

Data Paper

Have Modern Total Knee Arthroplasty Implant Improvements Affected Revision Rates? A Registry Review of Modern Implants and their Predecessors

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Keywords: total knee arthroplasty, revision rate, registry, implant data

<https://doi.org/10.60118/001c.127694>

Journal of Orthopaedic Experience & Innovation

Introduction

Total knee arthroplasty (TKA) is a common orthopaedic procedure used to alleviate pain and restore mobility in patients with knee pain. Substantial resources are committed to updating and refining new knee implant designs to improve outcomes. The aim of this study was to compare revision rates and failure modes between newer implants and their older counterparts.

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Methods

A systematic literature review of national registries was conducted to identify predecessor and successor implant designs from four manufacturers. Individual implant revision data points for each implant design across the registries were compared between generations by manufacturer. Reported revision rates of TKA implant designs were analyzed in addition to implant type and method of fixation when available. Additionally, TKA revision indications were collected and compared between registries.

Results

We found no differences in revision rates between newer implant designs and their older counterparts at any recorded time point between 1 and 15 years. A meta-analysis compared the indication percentages for infection, loosening, mechanical complication, instability, pain, wear, fracture, and stiffness and showed significant differences between registries ($P < 0.001$).

Conclusion

The study's findings showed comparable revision rates between successor and predecessor TKA implant designs. Other parameters, such as patient satisfaction and functional outcomes, are necessary to demonstrate the value of a new implant.

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INTRODUCTION

Total knee arthroplasty (TKA) is the gold standard surgical treatment for knee osteoarthritis, which has been shown to reduce knee pain and improve function for most patients (Steinhaus, Christ, and Cross 2017). The number of TKAs performed in the United States is expected to increase dramatically over the next few decades, with conservative projections predicting an increase of 143% by 2050 (Inacio et al. 2017). In efforts to improve function and reduce knee pain following TKA, modifications and innovations in TKA design have been introduced.

The development of highly cross-linked polyethylene is one of the best examples of implant design improving revision rate, thereby saving money for the healthcare system (Lombardi, Berend, and Adams 2014). Prior to its introduction, polyethylene wear was a leading cause of TKA revision (Lombardi, Berend, and Adams 2014; Tarazi et al. 2021). Recent studies have found that revisions indicated for polyethylene wear are now less common than aseptic loosening, instability, and infection (Lombardi, Berend, and Adams 2014; Tarazi et al. 2021). Similarly, other TKA innovations, such as cementless TKA fixation and asymmetric pivoting TKA designs, report superior patient outcomes while integrating today's technological advances into implant design (Mont et al. 2017; Harris et al. 2019; Batra et al. 2021). To ensure good value for the patient and society, it is important to demonstrate that the additional costs for developing new implants are associated with improved outcomes.

Obviously, a variety of outcome measures could be evaluated; however, the two most critical are patient satisfaction and implant survivorship. Each of these requires a different approach, with satisfaction measured by patient-reported outcomes measures (PROMs) and survivorship evaluated by revision rate. This comparison, which must include multiple contemporary and legacy implants, is virtually impossible to perform at a single institution. Since the incidence of revision is low (Vasarhelyi and Petis 2020), utilization of regional and national registry data is important when attempting to aggregate data on specific implant designs. This approach is not unique, as shown by Hoskins et al who utilized revision rates reported by the Australian Orthopaedic Association National Joint Replacement Registry (AOANJRR) database to determine “best-performing” prosthesis combinations in total joint arthroplasty (TJA) compared to prosthesis combinations with higher-than-anticipated revision rates (Hoskins et al. 2022). Best-performing TKA prostheses in their study were defined by prosthesis combinations with a 5-year cumulative percent revision rate of $\leq 2.3\%$ and at least 500 procedures (Hoskins et al. 2022; Steiger et al. 2013). Recently, Kelly et al also conducted a registry review to compare revision risk between one manufacturer's TKA implant system between generations (Kelly et al. 2024). Revision rates can provide a useful metric in identifying problematic implants and improving patient outcomes, as previously seen in older hip arthroplasty systems (De Steiger et al. 2011; Langton et al. 2010).

