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How the NJR has changed our Practice

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NJR Medical Director

Arthroplasty Surgeon

Past President BOA

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ODEP
Orthopaedic Data Evaluation Panel

Disclosures

- Past President BOA
- Past President BASK
- Previous Design Consultant to Smith and Nephew
- Speaker panel for Smith and Nephew
- Speaker panel for Stryker
- Speaker panel for Biomet
- Past Member MHRA Device Safety Committee
- Member ODEP and Beyond Compliance Committees

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How has the NJR Data affected Practice ?

- Data published about Implant Category performance
- Data Published about Bearing performance
- Data Published about individual implants
- Data published about Implant Specific Complications
- Data published about Surgeon’s performance

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Changing practice in Hip Replacement

Figure 3.3 Fixation by year of primary hip replacement.

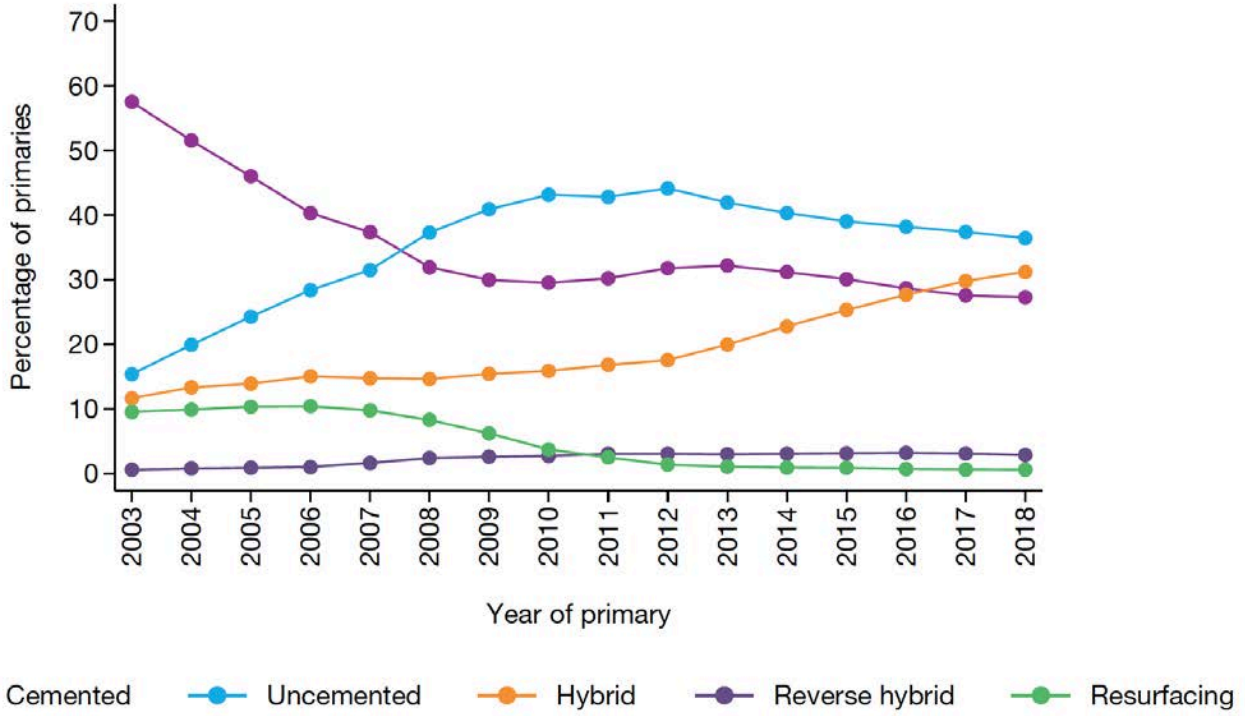

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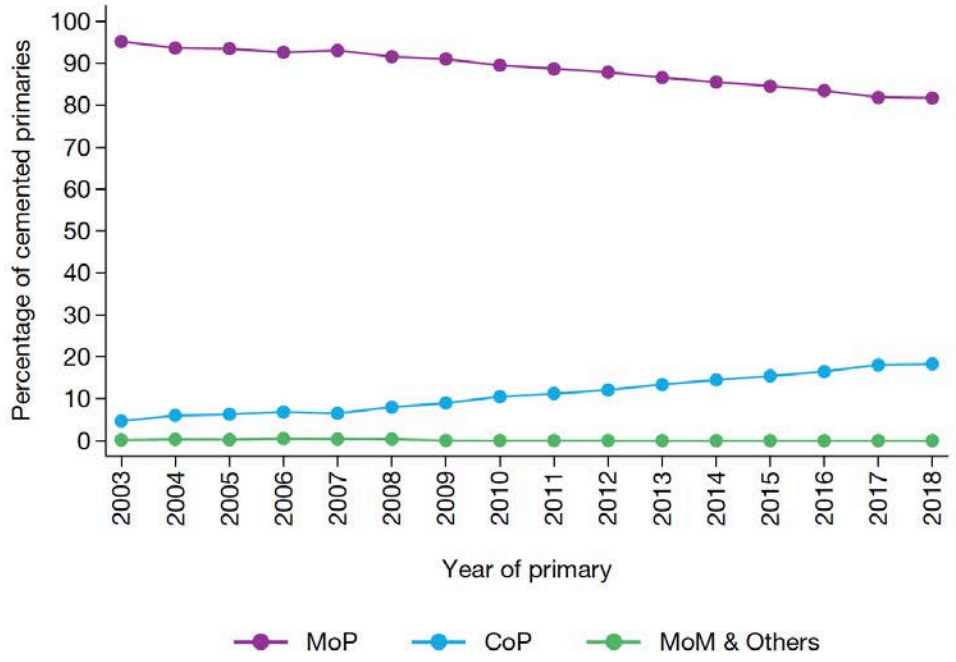
Figure 3.4 (a) Cemented primary hip replacement bearing surface by year.



Remarkably stable use of Metal-on-Poly for Cemented THR

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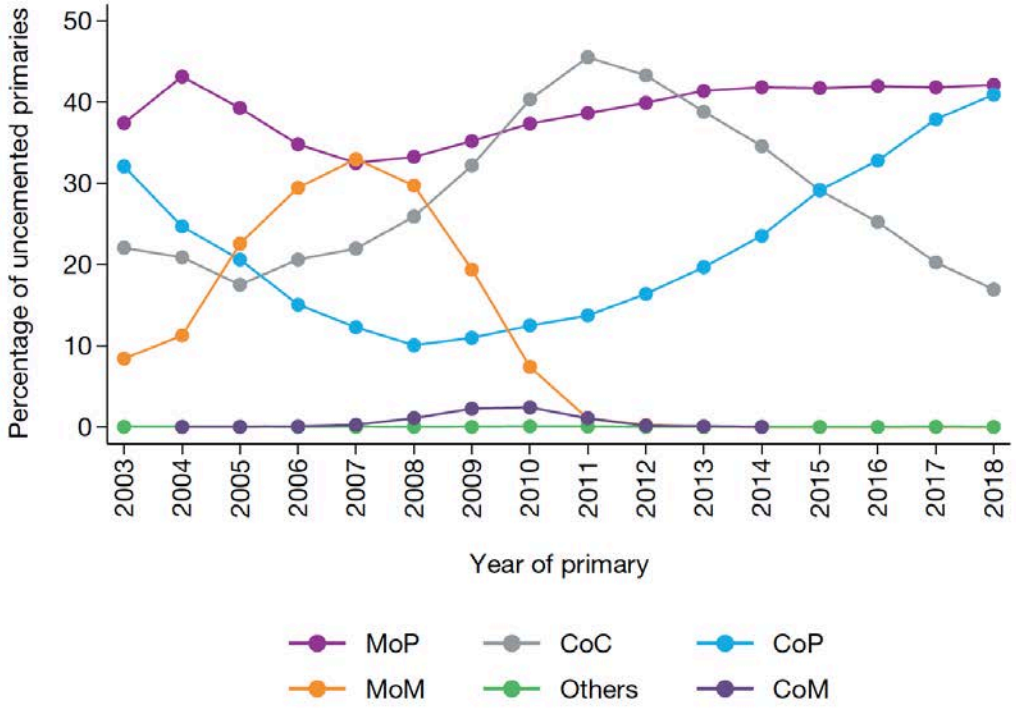
Figure 3.4 (b) Uncemented primary hip replacement bearing surface by year.



In Contrast wild Fluctuations in Uncemented THR Bearings as Metal-on-Metal was abandoned (Due to NJR publication!)

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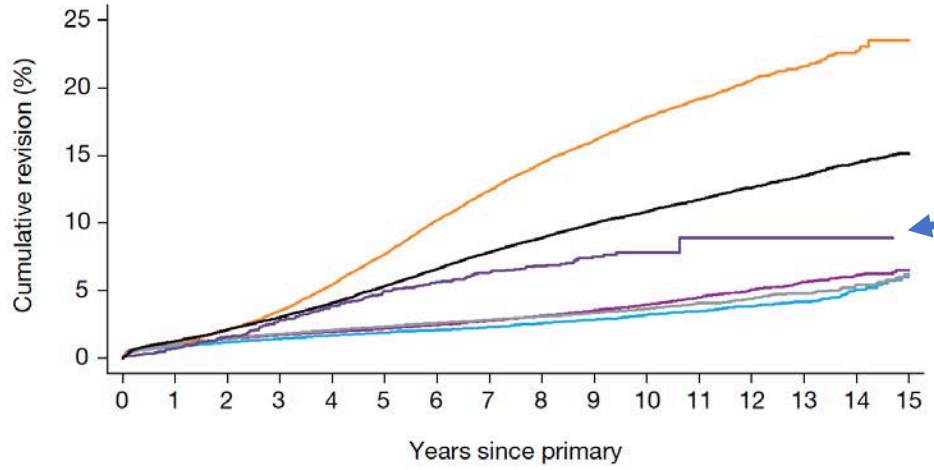
Figure 3.7 KM estimates of cumulative revision in uncemented primary hip replacements by bearing.



