AAOS
American Academy of Orthopaedic Surgeons

AJRR American Joint Replacement Registry

ANNUAL REPORT 2018

California State Registry Digital Supplement

Contents

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California State Registry

Established in 2009, the California Joint Replacement Registry (CJRR) collected and analyzed data from hip and knee replacement surgeries performed across California, as well as initiated public reporting of TJA patient-reported outcomes data. In 2015, CJRR was transferred to AJRR with the intent to streamline business operations under one unit. In 2016, CJRR data was fully integrated into the AJRR. Finally, in 2017 the California State Registry Committee was formed to address issues specific to the state.

For more information about the California State Registry initiative, please visit:
http://www.ajrr.net/state-registries

Figure 1: California State Registry Cumulative Case Volume by Year (N=49,266)

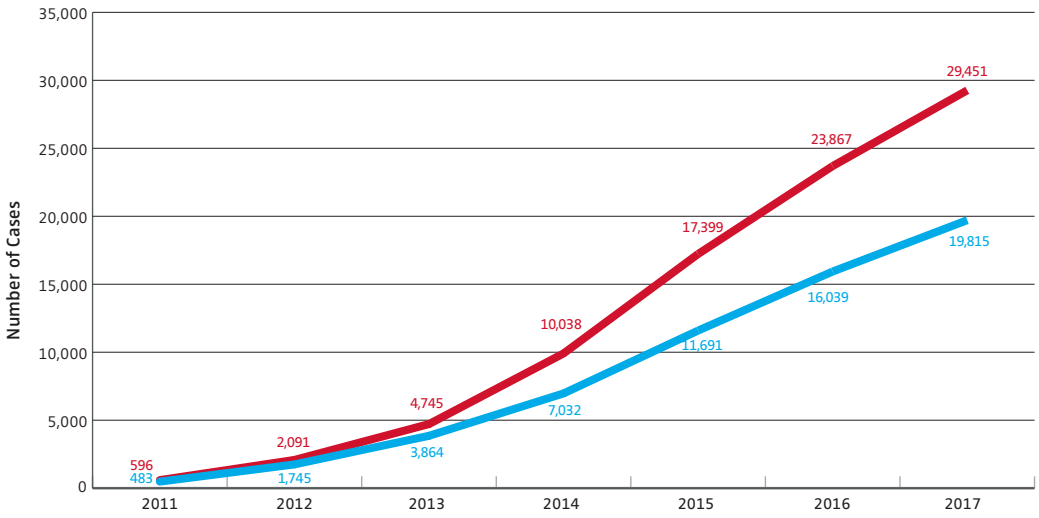
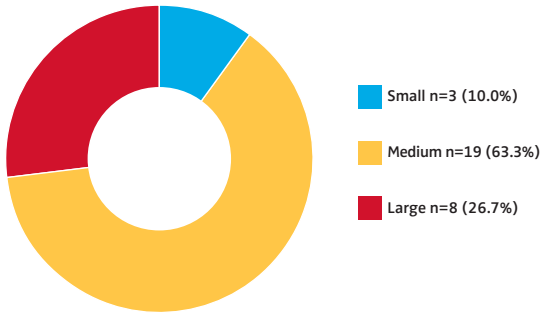


Figure 2: California State Registry Participants by Size (N=30)



Source: AHA Annual Survey Database Fiscal Year 2015

Small = 1-99 beds; Medium = 100-399 beds; Large = 400+ beds

Table 1: California State Registry Participants and Cases Reported through December 31, 2017*

Facility	Date Joined CJRR	Cases Reported
Alta Bates Summit Medical Center - Alta Bates Campus	9/17/2012	439
Alta Bates Summit Medical Center - Summit Campus	9/17/2012	723
California Pacific Medical Center	10/16/2014	619
Cedars-Sinai Medical Center	5/9/2011	1,142
Dameron Hospital	11/5/2013	719
Eisenhower Medical Center	10/28/2013	2,685
Glendale Adventist Medical Center	10/1/2015	1,872
Hoag Orthopedic Institute	4/7/2011	11,976
John Muir Medical Center, Concord	12/18/2012	1,784
John Muir Medical Center, Walnut Creek	12/18/2012	3,182
Lodi Memorial Hospital	3/10/2014	232
Long Beach Memorial	10/6/2014	2,224
Memorial Medical Center	5/9/2011	623
Mercy General Hospital	4/22/2016	44
Methodist Hospital of Sacramento	3/18/2014	574
Mills-Peninsula Medical Center	4/1/2014	1,515
Novato Community Hospital	12/3/2014	238
Orange Coast Memorial	9/23/2014	1,646
PIH Health Hospital - Whittier	3/4/2013	2,025
Saddleback Memorial	9/30/2014	2,157
Scripps Green Hospital	8/19/2013	754
St. Bernardine Medical Center	10/15/2013	14
St. Helena Napa Valley	11/24/2015	1,606
St. Joseph Hospital	11/12/2012	1,487
St. Jude Medical Center	8/12/2013	355
Stanford Health Care	9/12/2012	3,729
Sutter Medical Center, Sacramento	2/13/2013	111
Tahoe Forest Hospital	3/10/2015	414
Tri-City Medical Center	4/15/2014	548
UCSF Medical Center	3/1/2011	3,862

* With the integration of CJRR data into the AJRR database, a migration and validation process was implemented. As such, CJRR data that did not pass AJRR validation standards was excluded from import and analysis.

