Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

HHS Public Access

Author manuscript

J Knee Surg. Author manuscript; available in PMC 2019 November 01.

Published in final edited form as:

J Knee Surg. 2018 November ; 31(10): 928–933. doi:10.1055/s-0038-1669915.

Incidence of Drug Abuse in Revision Total Knee Arthroplasty Population

Martin Roche, MD[1], **Tsun Yee Law, MD**[1], **Nipun Sodhi, BA**[2], **Samuel Rosas, MD**[3], **Jennifer Kurowicki, MD**[4], **Shanell Disla, BS**[1], **Kevin Wang, MD**[1], and **Michael A. Mont, MD**[2]

[1]Department of Orthopedic Surgery, Holy Cross Orthopedic Institute, Fort Lauderdale, Florida

[2]Department of Orthopedic Surgery, Lenox Hill Hospital, New York, New York

[3]Department of Orthopedic Surgery, Wake Forest University School of Medicine, Winston-Salem, North Carolina

[4]Department of Orthopaedics, Seton Hall University School of Health and Medical Sciences, South Orange, New Jersey

Abstract

Substance abuse can have strong negative impacts on surgical outcomes. Therefore, this study assessed the effects of drug abuse in total knee arthroplasty (TKA) patients. Specifically, we identified revision TKA (RTKA): (1) incidence, (2) causes, (3) time to revision, and (4) patient demographics in patients with a history of drug abuse. The Medicare database within the PearlDiver Supercomputer (Warsaw, IN) was queried to identify 2,159,221 TKAs performed between 2005 and 2012. Drug abuse was subdivided into cocaine, cannabis, opioids, sedatives/hypnotics/anxiolytics (SHA), amphetamines, and alcohol abusers. The effect of drug use on the incidence and cause for RTKA, time to revision, as well as patient demographics were correlated using multivariate, analysis of variance, and regression analyses. There was a significant increase in the number of primary TKAs in cocaine ($p = 0.011$), cannabis ($p < 0.001$), opioid ($p < 0.001$), SHA ($p < 0.001$), amphetamine ($p < 0.001$), and alcohol ($p < 0.001$) users. Amphetamine users had the fastest mean time to revision (691 days, standard deviation: 679 days). At 30-, 90-day, and 6-month postoperative, cocaine had the highest proportion of patients requiring RTKA (7, 12, and 20%, respectively), and at 1-year alcohol abusers (38%, $p < 0.001$). Infection was the most common cause of revision in all drug abuse/dependent cohorts. Age distributions varied significantly by group for primary TKA ($p < 0.001$). Comorbidity status was similar in all RTKA patients as determined by comparison of the mean Charlson comorbidity index scores ($p = 0.091$). Based on these results, drug abuse patients are at increased risk for RTKA. These high-risk patients should, therefore, be appropriately risk stratified and receive comprehensive postoperative pain management.

Address for correspondence Michael A. Mont, MD, Department of Orthopaedic Surgery, Lenox Hill Hospital, Northwell Health, New York, NY 10075 (mmont@northwell.edu; rhondamont@aol.com).

Conflict of Interest

M.R.: Stryker, Orthosensor; T.Y.L.: Smith & Nephew, Stryker; M.A.M.: AAOS, Abbott, Cymedica, DJ Orthopaedics, Johnson & Johnson, Journal of Arthroplasty, Journal of Knee Surgery, Mallinckrodt Pharmaceuticals, Microport, National Institutes of Health (NIAMS & NICHD), Ongoing Care Solutions, Orthopedics, Orthosensor, Pacira, Peerwell, Performance Dynamics Inc., Sage, Stryker, Surgical Technologies International, Kolon TissueGene. The remaining authors report no conflict of interest.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Keywords

knee; illicit; drug; arthroplasty; revision; replacement

Illicit drugs, such as cocaine, cannabis, opioids, sedatives/ hypnotics/anxiolytics (SHA), amphetamines, and alcohol, have been thought to have a strongly negative impact on surgical outcomes. In particular, illicit drug abuse and dependence in joint arthroplasty are thought to increase the rates of postoperative infection and septic complications which can require revision surgery.[1–4] Drug abuse in the United States is common, as it has been estimated that approximately 46% of the U.S. population aged 12 years and older have tried an illicit drug in their lifetime.[5] In addition, the lifetime prevalence of drug abuse and dependence among U.S. adults is 8 and 3%, respectively.[6] In 2015 alone, it was estimated that more than 33,000 deaths were attributable to illicit drugs.[7]