There remains a paucity of literature that uses aggregated implant design data across registries to compare their performance between generations. The purpose of this registry review is to evaluate whether there is a decrease in the revision rates for new TKA implant designs compared to older models from the same manufacturer. We hypothesize that improved implant designs would reduce all-cause TKA revision, which would justify the additional healthcare expense to develop these new implants.

METHODS

A critical review of the literature was performed to find registries that report TJA implant data and revision rates. Institutional Review Board (IRB) exemption was granted. Registries that reported revision rates by year were reviewed and selected for study. Only registries with an annual report printed in the English language were reviewed. Data were recorded when available, including revision indication, total number of cases, revision percentage, and bearing type (fixed or mobile). Implant data collected included the femoral component model and the tibial component model. Registries that did not offer specific implant information were excluded from the study. Registries not providing at least five years of follow-up data were also excluded. We elected to include TKA implants only from the four largest orthopaedic implant manufacturers to have adequate power to make comparisons. These implants were divided into categories depending on their introduction into the marketplace. Based on their introduction to the market, systems from the same manufacturer are compared to their immediate successor and defined as a predecessor implant or a successor implant. Only contemporary implants were included, defined as having at least five years of approval and having been approved less than 30 years ago. Information regarding implant approval was gathered from the United States Food and Drug Administration (FDA) Premarket Approval (PMA) database and the United States FDA 510(K) Premarket Notification Database.

The study's primary outcome was to compare revision rates between predecessor and successor generations of TKA implant designs. We secondarily sought to compare differences in revision rates and revision indications between registries.

STATISTICAL ANALYSIS

T-tests or ANOVA were used to compare continuous data. Chi-square testing was used for categorical data. Statistical significance was set at an alpha level of 0.05, and all statistics were performed using R Studio (Version 3.6.3, Vienna, Austria).

RESULTS

There were four registries that reported specific implant design revision rates and met all the criteria that were identified. These included the AAOS American Joint Replacement Registry (AJRR), the Michigan Arthroplasty Registry Collaborative Quality Initiative (MARCQI), the National Joint Registry (NJR), and the AOANJRR. These registries provided published annual reports containing revision rates broken down by implant type. These registries combined to provide data on 3,168,279 primary and 1,554,953 revision TKAs. Follow-up data ranged from 5 to 20 years, depending upon the registry, and all four registries provided the indications for most revisions ([Table 1](#) and [Table 5](#)).

There were nine different implants from four different manufacturers selected for review, all of which were FDA-

approved between August 22nd, 1995, and November 14th, 2014. Of these implants, the NexGen and Persona systems (Zimmer Biomet), the Triathlon system (Stryker), the Sigma and Attune systems (Depuy Synthes), and the Genesis II and Journey II systems (Smith and Nephew) all utilize both femoral and tibial components from the same system. Implant combinations utilizing different femoral and tibial systems included Stryker's Scorpio femoral component and ScorpioNRG tibial component, as well as Smith and Nephew's Legion femoral component and Genesis II tibial component.

The flow chart in [Figure 1](#) demonstrates the predecessor implant as it correlates to the successor implants from each manufacturer. It also displays each knee system's 510(K) premarket submissions and FDA approval dates. The Journey II (Femur/Tibia) from Smith and Nephew was treated separately as the Smith and Nephew manufacturer already had entries for the predecessor and successor ([Figure 1](#)).

We collected 66 revision rate data points from each registry at follow-up intervals between 1 and 20 years. Data collected were similar for each registry as 19.7% of entries came from the MARCQI (n=13), 22.7% of entries from the AJRR (n=15), 25.8% from the NJR (n=17), and 31.8% from the AOANJRR (n=21). Data points represented the revision rate of a single implant from a single registry at a given time point. For instance, Zimmer/Biomet had 15 data points (22.7%) across the four registries on their NexGen and Persona TKA systems, as each registry had separate data points on the different generations and bearing surface types for each TKA system. Similarly, Stryker had 14 implant data points (21.2%) on their Triathlon and Scorpio/ScorpioNRG systems; Depuy Synthes had 18 implant data points (27.3%) on their Sigma and Attune systems; and Smith and Nephew had 19 implant data points (28.8%) on their Genesis II, Journey II, and Legion/Genesis II systems. Predecessor implants represented 43.9% (n=29) of the total data, while successors represented 50.0% (n=33). The Journey II made up 6.06% (n=4) of the entries.