Collection of patient-reported outcome (PRO) data still proves to be a challenge. Upon comparison to the previous year's report, most institutions had no to small changes in the number of completed pre- and 1-year post-surgery surveys (Tables 2-7). In an effort to minimize burden on surgeons and staff to collect these, patients can complete their PRO surveys online using a secure web-based interface (on a phone, computer, or tablet).

In the past, the most commonly submitted surveys included:

1. The Western Ontario & McMaster Universities Osteoarthritis Index (WOMAC), which assess a patient's hip and knee pain and function
2. The Veterans Rand 12-Item Health Survey (VR-12) which assesses a patient's general quality of life
3. The UCLA Activity Score, which surveys a patient's physical activity

This year, the California hospitals reporting still submitted the VR-12 and the WOMAC. However, the WOMAC could also be reported as part of the Knee Injury and Osteoarthritis Outcome Score (KOOS) and Hip Disability and Osteoarthritis Outcome Score (HOOS). Only one UCLA Activity score was submitted during this collection period from all California hospitals reporting.

PRO Results (From 2012-2017)

Figure 3: WOMAC Hip Mean Scores Pre-Surgery and One Year Post-Surgery (N=1,175)

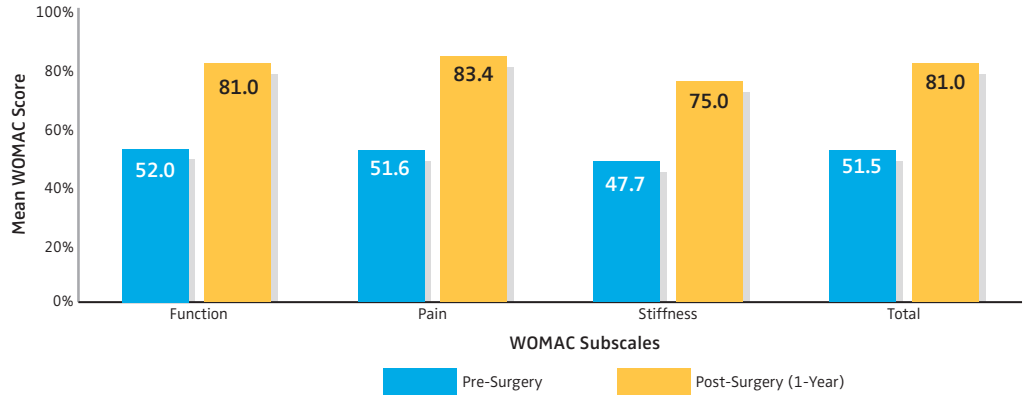


Figure 4: WOMAC Knee Mean Scores Pre-Surgery and One Year Post-Surgery (N=3,141)

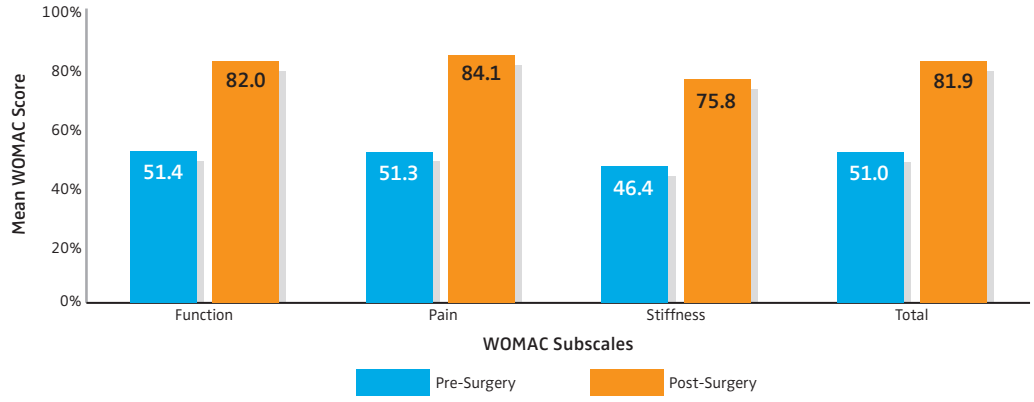


Table 2: Change in WOMAC Hip Function Scores for Pre-Surgery and One Year Post-Surgery by Hospital*

Hospital	WOMAC Subscale	Count of Patients That Had an Orthopaedic Surgery, N	Count of Patients with completed Pre-Op and 1-Year WOMAC, N	Response Rate - Percentage of Patients Who Completed a Pre-Op and 1-Year WOMAC, %	Percent of Patients That Reported Meaningful Improvement in Their WOMAC scores¥, %
Overall	**WOMAC Function**	**3,961**	**1,175**	**29.7%**	**82.1%**
Alta Bates Summit Medical Center (Alta Bates Campus)	WOMAC Function	225	54	24.0%	72.2%
Alta Bates Summit Medical Center (Summit Campus)	WOMAC Function	296	46	15.5%	78.3%
California Pacific Medical Center	WOMAC Function	434	70	16.1%	94.3%
John Muir Medical Center	WOMAC Function	795	280	35.2%	79.6%
Lodi Memorial Hospital	WOMAC Function	112	43	38.4%	86.1%
Long Beach Memorial	WOMAC Function	152	51	33.6%	86.3%
Memorial Medical Center	WOMAC Function	253	84	33.2%	85.7%
Methodist Hospital of Sacramento	WOMAC Function	362	111	30.7%	86.5%
Mills-Peninsula Medical Center	WOMAC Function	499	195	39.1%	75.4%
Orange Coast Memorial	WOMAC Function	194	34	17.5%	85.3%
Saddleback Memorial	WOMAC Function	362	83	22.9%	78.3%
Scripps Green Hospital	WOMAC Function	277	124	44.8%	89.5%

* For hospitals with >30 eligible patients who completed both pre-surgical and 1-year post-surgical PROMs.