Recently, the United States has experienced the rise of an opioid epidemic; so much so that the White House has declared the opioid crisis a public health emergency.[8] A large part of this problem is the use of opioids for acute or chronic pain by more than 125 million Americans.[7] Additionally, for some medical specialties, such as orthopaedics, the use of opioids is almost a necessity for pain control.[9] In fact, in a recent study by Kaafarani et al, the group found orthopaedics to be one of the highest opioid prescribing services at the Massachusetts General Hospital.[10] Although opioids remain a common medication class for postoperative management, some studies have found that patients with a history of chronic opioid use have worse pain management outcomes following to total hip or total knee arthroplasty (TKA).[11,12] However, because of the rising number of opioid users, as well as the continuous increase in orthopaedic procedures, the association between drug use and TKA needs to be more clearly identified.

Illicit drug use and prescription drug abuse are two independent factors that might have consequences resulting in revision TKA (RTKA). Currently, the effects of drug abuse in RTKA have not been adequately studied. Previous studies that have investigated the effect of drug abuse in total joint arthroplasty have primarily focused on the hip, or have only analyzed small sample sizes.[2,3] Therefore, the purpose of this study was to determine the effects of drug abuse in TKA patients who eventually needed a revision using a large nationwide database. Specifically, we used the Medicare database from 2005 to 2012 to identify RTKA: (1) incidence, (2) causes, and (3) time to RTKA in patients with a history of abusing cocaine, cannabis, opioids, SHA, amphetamines, and/or alcohol. Drug user patient demographics were also correlated with RTKA.

Methods

Data Source

A retrospective review of a comprehensive Medicare database within the PearlDiver Supercomputer application (Warsaw, IN) for TKA and RTKA procedure was performed. The PearlDiver database is a publicly available, Health Insurance Portability and Accountability Act compliant national database compiled from a collection of U.S.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Medicare records. This database contains current procedural terminology (CPT) and International Classification of Diseases, Ninth Revision (ICD-9) codes from January 1, 2005, to December 31, 2014.

Patient Selection

Patients who underwent primary TKA were identified by CPT 27447 and ICD-9 81.54. RTKA patients were identified with CPT-27486, CPT-27487, ICD-9 00.80–00.84, and ICD-9 81.55. Causes for revision were identified with ICD-9 codes 996.41, 996.43, 996.44, 996.45, 996.66–67, 998.59, 996.77, 718.46, 718.86, and 716.16 (Appendix A). Drug abuse and dependency was subdivided, based on respective ICD-9 codes (i.e., independent codes for abuse and dependence) into cocaine (ICD-9-D-304.20–22, ICD-9-D-305.60–62), cannabis (ICD-9- D-304.30–32, ICD-9-D-305.20–22), opioids (ICD-9-D-304.00–02, ICD-9-D-305.50–52), SHA (ICD-9-D-304.10–12, ICD-9-D-305.40–42), hallucinogens (ICD-9–304.50–52, ICD- 9-D-305.30–32), amphetamines (ICD-9-D-304.40–42, ICD- 9-D-305.70–72), and alcohol (ICD-9-D-303.90–92, ICD-9-D-305.00–02). For the purpose of this study, patients with defined dependency or abuse, as per ICD-9 code, were analyzed as the same cohort. Our query returned 2,729,006 primary TKAs performed between 2005 and 2014.

Data Analysis

Study end points were annual volume and incidence changes for the above-defined patients undergoing RTKA. These end points were assessed through linear regressions models. Mean values were compared through a one-way analysis of variance (ANOVA) with post hoc evaluations using Bonferroni correction. Chi-square testing was also performed to evaluate distribution of time to revision among groups. Significance was set at an a of 0.05. All tests were performed with SPSS (Version 20, IBM Corporation, Armonk, NY).