A comparison of cumulative revisions of each implant shows similar yearly revision rates for each manufacturer and implant ([Table 2](#)). The Stryker Triathlon and Depuy Synthes Attune successor TKA systems showed higher revision rates than their respective predecessors at each recorded interval from the primary TKA. "Modern" Smith and Nephew TKA systems (i.e., Legion/Genesis II and Journey II) also reported higher revision rates at the specified yearly intervals compared to the predecessor Genesis II system. The revision rates for each implant trended upwards as the years of follow-up increased, regardless of implant generation.

When comparing the predecessor, successor, and Journey II implants, we found no significant differences between the groups at 1, 2, 3, 5, 7, 10, or 15 years ([Table 3](#)). Like implant-specific revision rates over time, there was an increase in revision rates with longer follow-up between generations. There was a significant difference at 4 years, with the predecessor implants averaging a revision rate of 2.6% and successor implants averaging a revision rate of

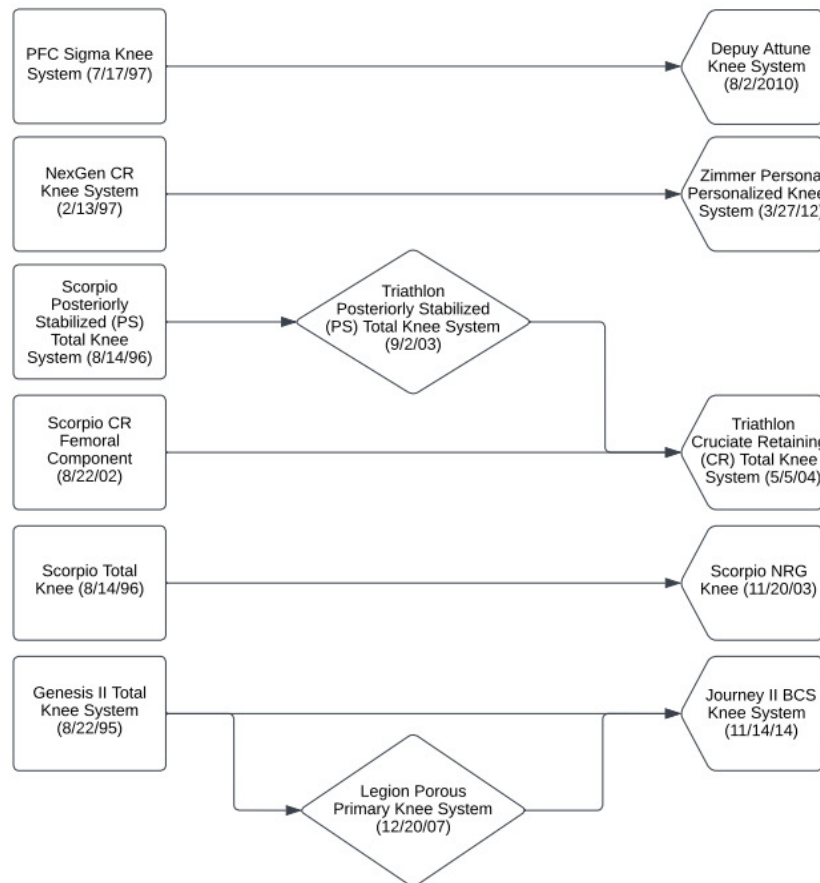


Fig 1. 510(K) Premarket Submissions

Table 1. Registry Overview

Registry	MARQI	AJRR	NJR	AOANJRR
Total # TKAs	133,190	908,223	1,357,077	769,789
Total # Revisions	3314	89,463	39,277	22,899
Year Mark Recorded	1, 2, 3, 4, 5	1, 3, 5, 7	1, 3, 5, 10, 15, 18	1, 3, 5, 10, 15, 20

AJRR, AAOS American Joint Replacement Registry; MARQI, The Michigan Arthroplasty Registry Collaborative Quality Initiative; NJR, National Joint Registry; AOANJRR, Australian Orthopaedic Association National Joint Replacement Registry.