¥Meaningful improvement was calculated by minimal clinically-important difference (MCID) and adjusted for age, gender and race. MCID was determined to be a positive change score of half the posted standard deviation.

Table 3: Change in WOMAC Hip Pain Scores Pre-Surgery and One Year Post-Surgery, by Hospital*

Hospital	WOMAC Subscale	Count of Patients That Had an Orthopaedic Surgery, N	Count of Patients with completed Pre-Op and 1-Year WOMAC, N	Response Rate - Percentage of Patients Who Completed a Pre-Op and 1-Year WOMAC, %	Percent of Patients That Reported Meaningful Improvement in Their WOMAC scores¥, %
Overall	**WOMAC Pain**	**3,961**	**1,175**	**29.7%**	**86.0%**
Alta Bates Summit Medical Center (Alta Bates Campus)	WOMAC Pain	225	54	24.0%	87.0%
Alta Bates Summit Medical Center (Summit Campus)	WOMAC Pain	296	46	15.5%	84.8%
California Pacific Medical Center	WOMAC Pain	434	70	16.1%	92.9%
John Muir Medical Center	WOMAC Pain	795	280	35.2%	86.1%
Lodi Memorial Hospital	WOMAC Pain	112	43	38.4%	76.7%
Long Beach Memorial	WOMAC Pain	152	51	33.6%	92.2%
Memorial Medical Center	WOMAC Pain	253	84	33.2%	85.7%
Methodist Hospital of Sacramento	WOMAC Pain	362	111	30.7%	91.0%
Mills-Peninsula Medical Center	WOMAC Pain	499	195	39.1%	76.4%
Orange Coast Memorial	WOMAC Pain	194	34	17.5%	85.3%
Saddleback Memorial	WOMAC Pain	362	83	22.9%	89.2%
Scripps Green Hospital	WOMAC Pain	277	124	44.8%	91.1%

* For hospitals with >30 eligible patients who completed both pre-surgical and 1-year post-surgical PROMs.

¥Meaningful improvement was calculated by minimal clinically-important difference (MCID) and adjusted for age, gender and race. MCID was determined to be a positive change score of half the posted standard deviation.

Table 4: Change in WOMAC Hip Stiffness Scores Pre-Surgery and One Year Post-Surgery, by Hospital*

Hospital	WOMAC Subscale	Count of Patients That Had an Orthopaedic Surgery, N	Count of Patients with completed Pre-Op and 1-Year WOMAC, N	Response Rate - Percentage of Patients Who Completed a Pre-Op and 1-Year WOMAC, %	Percent of Patients That Reported Meaningful Improvement in Their WOMAC scores¥, %
Overall	**WOMAC Stiffness**	**3,961**	**1,175**	**29.7%**	**79.2%**
Alta Bates Summit Medical Center (Alta Bates Campus)	WOMAC Stiffness	225	54	24.0%	66.7%
Alta Bates Summit Medical Center (Summit Campus)	WOMAC Stiffness	296	46	15.5%	67.4%
California Pacific Medical Center	WOMAC Stiffness	434	70	16.1%	88.6%
John Muir Medical Center	WOMAC Stiffness	795	280	35.2%	76.1%
Lodi Memorial Hospital	WOMAC Stiffness	112	43	38.4%	69.8%
Long Beach Memorial	WOMAC Stiffness	152	51	33.6%	84.3%
Memorial Medical Center	WOMAC Stiffness	253	84	33.2%	84.5%
Methodist Hospital of Sacramento	WOMAC Stiffness	362	111	30.7%	84.7%
Mills-Peninsula Medical Center	WOMAC Stiffness	499	195	39.1%	74.9%
Orange Coast Memorial	WOMAC Stiffness	194	34	17.5%	73.5%
Saddleback Memorial	WOMAC Stiffness	362	83	22.9%	83.1%
Scripps Green Hospital	WOMAC Stiffness	277	124	44.8%	89.5%

* For hospitals with >30 eligible patients who completed both pre-surgical and 1-year post-surgical PROMs.

¥Meaningful improvement was calculated by minimal clinically-important difference (MCID) and adjusted for age, gender and race. MCID was determined to be a positive change score of half the posted standard deviation.