Results

Over the 10-year study period, there was a significant increase in the number of primary TKAs performed ($p < 0.001$), as well as, TKA in cocaine ($p = 0.011$), cannabis ($p < 0.001$), opioid ($p < 0.001$), SHA ($p < 0.001$), amphetamine ($p < 0.001$), and alcohol ($p < 0.001$; fig. 1) users. There was a significant increase in the number of RTKA performed from 2005 to 2014; however, no significant increases in number of RTKA by drug abuse/dependence were observed (Table 1). Nevertheless, 9% ($n = 248,098$) of patients in the general population underwent RTKA compared with an average of 12.9% of drug and alcohol abusers/dependent patients required RTKA, which was found to be significant ($p < 0.001$). Post hoc Bonferroni testing demonstrated that cocaine use was associated with a significantly higher revision rate (15.1%), followed by amphetamines (13.7%) and opioids (12.9%, $p < 0.001$; Table 1).

The mean time to RTKA in the general population was 821 days (standard deviation [SD]: 741 days). Amphetamine users had the fastest mean time to revision (691 days, SD: 679 days); however, there was no significant difference in time to revision across different drug abuse cohorts (ANOVA, $p = 0.0978$; Table 2). At 30-, 90-day, and 6-month post-operative, cocaine had the highest proportion of patients requiring RTKA (7, 12, and 20%,

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

respectively), and at 1-year alcohol abusers (38%, $p < 0.001$; Table 3). Infection was the most common cause of revision in all drug abuse/dependent cohorts (Table 4).

Patient demographics for primary TKA by drug abuse/ dependence type are demonstrated in Table 5. Age distributions varied significantly by group for primary TKA ($p < 0.001$) chi-squared. The mean Charlson comorbidity index (CCI) for primary TKA in the general population was 4.75 (SD: 1.9). CCI comparison among drug abuse/dependency cohorts, excluding primary TKA in the general population demonstrated significant differences ($p < 0.001$). Tukey honest significant difference post hoc testing demonstrated that significant difference in CCI for primary TKA were seen between cannabis and opioid (4.33 vs. 4.78, $p = 0.0065$), cannabis and alcohol (4.33 vs. 4.90, $p = 0.0001$), and amphetamines and alcohol (4.37 vs. 4.90, $p = 0.0147$). Comorbidity status was similar in all RTKA patients as determined by comparison of the mean CCI scores ($p = 0.091$; Table 6).

Discussion

Although there are a few prior studies investigating the effects of substance abuse on joint arthroplasty, these studies do not address specific illicit drugs.[1,2,4] Thus, the purpose of this study was to determine the effects of individual illicit drug abuse on RTKA incidence, causes, and time to revision, as well as correlate drug user patient demographics with RTKA using a Medicare patient population database. The results of this study show that illicit drug use, in general, increases the risk for revision and on average, and all illicit drug abuse lead to earlier revision.

This study is not without limitations. The PearlDiver database is reliant upon accurate CPT or ICD codes, which creates the potential for a reporting bias. Additionally, we do not have information on the implant used, prosthesis fixation method, patient bone quality, and data regarding which component failed. Furthermore, patient demographics as well as time and amount of drug use could not be determined. Also, we were not able to differentiate illicit opioid abuse versus prescription opioid abuse. Therefore, the opioid abuse patients analyzed in this article encompass all patients with cause for RTKA identified to be opioids based on ICD-9 codes 304.00–02 and 305.50–52 as a single cohort. Nevertheless, this study analyzes more than 2 million TKA cases from a large national patient population database. Additionally, this study investigated the specific drugs abused and the causes of RTKA in subgroups that have not been previously adequately studied in the literature.

Similar to our study, other studies have found analogous results. Dufour et al[13] performed a retrospective study analyzing the prevalence of diagnosed opioid abuse in commercial versus Medicare patient populations. The group found an increased 6-month prevalence of diagnosed opioid abuse in the Medicare patient population from 3.17 to 6.35 per 1,000 patients, during January 1, 2008, to June 30, 2010, while for commercial patients, the increase was only from 0.84 to 1.15 during the same time period. Bozic et al[14] performed a study analyzing the Medicare patient population and risk factors for early RTKA. The group found that drug abusers had a higher risk for early revision when compared with nondrug abusers (hazard ratio [HR], 2.08; 95% confidence interval, 1.17–3.72 compared with an overall HR, 1.14).