2.7%, while the Journey II averaged a revision rate of 4.6% ($P=0.009$) (Table 3).

Cumulative revision rates between each registry demonstrated significant differences at specific timeframes. Differences in revision rates at each year of follow-up were statistically significant at 1, 3, 5, and 10 years (Table 4).

Indications for revision were collected from each registry and categorized as shown in Table 5. Mechanical indications included metallosis, sizing issues, malalignment, and implant failure. Wear included all instances of tibial component, femoral component, patellar component, and polyethylene spacer wear. All categories comparing the four registries to each other reported significant differences.

DISCUSSION

This registry review sought to evaluate differences in revision rates between TKA implant designs from newer and older generations. Contrary to our hypothesis, we found that modern implant designs failed to provide a significantly measurable difference in revision rate compared to predecessor implants individually and as a group.

Previous studies have questioned the effectiveness of newer-generation implant designs, but there has been variability in outcomes. Existing literature comparing the Attune and Sigma implants reported no differences in clinical outcomes at 2-year and 5-year follow-ups (Chua et al. 2019; Hauer et al. 2021; White et al. 2020), with one study by Behrend et al demonstrating similar joint awareness scores

Table 2. Average Revision Rates of Each Implant

Years Since Primary	NexGen (n=8)	Persona (n=7)	Scorpio/ ScorpioNRG (n=3)	Triathlon (n=11)	Sigma (n=8)	Attune (n=10)	Genesis II (n=10)	Legion/ Genesis II (n=5)	Journey II (n=4)
1	0.6 ± 0.3	0.6 ± 0.2	0.4 ± 0.2	0.9 ± 0.4	0.6 ± 0.3	0.6 ± 0.2	1.0 ± 0.4	1.0 ± 0.3	1.2 ± 0.5
2		1.4 ± 0.4		1.5 ± 0.0	1.2 ± 0.0	1.7 ± 0.1	1.6 ± 0.3	2.4*	3.8 ± 0.8
3	1.5 ± 0.6	1.5 ± 0.5	1.8 ± 0.1	2.0 ± 0.7	1.6 ± 0.6	1.7 ± 0.6	2.3 ± 0.9	2.1 ± 0.9	3.1 ± 1.3
4		2.3 ± 0.6		2.2 ± 0.0	1.9 ± 0.0	3.0 ± 0.1	3.2 ± 0.3	3.7*	4.6 ± 0.4
5	2.1 ± 0.7	2.0 ± 0.7	2.6 ± 0.0	2.6 ± 1.0	2.1 ± 0.7	2.4 ± 0.8	3.0 ± 1.1	2.7 ± 1.1	3.6 ± 1.5
7	1.6 ± 0.7	1.5 ± 0.4		1.6 ± 0.3	1.5 ± 0.3	1.7 ± 0.6	1.8 ± 0.4	2.0 ± 0.1	2.3*
10	3.4 ± 0.9		4.0 ± 0.2	4.1 ± 1.3	3.5 ± 1.0		4.9 ± 1.7	4.3 ± 0.0	
15	4.7 ± 1.3		5.1 ± 0.4	5.7 ± 1.8	5.8 ± 0.9		4.8 ± 1.4		
18	5.2 ± 1.9		5.8 ± 0.4				3.2*		
20	6.9 ± 1.7				7.0*		6.7 ± 0.4		

Values represent cumulative revision rates (%). n is the number of recorded revision rates across all registries. Values given as mean ± SD; Values with an * represent values with only one data point from a singular registry. Only the MARQI released data at 2 and 4 years. Only the AJRR released data at 7 years. Predecessor implants are colored grey. Successor implants are colored white.

Table 3. Comparison of Implant Revision Rate by Relative Age

Years Since Primary	Predecessor (n=29)	Successor (n=33)	Journey II (n=4)	P value
1	0.7 ± 0.4	0.8 ± 0.3	1.2 ± 0.5	0.177
2	1.4 ± 0.3	1.7 ± 0.4	3.8 ± 0.8	0.068
3	1.8 ± 0.7	1.8 ± 0.7	3.1 ± 1.3	0.096
4	2.6 ± 0.8	2.7 ± 0.6	4.6 ± 0.4	0.009
5	2.5 ± 0.9	2.4 ± 0.9	3.6 ± 1.5	0.294
7	1.6 ± 0.4	1.7 ± 0.4	2.3*	0.261
10	4.0 ± 1.3	4.1 ± 1.1		0.755
15	4.9 ± 1.1	5.7 ± 1.8		0.316

Values represent cumulative revision rates (%) for all indications. n is the number of recorded revision rates across all registries. Values given as mean ± SD. Values with an * represent values with only one data point from a singular registry.