Table 5: Change in WOMAC Knee Function Scores Pre-surgery and One Year Post Surgery, by Hospital*

Hospital	WOMAC Subscale	Count of Patients That Had an Orthopaedic Surgery, N	Count of Patients with completed Pre-Op and 1-Year WOMAC, N	Response Rate - Percentage of Patients Who Completed a Pre-Op and 1-Year WOMAC, %	Percent of Patients That Reported Meaningful Improvement in Their WOMAC scores¥, %
Overall	**WOMAC Function**	**8,581**	**3,141**	**36.6%**	**83.1%**
Alta Bates Summit Medical Center (Alta Bates Campus)	WOMAC Function	225	54	24.0%	72.2%
Alta Bates Summit Medical Center (Summit Campus)	WOMAC Function	296	46	15.5%	78.3%
California Pacific Medical Center	WOMAC Function	434	70	16.1%	94.3%
Cedars-Sinai Medical Center	WOMAC Function	166	91	54.8%	78.0%
Eisenhower Medical Center	WOMAC Function	1,108	462	41.7%	86.4%
Hoag Orthopedic Institute	WOMAC Function	1,029	410	39.8%	83.2%
John Muir Medical Center	WOMAC Function	797	279	35.0%	79.6%
Lodi Memorial Hospital	WOMAC Function	112	43	38.4%	86.1%
Long Beach Memorial	WOMAC Function	152	51	33.6%	86.3%
Memorial Medical Center	WOMAC Function	255	179	70.2%	89.9%
Methodist Hospital of Sacramento	WOMAC Function	362	111	30.7%	86.5%
Mills-Peninsula Medical Center	WOMAC Function	499	195	39.1%	75.4%
Orange Coast Memorial	WOMAC Function	194	34	17.5%	85.3%
PIH Health Hospital - Whittier	WOMAC Function	400	78	19.5%	80.8%
Saddleback Memorial	WOMAC Function	363	83	22.9%	78.3%
Scripps Green Hospital	WOMAC Function	277	124	44.8%	91.1%
St. Joseph Hospital	WOMAC Function	184	93	50.5%	88.2%
Stanford Health Care	WOMAC Function	707	269	38.1%	83.3%
Tri-City Medical Center	WOMAC Function	269	128	47.6%	79.7%
UCSF Medical Center	WOMAC Function	752	341	45.4%	80.4%

* For hospitals with >30 eligible patients who completed both pre-surgical and 1-year post-surgical PROMs.

¥Meaningful improvement was calculated by minimal clinically-important difference (MCID) and adjusted for age, gender and race. MCID was determined to be a positive change score of half the posted standard deviation.

Table 6: Change in WOMAC Knee Pain Scores Pre-surgery and One Year Post Surgery, by Hospital*

Hospital	WOMAC Subscale	Count of Patients That Had an Orthopaedic Surgery, N	Count of Patients with completed Pre-Op and 1-Year WOMAC, N	Response Rate - Percentage of Patients Who Completed a Pre-Op and 1-Year WOMAC, %	Percent of Patients That Reported Meaningful Improvement in Their WOMAC scores¥, %
Overall	**WOMAC Pain**	**8,581**	**3,141**	**36.6%**	**86.4%**
Alta Bates Summit Medical Center (Alta Bates Campus)	WOMAC Pain	225	54	24.0%	87.0%
Alta Bates Summit Medical Center (Summit Campus)	WOMAC Pain	296	46	15.5%	84.8%
California Pacific Medical Center	WOMAC Pain	434	70	16.1%	92.9%
Cedars-Sinai Medical Center	WOMAC Pain	166	91	54.8%	78.0%
Eisenhower Medical Center	WOMAC Pain	1,108	462	41.7%	89.8%
Hoag Orthopedic Institute	WOMAC Pain	1,029	410	39.8%	86.3%
John Muir Medical Center	WOMAC Pain	797	279	35.0%	86.4%
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Tri-City Medical Center	WOMAC Pain	269	128	47.6%	86.7%
UCSF Medical Center	WOMAC Pain	752	341	45.4%	85.3%

* For hospitals with >30 eligible patients who completed both pre-surgical and 1-year post-surgical PROMs.

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Table 7: Change in WOMAC Knee Stiffness Scores Pre-surgery and One Year Post Surgery, by Hospital*

Hospital	WOMAC Subscale	Count of Patients That Had an Orthopaedic Surgery, N	Count of Patients with completed Pre-Op and 1-Year WOMAC, N	Response Rate - Percentage of Patients Who Completed a Pre-Op and 1-Year WOMAC, %	Percent of Patients That Reported Meaningful Improvement in Their WOMAC scores¥, %
Overall	**WOMAC Stiffness**	**8,581**	**3,141**	**36.6%**	**80.4%**
Alta Bates Summit Medical Center (Alta Bates Campus)	WOMAC Stiffness	225	54	24.0%	66.7%
Alta Bates Summit Medical Center (Summit Campus)	WOMAC Stiffness	296	46	15.5%	69.6%
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Cedars-Sinai Medical Center	WOMAC Stiffness	166	91	54.8%	78.0%
Eisenhower Medical Center	WOMAC Stiffness	1,108	462	41.7%	85.3%
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* For hospitals with >30 eligible patients who completed both pre-surgical and 1-year post-surgical PROMs.