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Another study performed by Zywiel et al[11] comparing 49 patients with a mean age of 56 years (range, 37–78) who underwent TKA after 6 or more weeks of chronic opioid use for pain control and to a matched cohort of nonopioid users. The group found Knee Society scores (KSSs) to be significantly lower in opioid abusers at final follow-up (mean, 3 years; range, 2–7 years). Opioid abusers had a mean KSS of 79 points (range, 45–100 points), while nonopioid patients had a mean of 92 points (range, 59–100 points). Additionally, opioid abusers underwent a significantly higher number of surgical procedures to help resolve unexplained knee stiffness or pain than nonopioid users (11 vs. 0, $p < 0.001$). The study also found that chronic opioid use prior to TKA contributed to a 16% revision rate, consistent with the results of our study.

Based on the results of ours and the above studies, there is clearly a strong correlation between drug abuse and adverse primary TKA outcomes, potentially resulting in RTKA. Based on these results, therefore, a more targeted approach should be made when managing pain in orthopaedic patients. Specifically, patients and physicians need to keep in mind that it has been well documented in the literature that patients have poorer pain outcomes and are more likely to be opioid/drug dependent postoperatively if treated with opioids preoperatively.[11,15] Additionally, as noted in this study, certain drugs, such as alcohol, opioids, and cannabis, can put patients at higher risk for TKA complications. Recent literature has suggested the use of nonopioid management techniques, such as intraoperative local infiltration analge- sia[16] or peripheral nerve blocks.[17] However, specifically for drug abuse patients, these newer potential treatment options should be coupled with risk stratification, as well as a more holistic and life-style altering approach to pain management.[18–20]

Conclusion

The prevalence of drug abuse patients, particularly Medicare patients, is of substantial concern, and will remain a concern until marked changes are made to the way these patients managed. Therefore, studies such as this are critical in identifying specific incidences and prevalences, specific illicit drugs abused, and patient demographics, to target and improve patient care. Although alcohol and opioids are the most abused substances, cocaine abuse holds the highest risk for revision. However, those who abuse cannabis are more likely to need an RTKA sooner than those who use other substances, particularly in the 30- and 90-day postoperative day intervals. Infection remains one of the most common causes of revision post- TKA regardless of the substance abused. The results of this study help highlight the strong correlation between drug abuse and RTKA. Based on these results, therefore, drug abuse patients should therefore be appropriately risk stratified and receive comprehensive postoperative pain management.