Table 4. Revision Rates in Each Registry

Years Since Primary	MARCQI (n=13)	AJRR (n=15)	AOANJRR (n=17)	NJR (n=21)	P Value
1	0.9 ± 0.3	0.6 ± 0.2	0.4 ± 0.1	1.1 ± 0.4	<0.001
3	2.5 ± 0.9	1.3 ± 0.4	1.5 ± 0.4	2.3 ± 0.7	<0.001
5	3.3 ± 1.0	1.5 ± 0.4	2.1 ± 0.4	3.1 ± 0.8	<0.001
10			3.3 ± 0.7	4.6 ± 1.3	0.004
15			4.4 ± 1.1	5.6 ± 1.2	0.039

Values represent cumulative revision rates (%) for all indications. n is the number of recorded revision rates across all registries. Values given as mean ± SD; AJRR, AAOS American Joint Replacement Registry; MARCQI, The Michigan Arthroplasty Registry Collaborative Quality Initiative; NJR, National Joint Registry; AOANJRR, Australian Orthopaedic Association National Joint Replacement Registry.

between the two generations (Behrend et al. 2019). One analysis of a United States-based TKA registry found higher risks for aseptic revision and instability with a modern implant design compared to its predecessor from the same manufacturer (Kelly et al. 2024). Although one study found statistically significant differences between newer and older TKA generations in PROMs at the 6-month postoperative period, they did not address whether the difference met minimally clinically important differences (Toossi et al. 2023). Conversely, a meta-analysis by Choudhury et al reported improved Knee Society scores and reduced patellofemoral complications in the modern Attune than the predecessor Sigma design (Choudhury et al. 2023).

Although newer generation TKA designs did not necessarily yield significantly lower revision rates, the expanded population that TKAs are performed on today may suggest improved outcomes in modern implant designs compared to their predecessor counterparts (S. M. Kurtz et al. 2009). The mean age of patients undergoing primary TKA is decreasing, with younger, more active patients requiring the procedure (S. M. Kurtz et al. 2009; S. Kurtz et al. 2007). The shift in demographic parallels the newer uncemented fixation techniques that have developed, including improved biologic ingrowth and osseointegration at the bone-implant interface (Helvie, Deckard, and Meneghini 2023). With the expansion of modern uncemented TKA designs that provide better fixation in younger patients – and thus better durability – having these implants perform similarly

to predecessor counterparts with no change in revision risk may suggest inherent improvements. Controlling for patient selection through propensity score matching or regression analysis more accurately isolates implant design affecting outcomes. Although this is outside the scope of our registry review, stratification by specific patient demographic variables would allow for a more granular analysis of outcomes between successor and predecessor implant generations.

Implant prices constitute a substantial proportion of the cost associated with a TKA procedure. Nguyen et al conducted a systematic review and reported that approximately 22.3% of the total cost of a primary TKA procedure is attributed to the cost of the implant (Nguyen et al. 2024). A previous comparison of a “premium” TKA implant to a standard TKA implant found that the cost of the “premium” implant (i.e., components using mobile-bearing designs, high-flexion designs, oxidized-zirconium femoral components, newer moderately-crosslinked polyethylene inserts, or a combination thereof) averaged \$1,000 higher with no discernable difference in revision rates (Gioe et al. 2011). With our findings being consistent with the existing literature comparing outcomes between generations, this can raise the question of whether a newer, more expensive implant design is justified if they do not demonstrate clear advantages (Chua et al. 2019; Gioe et al. 2011). However, design alone should not be weighted as the sole factor for a new implant’s success (Hauer et al. 2021). If implant design