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Figure 5: VR-12 Hip and Knee Scores for Physical Component, Pre-Surgery and One Year Post-Surgery (N=5,019)

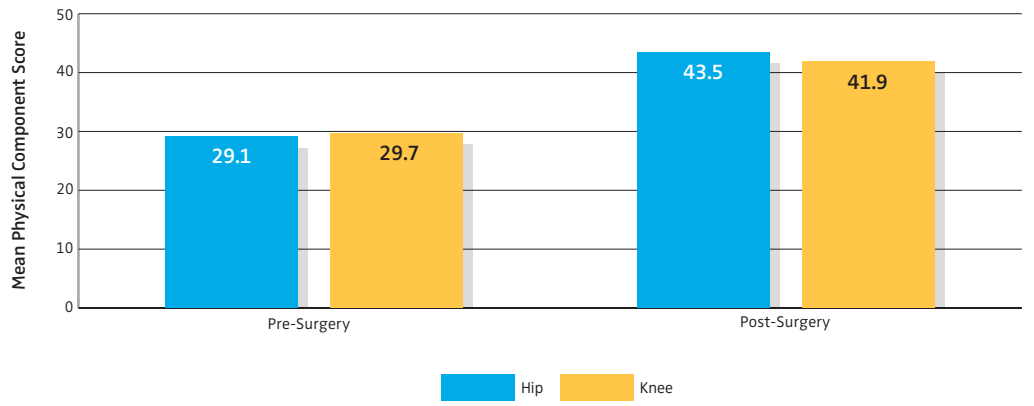

Figure 6: VR-12 Hip and Knee Scores for Mental Component, Pre-Surgery and One Year Post-Surgery (N=5,019)

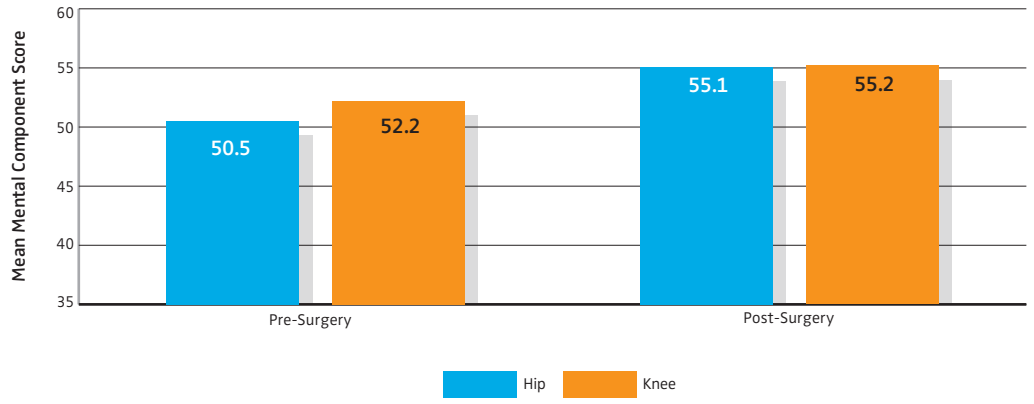

Table 8: Change in VR-12 Physical Score*

Hospital	VR-12 Component	Count of Patients That Had an Orthopaedic Surgery, N	Count of Patients with completed Pre-Op and 1-Year VR-12, N	Response Rate - Percentage of Patients Who Completed a Pre-Op and 1-Year VR-12, %	Percent of Patients That Reported Meaningful Improvement in Their VR-12 scores¥, %
Overall	**Physical Health Component**	**13,618**	**5,019**	**36.9%**	**75.7%**
Alta Bates Summit Medical Center (Alta Bates Campus)	Physical Health Component	325	108	32.2%	68.5%
Alta Bates Summit Medical Center (Summit Campus)	Physical Health Component	551	117	21.2%	74.4%
California Pacific Medical Center	Physical Health Component	497	113	22.7%	80.5%
Cedars-Sinai Medical Center	Physical Health Component	280	157	56.1%	75.8%
Eisenhower Medical Center	Physical Health Component	2,157	967	44.8%	78.1%
John Muir Medical Center	Physical Health Component	1,283	498	38.8%	77.7%
Lodi Memorial Hospital	Physical Health Component	196	65	32.2%	78.5%
Long Beach Memorial	Physical Health Component	265	84	31.7%	82.1%
Memorial Medical Center	Physical Health Component	404	163	40.4%	82.2%
Methodist Hospital of Sacramento	Physical Health Component	446	114	25.6%	78.1%
Mills-Peninsula Medical Center	Physical Health Component	878	309	35.2%	67.0%
Novato Community Hospital	Physical Health Component	169	32	18.9%	78.1%
Orange Coast Memorial	Physical Health Component	353	73	20.7%	69.9%
PIH Health Hospital - Whittier	Physical Health Component	638	164	25.7%	79.3%
Saddleback Memorial	Physical Health Component	613	145	23.7%	79.3%
Scripps Green Hospital	Physical Health Component	424	190	44.8%	84.7%
St. Joseph Hospital	Physical Health Component	268	146	54.5%	79.5%
St. Jude Medical Center	Physical Health Component	263	103	39.2%	71.8%
Stanford Health Care	Physical Health Component	1,505	565	37.5%	73.5%
Tri-City Medical Center	Physical Health Component	423	215	50.8%	75.8%
UCSF Medical Center	Physical Health Component	1,680	691	41.1%	70.0%

* For hospitals with >30 eligible patients who completed both pre-surgical and 1-year post-surgical PROMs.