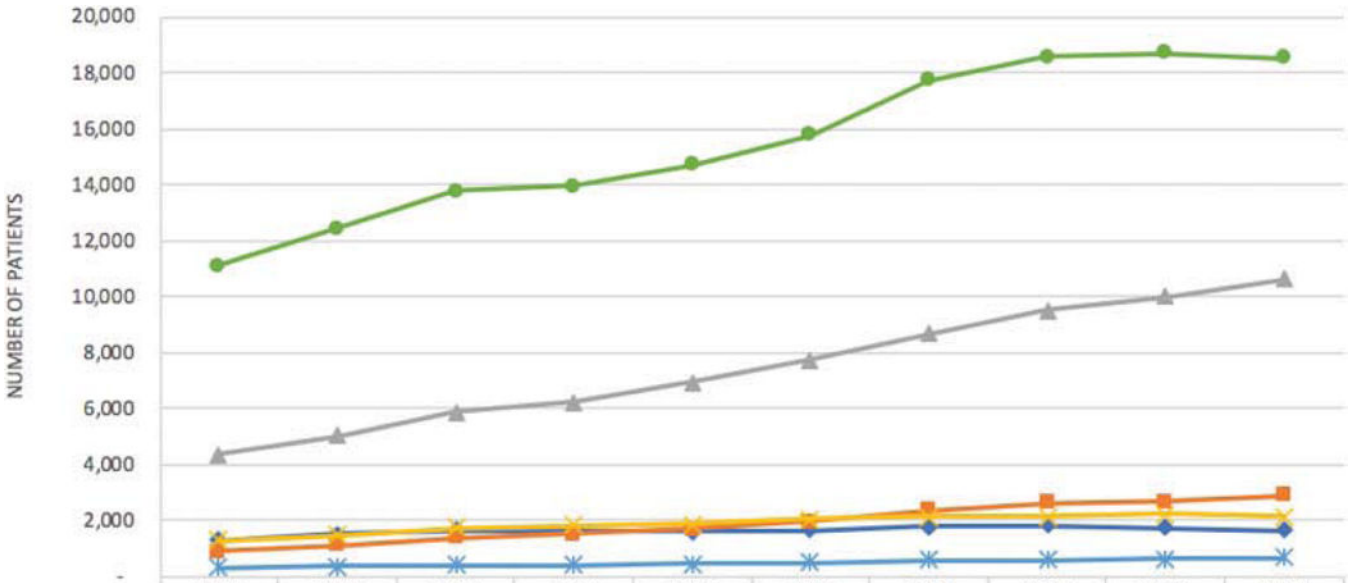
References

1. Gordon RJ, Lowy FD. Bacterial infections in drug users. N Engl J Med 2005;353(18):1945–1954 [PubMed: 16267325]
2. Wieser K, Zingg PO, Betz M, Neubauer G, Dora C. Total hip replacement in patients with history of illicit injecting drug use. Arch Orthop Trauma Surg 2012;132(07):1037–1044 [PubMed: 22476213]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

3. Lehman CR, Ries MD, Paiement GD, Davidson AB. Infection after total joint arthroplasty in patients with human immunodeficiency virus or intravenous drug use. J Arthroplasty 2001;16(03): 330–335 [PubMed: 11307131]
4. Best MJ, Buller LT, Klika AK, Barsoum WK. Outcomes following primary total hip or knee arthroplasty in substance misusers. J Arthroplasty 2015;30(07):1137–1141 [PubMed: 25765129]
5. Schulden JD, Thomas YF, Compton WM. Substance abuse in the United States: findings from recent epidemiologic studies. Curr Psychiatry Rep2009;11(05):353–359 [PubMed: 19785975]
6. Compton WM, Thomas YF, Stinson FS, Grant BF. Prevalence, correlates, disability, and comorbidity of DSM-IV drug abuse and dependence in the United States: results from the national epidemiologic survey on alcohol and related conditions. Arch Gen Psychiatry 2007;64(05):566–576 [PubMed: 17485608]
7. Skolnick P The opioid epidemic: crisis and solutions. Annu Rev Pharmacol Toxicol 2018;58:143–159 [PubMed: 28968188]
8. Hargan ED. Determiniation That a Public Health Emergency Exists. Available at: https://www.hhs.gov/sites/default/files/opioidPHE-Declaration-no-sig.pdf. Accessed August 26, 2018
9. Goesling J, Moser SE, Zaidi B, et al. Trends and predictors of opioid use after total knee and total hip arthroplasty. Pain 2016;157(06): 1259–1265 [PubMed: 26871536]
10. Kaafarani HM, Weil E, Wakeman S, Ring D. The opioid epidemic and new legislation in Massachusetts: time for a culture change in surgery? Ann Surg 2017;265(04):731–733 [PubMed: 27849666]
11. Zywiel MG, Stroh DA, Lee SY, Bonutti PM, Mont MA. Chronic opioid use prior to total knee arthroplasty. J Bone Joint Surg Am 2011;93(21):1988–1993 [PubMed: 22048093]
12. Pivec R, Issa K, Naziri Q, Kapadia BH, Bonutti PM, Mont MA. Opioid use prior to total hip arthroplasty leads to worse clinical out-comes. Int Orthop 2014;38(06):1159–1165 [PubMed: 24573819]
13. Dufour R, Joshi AV, Pasquale MK, et al. The prevalence of diagnosed opioid abuse in commercial and Medicare managed care populations. Pain Pract 2014;14(03):E106–E115 [PubMed: 24289539]
14. Bozic KJ, Lau E, Ong K, et al. Risk factors for early revision after primary TKA in Medicare patients. Clin Orthop Relat Res 2014; 472(01):232–237 [PubMed: 23661301]
15. Bedard NA, DeMik DE, Dowdle SB, Callaghan JJ. Trends and risk factors for prolonged opioid use after unicompartmental knee arthroplasty. Bone Joint J 2018;100-B(1, suppl A):62–67 [PubMed: 29292342]
16. Mont MA, Beaver WB, Dysart SH, Barrington JW, Del Gaizo DJ. Local infiltration analgesia with liposomal bupivacaine improves pain scores and reduces opioid use after total knee arthroplasty: results of a randomized controlled trial. J Arthroplasty 2018;33 (01):90–96 [PubMed: 28802777]
17. Elmallah RK, Cherian JJ, Pierce TP, Jauregui JJ, Harwin SF, Mont MA. New and common perioperative pain management techniques in total knee arthroplasty. J Knee Surg 2016;29(02): 169–178 [PubMed: 25892004]
18. Oliver J, Coggins C, Compton P, et al.; American Society for Pain Management Nursing. American Society for Pain Management Nursing position statement: pain management in patients with substance use disorders. J Addict Nurs 2012; 23(03):210–222 [PubMed: 24335741]
19. Ballantyne JC. Opioids for the treatment of chronic pain: mistakes made, lessons learned, and future directions. Anesth Analg 2017; 125(05):1769–1778 [PubMed: 29049121]
20. Prater CD, Zylstra RG, Miller KE. Successful pain management for the recovering addicted patient. Prim Care Companion J Clin Psychiatry 2002;4(04):125–131 [PubMed: 15014719]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Cocaine	1,280	1,522	1,664	1,618	1,598	1,636	1,774	1,813	1,749	1,657
Cannabis	912	1,136	1,373	1,494	1,683	1,961	2,343	2,604	2,660	2,886
Opioid	4,375	5,003	5,887	6,219	6,911	7,734	8,648	9,519	10,015	10,610
SHA	1,291	1,460	1,720	1,806	1,866	2,030	2,118	2,154	2,247	2,138
Amphet	337	383	395	400	467	494	563	592	633	689
Alcohol	11,126	12,446	13,777	13,928	14,716	15,754	17,725	18,553	18,704	18,511