Table 5. Meta-analysis Comparing Revision Indications Among Registries

Indications	AJRR (n=77520)	MARCQI (n=3314)	AOANJRR (n=22899)	NJR (n=39277)	P Value
Infection	0.2520 (0.2490 – 0.2551)	0.2339 (0.2198 – 0.2486)	0.2644 (0.2587 – 0.2702)	0.1960 (0.1921 – 0.2000)	<0.001
Loosening	0.2410 (0.2380 – 0.2440)	0.1940 (0.1809 – 0.2078)	0.2268 (0.2214 – 0.2323)	0.2211 (0.2170 – 0.2252)	<0.001
Other Mechanical Complication	0.2030 (0.2002 – 0.2059)	0.0772 (0.0686 – 0.0868)	0.0386 (0.0362 – 0.0412)	0.0388 (0.0369 – 0.0407)	<0.001
Instability/Dislocation	0.1310 (0.1286 – 0.1334)	0.2858 (0.2706 – 0.3014)	0.0948 (0.0910 – 0.0986)	0.1369 (0.1336 – 0.1404)	<0.001
Pain	0.0570 (0.0554 – 0.0587)	0.0896 (0.0804 – 0.0998)	0.1649 (0.1602 – 0.1698)	0.1860 (0.1822 – 0.1899)	<0.001
Other	0.0520 (0.0505 – 0.0536)	0.0145 (0.0109 – 0.0192)	0.0614 (0.0583 – 0.0645)	0.0581 (0.0558 – 0.0605)	<0.001
Wear	0.0310 (0.0298 – 0.0322)	0.0094 (0.0066 – 0.0133)	0.0762 (0.0728 – 0.0797)	0.0865 (0.0838 – 0.0894)	<0.001
Fracture	0.0240 (0.0229 – 0.0251)	0.0253 (0.0205 – 0.0313)	0.0345 (0.0322 – 0.0369)	0.0417 (0.0397 – 0.0437)	<0.001
Stiffness	0.0090 (0.0084 – 0.0097)	0.0703 (0.0621 – 0.0795)	0.384 (0.0360 – 0.0410)	0.0349 (0.0331 – 0.0367)	<0.001

Values represent cumulative revision rates (%) out of all reported TKA procedures in the respective registry. n is the number of recorded revisions. Values given as mean [95% Confidence Interval]. P values that are significant (<0.05) are bold; AJRR, AAOS American Joint Replacement Registry; MARCQI, The Michigan Arthroplasty Registry Collaborative Quality Initiative; NJR, National Joint Registry; AOANJRR, Australian Orthopaedic Association National Joint Replacement Registry.

also coincides with improved perioperative management, such as by reducing surgical tray instrumentation and improving alignment with patient-specific instrumentation or computer-assisted navigation, these can contribute to justifying the higher upfront costs of an implant if operating efficiency and other episode-of-care costs are ultimately optimized (Law 2021; Sassoon et al. 2015).

The secondary aim of our registry review was to compare differences in TKA revision rates and revision indications by registry. The significant increase in revision rates with longer follow-up in all the registries certainly lends credence to the data in the present study. However, the statistical differences between the registries for overall revision rates and the reason for revision remain to be explained. The MARQI, limited to the single state of Michigan, covered the smallest population and was found to have the highest reported cumulative revision rates. This may be due to the completeness of the data, as 96% of all TJA procedures and revisions are captured by the registry (Hallstrom, Hughes, and Huddleston 2022). For comparison, the AJRR is reported to capture just 40% of TJA procedures in the United States (Hallstrom, Hughes, and Huddleston 2022). However, registries that prioritize completeness often need to sacrifice the level of detail, as seen with the AOANJRR (Porter, Rolfson, and de Steiger 2022). Regional differences in indications, training, and support systems may explain some

differences between registries. One investigation of the AOANJRR data found that surgeons with low revision rates following TJA had different indication distributions compared with surgeons with a higher rate of revisions (Hoskins et al. 2022). They found that at a low revision rate, surgeons had fewer revisions for aseptic loosening, followed by instability (Hoskins et al. 2022). Therefore, it is possible that our meta-analysis comparing revision indications between registries (Table 5) is potentially skewed by data collection techniques and surgeon differences.