Number at risk

MoP	161,460	143,595	126,532	109,560	93,126	77,187	62,579	48,684	37,093	26,881	18,625	12,109	7,542	4,242	1,811	448
MoM	29,066	28,467	27,894	27,127	26,165	25,078	23,909	22,747	21,392	18,689	14,092	8,703	4,451	1,882	516	101
CoP	92,258	77,188	63,189	50,999	40,469	31,955	25,209	19,578	15,219	11,566	8,726	6,495	4,508	2,861	1,415	466
CoC	125,287	117,830	109,562	99,596	88,679	75,935	62,675	48,047	34,259	22,729	14,551	8,805	5,132	2,716	1,278	356
CoM	2,119	2,092	2,056	2,010	1,961	1,907	1,847	1,766	1,442	790	269	42	6	1	1	0
Resurfacing	39,246	38,120	37,086	35,950	34,651	33,268	31,869	30,273	28,022	25,128	21,018	15,971	10,835	6,665	3,349	1,102

Uncemented MoM, Resurfacing and Ceramic-on-Metal all do badly compared to traditional bearings!

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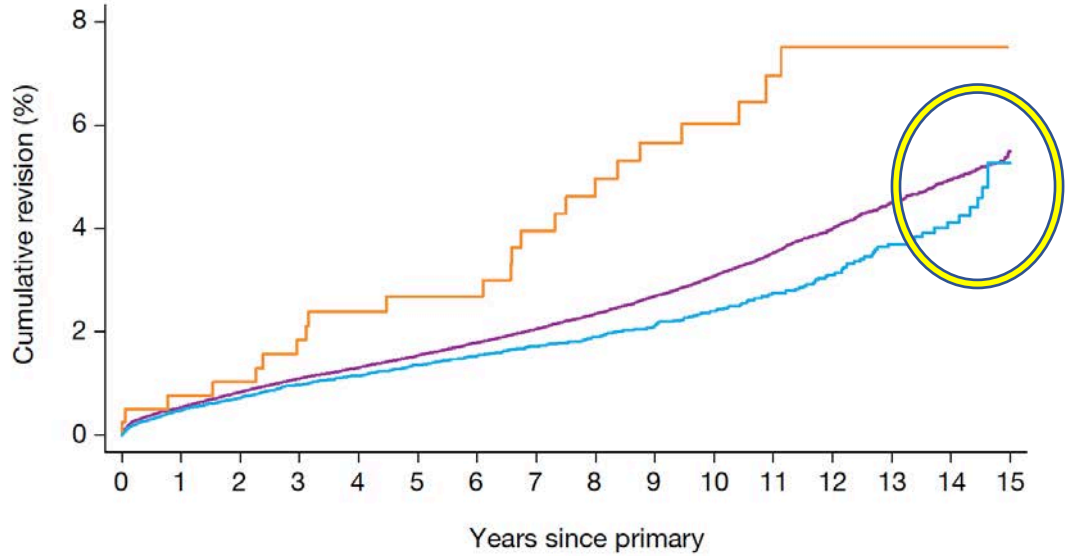
Changing Practice in Hip Replacement

Figure 3.6 KM estimates of cumulative **revision** in **cemented** primary hip replacements by **bearing**.



Number at risk

MoP	310,690	282,064	254,579	226,261	197,859	169,803	143,547	119,279	98,059	79,147	61,837	45,777	31,050	19,689	10,089	3,417
MoM	394	382	371	358	341	329	315	295	280	265	244	181	113	53	23	7
CoP	41,955	36,803	31,730	27,003	22,655	18,586	15,054	11,992	9,478	7,319	5,603	4,036	2,779	1,691	837	226

Cemented
Ceramic-on-Poly LOOKED better than Metal-on-Poly until 13 year follow-up