Fig. 1.
Primary total knee arthroplasty by drug dependence/abuse.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

J Knee Surg. Author manuscript; available in PMC 2019 November 01.

Table 1

Revision TKA by drug abuse or dependency

Year	Revision TKA		Cocaine		Cannabis		Opioid		SHA		Amphetamines		Alcohol	
2005	22,165	8.4%	209	16.3%	123	13.5%	631	14.4%	163	12.6%	37	11.0%	911	8.2%
2006	22,096	8.4%	229	15.0%	166	14.6%	795	15.9%	193	13.2%	55	14.4%	1,115	9.0%
2007	22,961	8.6%	282	16.9%	242	17.6%	954	16.2%	239	13.9%	65	16.5%	1,299	9.4%
2008	23,334	8.7%	263	16.3%	256	17.1%	1,074	17.3%	287	15.9%	62	15.5%	1,331	9.6%
2009	23,777	8.9%	279	17.5%	284	16.9%	1,157	16.7%	269	14.4%	82	17.6%	1,409	9.6%
2010	24,855	8.9%	280	17.1%	322	16.4%	1,247	16.1%	292	14.4%	87	17.6%	1,421	9.0%
2011	26,632	9.9%	283	16.0%	323	13.8%	1,191	13.8%	280	13.2%	84	14.9%	1,387	7.8%
2012	27,187	9.8%	256	14.1%	282	10.8%	1,043	11.0%	245	11.4%	74	12.5%	1,338	7.2%
2013	27,693	9.6%	208	11.9%	250	9.4%	907	9.1%	220	9.8%	68	10.7%	1,100	5.9%
2014	27,398	9.7%	170	10.3%	188	6.5%	682	6.4%	167	7.8%	63	9.1%	827	4.5%
Total	248,098	9.1%	2,459	15.1%	2,436	12.8%	9,681	12.9%	2,355	12.5%	677	13.7%	12,138	7.8%
p-Value	<0.001	<0.001	0.464	0.022	0.195	0.210	0.612	0.007	0.789	0.034	0.110	0.267	0.909	0.010

Abbreviations: SHA, sedatives/hypnotics/anxiolytics; TKA, total knee arthroplasty.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Table 2

Mean time to revision (in days)

Time (in days)	Revision TKA	Cocaine	Cannabis	Opioid	SHA	Amphetamines	Alcohol
Mean	821	730	739	804	769	691	756
Standard deviation	740.9	674.5	685.5	717.2	681.2	679.3	712.0

Abbreviations: SHA, sedatives/hypnotics/anxiolytics; TKA, total knee arthroplasty.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Table 3

Time to revision (%)