Revision rate is a parameter previously used in literature to guide surgeon decision-making when selecting implant designs that will optimize patient outcomes. In the context of total shoulder arthroplasty (TSA), Page et al found there were higher revision rates in anatomic TSAs with non-crosslinked, all-polyethylene glenoid components when compared to crosslinked, all-polyethylene glenoid components (Page et al. 2022). Similarly, the lack of reduction in cumulative revision rates between premium and standard TKA and THA implants reported by Gioe et al would suggest that implants with newer technologies do not necessarily translate to lower revision rates (Gioe et al. 2011). The natural extension of a registry analysis assessing potential differences in revision rates of implants would be to collect PROMs that could provide insight into patient satisfaction. It is a rightful assumption that higher revision

rates of an implant design would inversely correlate with PROM metrics. However, a recent study by Hoskins et al found there was practically no correlation between revision rate and PROMs in THA and TKA procedures (Hoskins et al. 2024). This would suggest that either revision rate or PROMs alone would be incomplete, imperfect indicators of an arthroplasty procedure and may well, in fact, track different aspects of an implant's performance (Hoskins et al. 2024). Furthermore, previous prospective trials comparing newer generation TKA implant designs to their predecessors using PROM scores and patient satisfaction assessments found no significant differences between generations (Chua et al. 2019; Hauer et al. 2021). Besides the studies calling into question the cost-effectiveness of newer implant designs if they yield comparable clinical outcomes to older generations, the lack of sensitivity in the measured functional outcome scores is also cited as a potential limitation (Hoskins et al. 2022; Hauer et al. 2021).

Despite the non-superior outcomes in revision rate seen in our study between newer and older generation TKA systems, this should not be taken as a suggestion to pause innovation. Highly cross-linked polyethylene remains a noteworthy advancement in TKA design that significantly reduced the number of revision TKAs being performed for polyethylene wear (Lombardi, Berend, and Adams 2014). Advancements in uncemented fixation have led to an increase in the number of younger patients with higher activity demands undergoing TKA (Mont et al. 2017; Harwin et al. 2015). Expanded implant sizing and alternative pivoting designs also help to further improve knee kinematics and accommodate morphological variations in bone (Harris et al. 2019; Batra et al. 2021; Dai et al. 2014). These innovations provide demonstrable benefits that span more than just the revision rate, as these modern techniques can optimize surgical efficiency or improve implant compatibility with the patient. Furthermore, if a newer-generation implant design is optimized to facilitate faster recovery times, earlier mobilization, and a less invasive surgical approach, this translates into tangible value for the healthcare system and patient. The study's findings do not intend to downplay these advancements but rather highlight the need for evidence outside of revision rates or PROMs demonstrating

that changes in implant design lead to their improved performance.

Our findings should be interpreted within the context of the study design. As with all extensive database studies, there are differences in data collection methodologies and follow-up intervals that introduce bias. The large number of patients evaluated may have mitigated some of these discrepancies. The release dates of each implant did not necessarily overlap those from other manufacturers. By comparing each predecessor to their successor from the same manufacturer, we attempted to negate this effect. The scope of the registry analysis also could not allow for a more granular analysis of patient selection by matching certain demographics of interest, which could better isolate how differences in implant generations can affect outcomes. Another limitation is that registry data restricted our analysis to revision rates and could not comment on the comparisons in PROMs, which are not always reported in registry databases (Vasarhelyi and Petis 2020). Recommendations for further investigation include developing prospective, randomized trials that assessed PROMs between modern TKA systems and their predecessors, as well as evaluating surgical efficiency. This would be interpreted not independently of revision rate but rather as an adjunct to it, allowing orthopaedic surgeons to obtain a better understanding of an implant design's performance in relation to their older counterparts.

CONCLUSION

In the present era of cost consciousness, it is essential to encourage the development of new implants that are more durable and are associated with improved patient results. In this review of registry data, we found that modern TKA implants do not appear to significantly decrease revision rates compared to predecessor implants. Future studies that include PROMs and surgical efficiency are the logical next step to assess the contribution of new technology to TKA outcomes.

Submitted: September 25, 2024 EDT. Accepted: December 20, 2024 EDT. Published: May 08, 2025 EDT.



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