Education Prior to Hip or
372 Knee Arthroplasty on Immediate Postoperative Outcomes. *Orthop Nurs* 41(1): 4, 2022
- 373 51. Mancuso CA, Graziano S, Briskie LM, Peterson MG, Pellicci PM, Salvati EA, Sculco TP.
374 Randomized trials to modify patients' preoperative expectations of hip and knee arthroplasties.
375 *Clin Orthop Relat Res* 466(2): 424, 2008
- 376 52. Kim K, Chin G, Moore T, Schwarzkopf R. Does a Preoperative Educational Class Increase
377 Patient Compliance. *Geriatr Orthop Surg Rehabil* 6(3): 153, 2015
- 378 53. Kelmer GC, Turcotte JJ, Dolle SS, Angeles JD, MacDonald JH, King PJ. Preoperative
379 Education for Total Joint Arthroplasty: Does Reimbursement Reduction Threaten Improved
380 Outcomes? *J Arthroplasty* 36(8): 2651, 2021
- 381 54. Bernstein JA, Rana A, Iorio R, Huddleston JI, 3rd, Courtney PM. The Value-Based Total
382 Joint Arthroplasty Paradox: Improved Outcomes, Decreasing Cost, and Decreased Surgeon
383 Reimbursement, Are Access and Quality at Risk? *J Arthroplasty* 37(7): 1216, 2022
- 384 55. Siddiqi A, Piuizzi NS. Letter to the Editor: Value-based Healthcare: Not Going Anywhere-
385 Why Orthopaedic Surgeons Will Continue Using Telehealth in a Post-COVID-19 World. *Clin*
386 *Orthop Relat Res* 479(6): 1398, 2021

- 387 56. Vetter TR, Uhler LM, Bozic KJ. Value-based Healthcare: Preoperative Assessment and
388 Global Optimization (PASS-GO): Improving Value in Total Joint Replacement Care. *Clin Orthop*
389 *Relat Res* 475(8): 1958, 2017
- 390 57. Sutton RM, Baker CM, D'Amore T, Courtney PM, Krueger CA, Austin MS. Poor Patient
391 Compliance Limits the Attainability of Patient-Reported Outcome Measure Completion
392 Thresholds for the Comprehensive Care for Joint Arthroplasty Model. *J Arthroplasty* 38(7 Suppl
393 2): S63, 2023
- 394 58. Jenny JY, Godet J, de Ladoucette A. Complication Rates Are Not Higher After Outpatient
395 Versus Inpatient Fast-Track Total Knee Arthroplasty: A Propensity-Matched Prospective
396 Comparative Study. *J Arthroplasty*, 2024
- 397 59. Acuña AJ, Forlenza EM, Serino JM, 3rd, Lavu MS, Della Valle CJ. Is Hospital-Based
398 Outpatient Revision Total Knee Arthroplasty Safe? An Analysis of 2,171 Outpatient Aseptic
399 Revision Procedures. *J Arthroplasty*, 2024
- 400 60. Haglin JM, Brinkman JC, Austin RP, Deckey DG, Christopher ZK, Spangehl MJ, Bingham
401 JS. Risk Versus Reward: Hospitals Incentivized More Than Surgeons to Care for Riskier
402 Arthroplasty Patients. *J Arthroplasty*, 2024
- 403 61. Jang CW, Bang M, Park JH, Cho HE. Impact of changes in clinical practice guidelines for
404 intra-articular injection treatments for knee osteoarthritis on public interest and social media.
405 *Osteoarthritis Cartilage* 31(6): 793, 2023
- 406 62. Fillingham YA, Krueger CA, Rondon AJ, Vannello C, Austin MS, Courtney PM. Traditional
407 Risk Factors and Logistic Regression Failed to Reliably Predict a "Bundle Buster" After Total
408 Joint Arthroplasty. *J Arthroplasty* 35(6): 1458, 2020
- 409 63. Krueger CA, Yayac M, Vannello C, Wilsman J, Austin MS, Courtney PM. From Winners to
410 Losers: The Methodology of Bundled Payments for Care Improvement Advanced
411 Disincentivizes Participation in Bundled Payment Programs. *J Arthroplasty* 36(4): 1204, 2021

- 412 64. Phillips JLH, Rondon AJ, Vannello C, Fillingham YA, Austin MS, Courtney PM. A Nurse
413 Navigator Program Is Effective in Reducing Episode-of-Care Costs Following Primary Hip and
414 Knee Arthroplasty. *J Arthroplasty* 34(8): 1557, 2019
- 415 65. Hobbs JR, Magnuson JA, Woelber E, Sarangdhar K, Courtney PM, Krueger CA. Comparing
416 Risk Assessment Between Payers and Providers: Inconsistent Agreement in Medical
417 Comorbidity Records for Patients Undergoing Total Joint Arthroplasty. *J Arthroplasty* 38(10):
418 2105, 2023
- 419 66. Sauder N, Bozic KJ. Value-based Healthcare: Early Wins and Smooth Transitions to Value-
420 based Delivery. *Clin Orthop Relat Res* 480(11): 2101, 2022
- 421 67. Wang KY, Margalit A, Thakkar SC, Hsu NN, Srikumaran U, Ficke JR, Jain A.
422 Reimbursement for Orthopaedic Surgeries in Commercial and Public Payors: A Race to the
423 Bottom. *J Am Acad Orthop Surg* 29(23): e1232, 2021
- 424 68. Gerhart CR, Boddu SP, Haglin JM, Bingham JS. Revision Arthroplasty Among Medicare
425 Patients in the United States – Arthroplasty Surgeons are Doing More for Less. *The Journal of*
426 *Arthroplasty*, 2024
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428

429 Figure Legend

430

431 Figure 1. The Venn diagram demonstrates some of the different pressures passed on to surgeons.
432 The pressures mentioned here are divided into 3 groups with cross-over between many of them.
433 Those placed by patients are those of increased demand for good outcomes, more knowledge
434 about their own conditions, ease of access to online information that may not be of the highest
435 quality, and patients' ability to compare surgeons online based on reviews and outcomes. The
436 pressures created by insurance enterprises on surgeons include the number of quality initiatives
437 and evaluation projects that they are forced to keep up with in association with more
438 documentation requirements. These are often denials and prior authorization communication
439 requests associated with more bundling of operative services with decreased and delayed
440 reimbursements. Also, surgeons' part of practices is also faced with pressures placed on them,
441 which include quality improvement projects, comparison to their peers, intra-facility grading,
442 satisfaction, volume demand, and objective demands for payer mix improvement. These are also
443 some of the other challenges encountered.

444

445 Figure 2. Recent trends in reimbursements of revision hip and knee arthroplasty as reported by
446 Gerhardt et al. and Wang et al., and burnout rates in orthopaedic surgery per Medscape. The
447 linear trend equations are shown in the graph to demonstrate that the magnitude of decreasing
448 reimbursements is many times more than any change in burnout rate.[26-31, 67, 68]

449

Patients

Heightened demands
Increased disease knowledge
Ease of Access Information
Highly variable online data quality
Surgeon Data Available for Comparison

Triple aim:

- 1) care experience
- 2) population health
- 3) reducing costs

Quadruple aim:

- 1) 3 above
- +
- 2) provider satisfaction

Insurance

Quality Evaluation
Increased Documentation
Prior Authorization Requests
Surgery and Medication Denials
Decreasing Reimbursement
Increasing Bundling
Delays in Reimbursement

Practices

Quality Improvement Projects
Patient Reported Outcome Measures used
Surgeon Score Cards for VBC practices
Patient Satisfaction Scores
Volume Demands
Payer Improvement

Journal Pre-proof