Time	Revision TKA	Cocaine	Cannabis	Opioid	SHA	Amphetamines	Alcohol
30 d	4–5%	7%	6%	3–4%	4%	5–6%	6–7%
90 d	8%	12%	11%	8%	9%	12%	12%
6 mo	16%	20%	20%	17%	19%	25%	20%
1 y	33%	36%	37%	32%	34%	42%	38%
Chi-square	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Abbreviations: SHA, sedatives/hypnotics/anxiolytics; TKA, total knee arthroplasty.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Table 4

Causes for revision total knee arthroplasty by drug abuse or dependency

Cause	Rev		Cocaine		Cannabis		Opioid		SHA		Amphetamines		Alcohol	
Mechanical loosening	23,563	9.5%	214	8.7%	259	10.6%	1,065	11.0%	247	10.5%	66	9.7%	1,139	9.4%
Failure/break	7,093	2.9%	60	2.4%	69	2.8%	360	3.7%	82	3.5%	19	2.8%	351	2.9%
Periprosthetic fracture	3,457	1.4%	29	1.2%	32	1.3%	199	2.1%	51	2.2%	11	1.6%	200	1.6%
Osteolysis	1,860	0.7%	15	0.6%	18	0.7%	87	0.9%	18	0.8%	<11	N/A	78	0.6%
Infection	39,385	15.9%	441	17.9%	547	22.5%	2,107	21.8%	462	19.6%	161	23.8%	2,535	20.9%
Pain-joint replacement	29,667	12.0%	328	13.3%	363	14.9%	1,502	15.5%	363	15.4%	102	15.1%	1,509	12.4%
Arthrofibrosis	7,204	2.9%	87	3.5%	81	3.3%	344	3.6%	70	3.0%	19	2.8%	335	2.8%
Instability	3,999	1.6%	49	2.0%	70	2.9%	269	2.8%	72	3.1%	17	2.5%	263	2.2%
Trauma	1,224	0.5%	42	1.7%	53	2.2%	144	1.5%	43	1.8%	18	2.7%	141	1.2%

Abbreviation: SHA, sedatives/hypnotics/anxiolytics.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Table 5

Primary TKA demographics by substance abuse or dependency

Demographic variable	Rev	Cocaine	Cannabis	Opioid	SHA	Amphetamines	Alcohol
Age							
Unknown	33,809	245	175	803	198	56	1,952
< 65	240,896	5,502	6,983	18,604	5,081	1,799	19,988
65–69	691,166	572	1,327	8,090	2,118	338	21,562
70–74	627,124	242	652	6,838	1,802	208	22,389
75–79	513,325	74	231	4,433	1,162	115	17,042
80–84	303,594	18	99	2,357	593	50	9,402
> 85	117,677	(1)	43	981	219	23	3,596
Gender							
Female	1,513,683	3,114	4,349	22,282	6,387	1,390	25,616
Male	846,550	2,864	4,070	9,703	2,303	839	41,263
Unknown	33,809	245	175	803	198	56	1,953
Comorbidity burden							
CCI (SD)	4.75 (1.9)	4.57 (2.61)	4.33 (2.37)	4.78 (2.46)	4.68 (2.34)	4.37 (2.39)	4.90 (2.27)

Abbreviations: CCI, Charlson comorbidity index; SD, standard deviation; SHA, sedatives/hypnotics/anxiolytics; TKA, total knee arthroplasty.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Table 6

Revision TKA demographics by substance abuse or dependency

Demographic variable	Rev	Cocaine	Cannabis	Opioid	SHA	Amphetamines	Alcohol
Age							
Unknown	2,549	35	22	134	28	<11	191
< 65	38,730	741	844	2,605	667	224	2,248
65–69	52,202	49	82	779	182	34	1,315
70–74	49,589	<11	27	548	121	<11	1,162
75–79	42,732	<11	13	277	56	<11	762
80–84	27,865	<11	<11	113	20	0	336
> 85	14,151	<11	<11	29	<11	0	85
Gender							
Female	131,756	396	481	2,395	649	144	1,708
Male	83,991	373	435	1,205	243	110	2,801
Unknown	2,549	35	22	134	28	<11	191
Comorbidity burden							
CCI (SD)	5.24 (2.36)	4.44 (2.65)	4.23 (2.38)	4.35 (2.31)	4.42 (2.42)	4.29 (2.43)	4.58 (2.33)

Abbreviations: CCI, Charlson comorbidity index; SD, standard deviation; SHA, sedatives/hypnotics/anxiolytics; TKA, total knee arthroplasty.