¥Meaningful improvement was calculated by minimal clinically-important difference (MCID) and adjusted for age, gender and race. MCID was determined to be a positive change score of half the posted standard deviation.

Table 9: Change in VR-12 Mental Component Score*

Hospital	VR-12 Component	Count of Patients That Had an Orthopaedic Surgery, N	Count of Patients with completed Pre-Op and 1-Year VR-12, N	Response Rate - Percentage of Patients Who Completed a Pre-Op and 1-Year VR-12, %	Percent of Patients That Reported Meaningful Improvement in Their VR-12 scores¥, %
Overall	**Mental Health Component**	**13,618**	**5,019**	**36.9%**	**38.8%**
Alta Bates Summit Medical Center (Alta Bates Campus)	Mental Health Component	325	108	32.2%	32.4%
Alta Bates Summit Medical Center (Summit Campus)	Mental Health Component	551	117	21.2%	34.2%
California Pacific Medical Center	Mental Health Component	497	113	22.7%	36.3%
Cedars-Sinai Medical Center	Mental Health Component	280	157	56.1%	38.2%
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Memorial Medical Center	Mental Health Component	404	163	40.4%	25.2%
Methodist Hospital of Sacramento	Mental Health Component	446	114	25.6%	36.8%
Mills-Peninsula Medical Center	Mental Health Component	878	309	35.2%	34.0%
Novato Community Hospital	Mental Health Component	169	32	18.9%	31.3%
Orange Coast Memorial	Mental Health Component	353	73	20.7%	39.7%
PIH Health Hospital - Whittier	Mental Health Component	638	164	25.7%	42.7%
Saddleback Memorial	Mental Health Component	613	145	23.7%	46.9%
Scripps Green Hospital	Mental Health Component	424	190	44.8%	40.5%
St. Joseph Hospital	Mental Health Component	268	146	54.5%	47.3%
St. Jude Medical Center	Mental Health Component	263	103	39.2%	39.8%
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Tri-City Medical Center	Mental Health Component	423	215	50.8%	37.2%
UCSF Medical Center	Mental Health Component	1,680	691	41.1%	36.8%

* For hospitals with >30 eligible patients who completed both pre-surgical and 1-year post-surgical PROMs.

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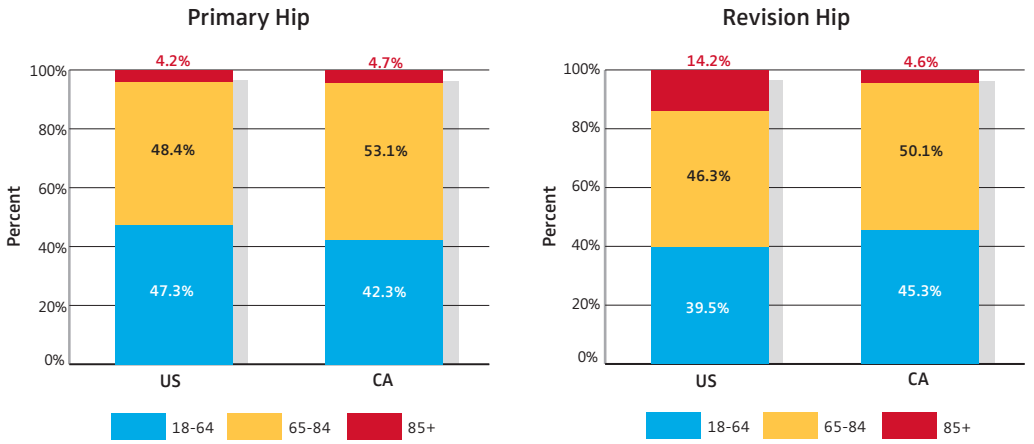
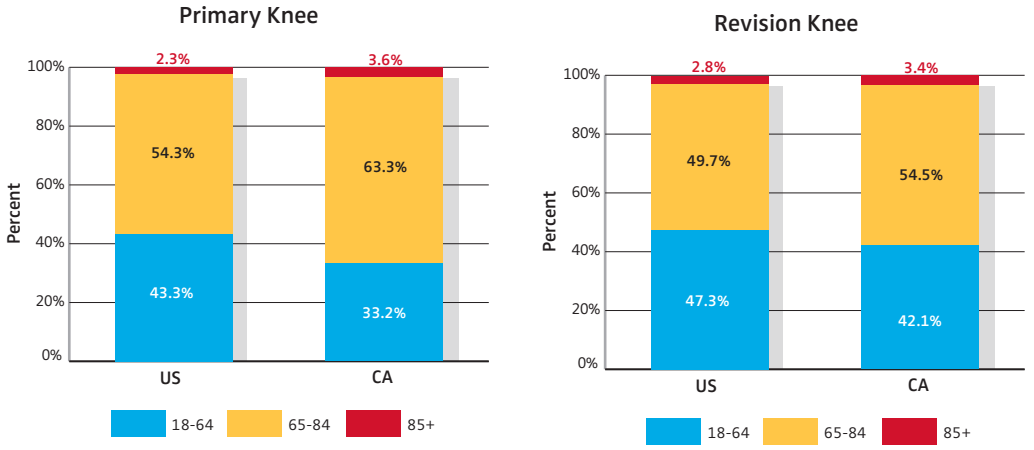
Procedural Data Metrics

Figure 7: Age Distribution of Primary and Revision Hip Procedures in US and California*



*Source: Healthcare Cost and Utilization Project [HCUP], 2014 (US). California State Registry data January 2011 to June 15, 2017.

Figure 8: Age Distribution of Primary and Revision Knee Procedures in US and California*



*Source: Healthcare Cost and Utilization Project [HCUP], 2014 (US). California State Registry data January 2011 to June 15, 2017.

Figure 9: Mean Body Mass Index (BMI) by Procedure and Sex (N=41,065)

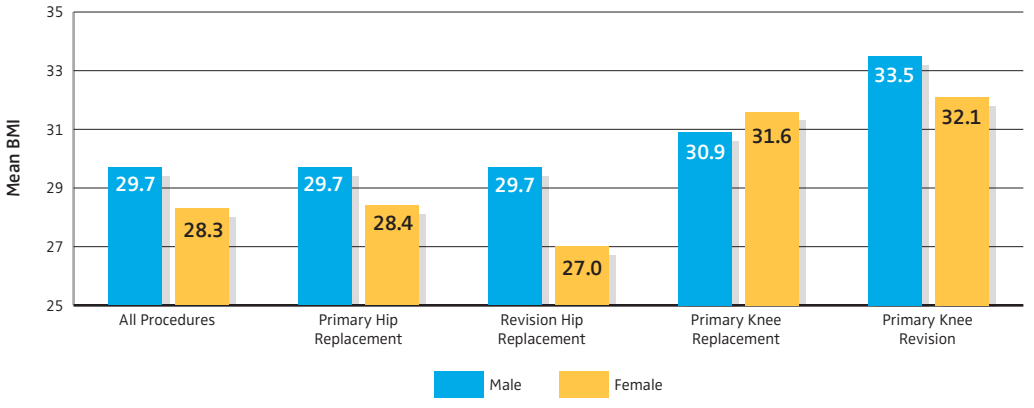
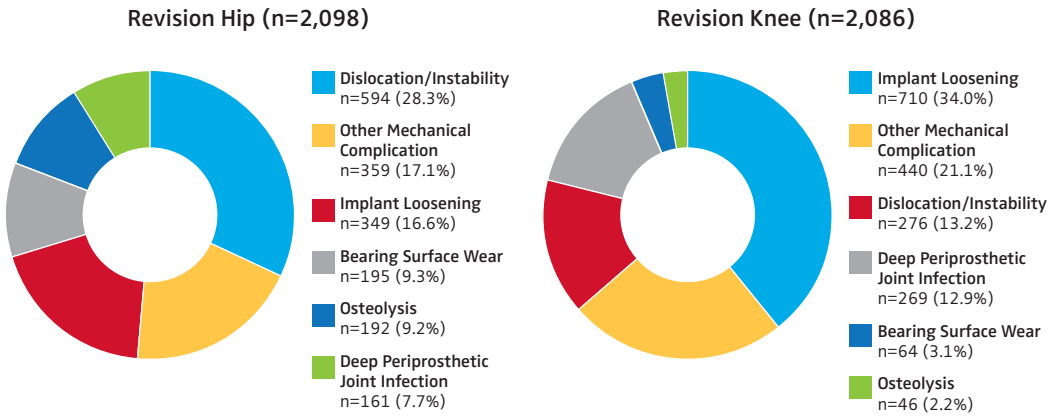


Figure 10: Principal Diagnoses based on Revision Procedure



Osteoarthritis was the diagnosis at the time of surgery for approximately 90.7% of patients undergoing a primary hip arthroplasty and 97.1% for primary knee arthroplasty.

Figure 11: Mean Length of Stay (N=35,466)

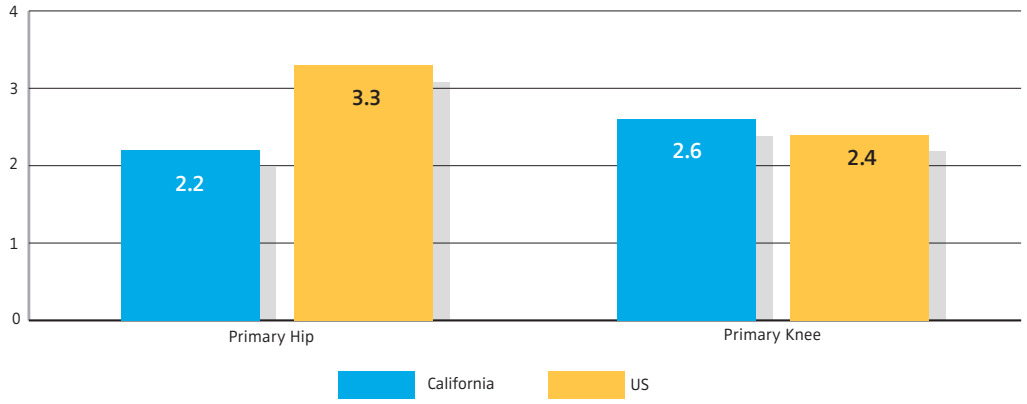
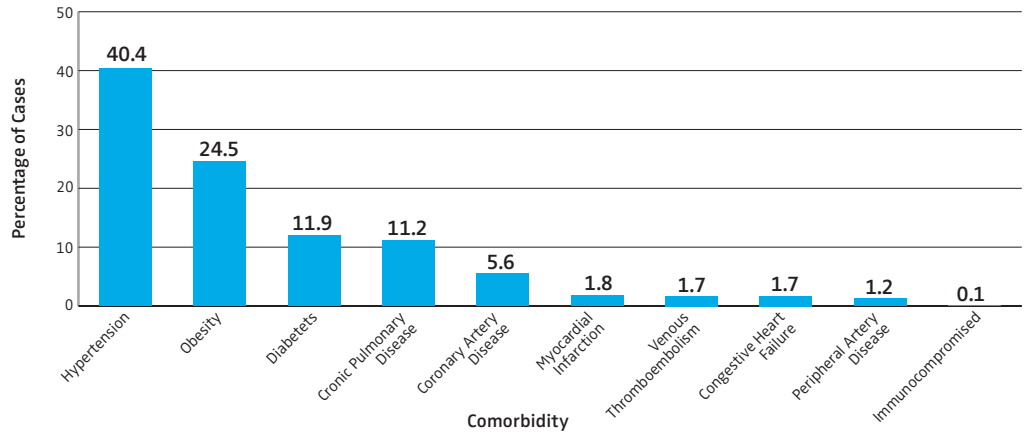


Figure 12: Observed Comorbidities by Percentage (N=48,181)



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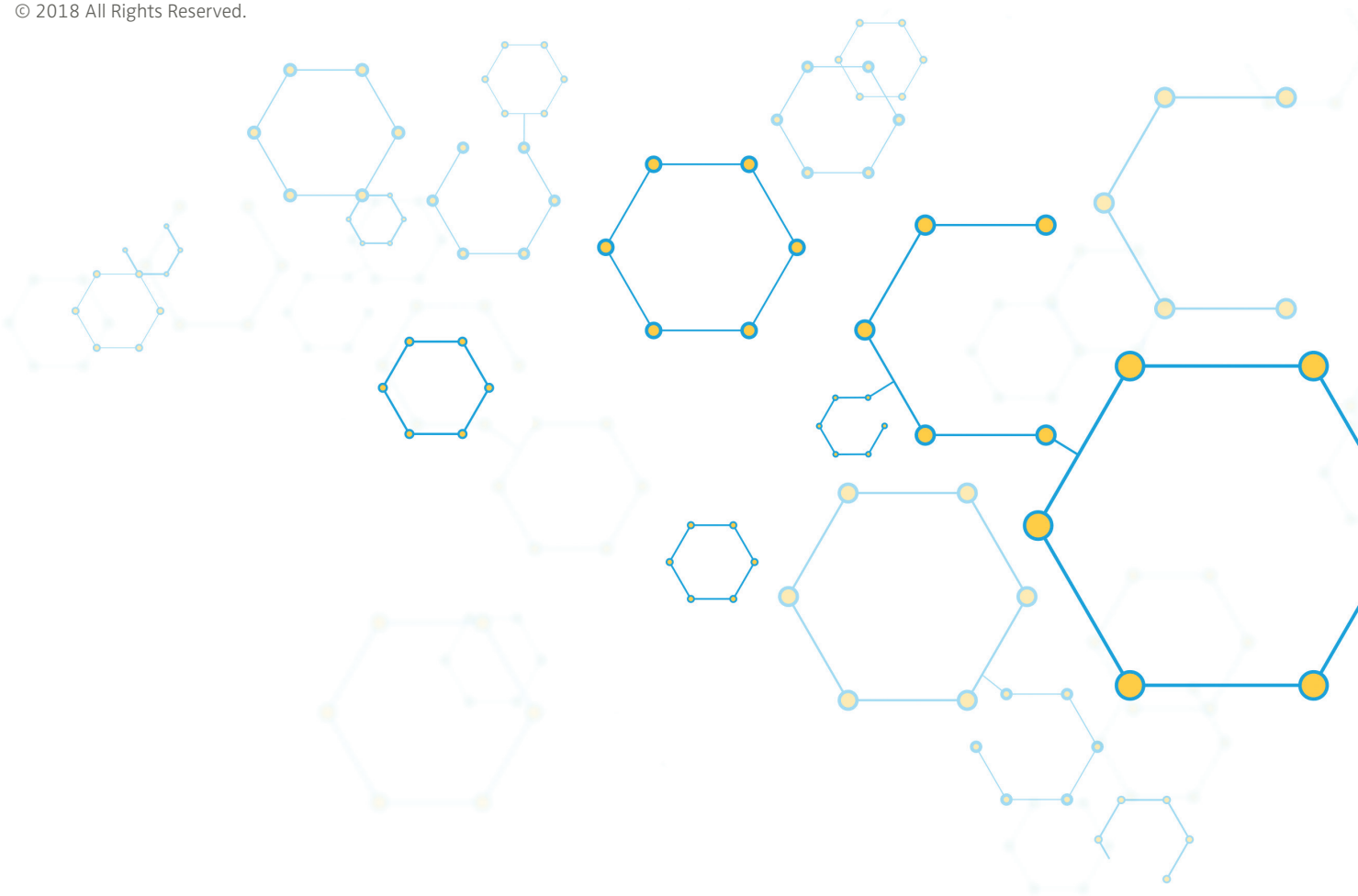

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