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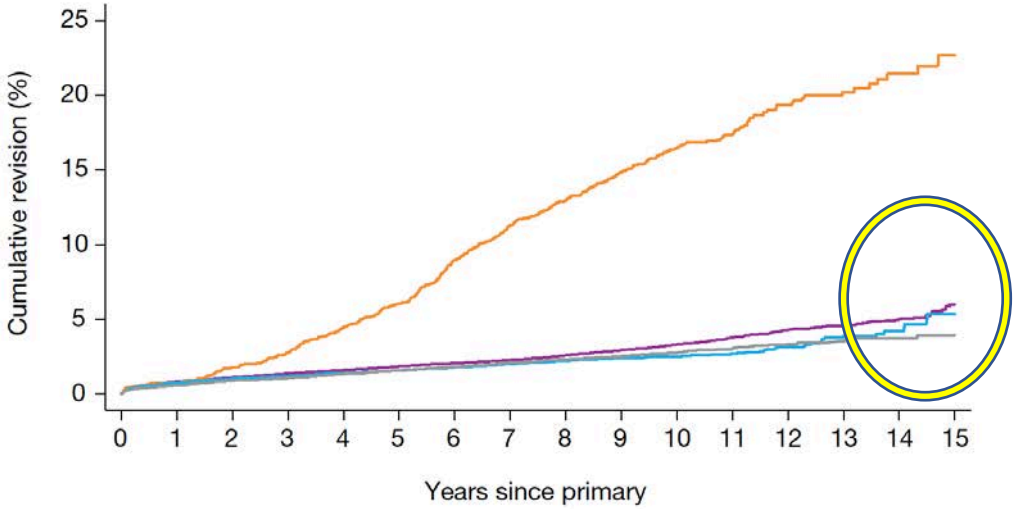
Figure 3.8 KM estimates of cumulative **revision** in **hybrid** primary hip replacements by **bearing**.



Number at risk

MoP	135,831	118,019	100,822	84,654	70,392	57,647	47,269	38,148	29,919	22,908	16,936	11,857	7,595	4,403	2,144	654
MoM	2,369	2,330	2,270	2,206	2,122	2,054	1,945	1,847	1,737	1,542	1,307	952	578	341	193	67
CoP	63,532	49,230	37,162	26,994	18,991	12,934	8,954	6,572	5,035	3,766	2,664	1,868	1,316	832	441	138
CoC	25,621	24,383	22,839	21,135	19,110	16,864	14,639	12,344	10,083	8,040	6,136	4,485	2,894	1,562	622	145

HYBRID THR

CoC, CoP and MoP all do better than 5% revision rate at 15 years

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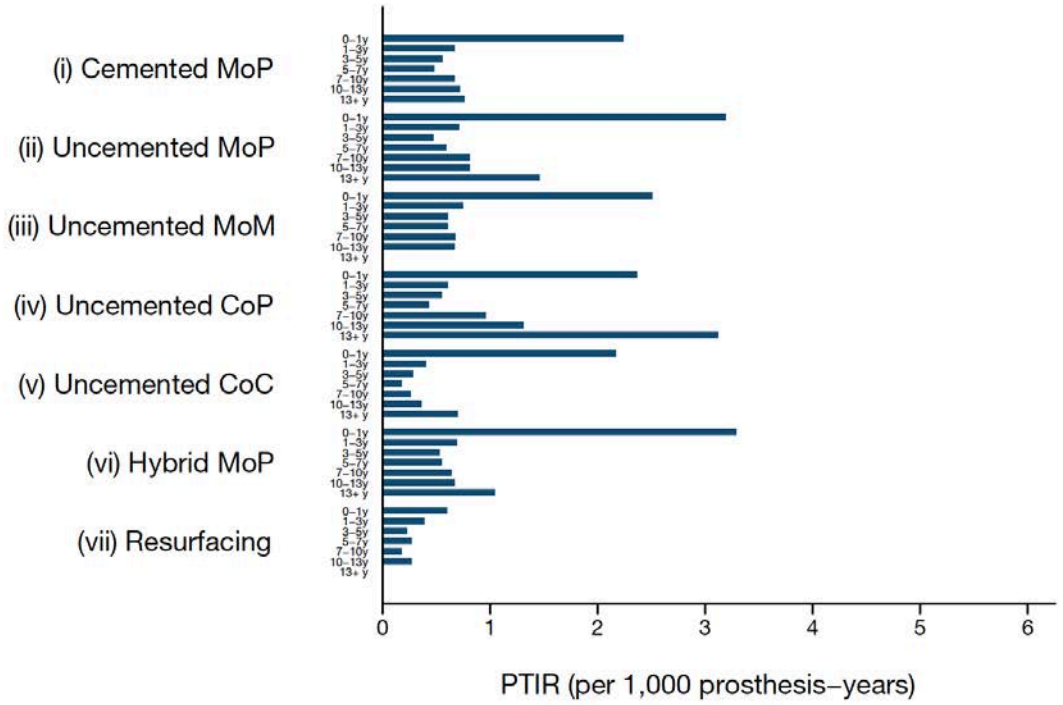
Figure 3.12 (c) PTIR estimates of dislocation/subluxation by fixation and bearing.



Little difference between Hip Implant classes as regards dislocation rate

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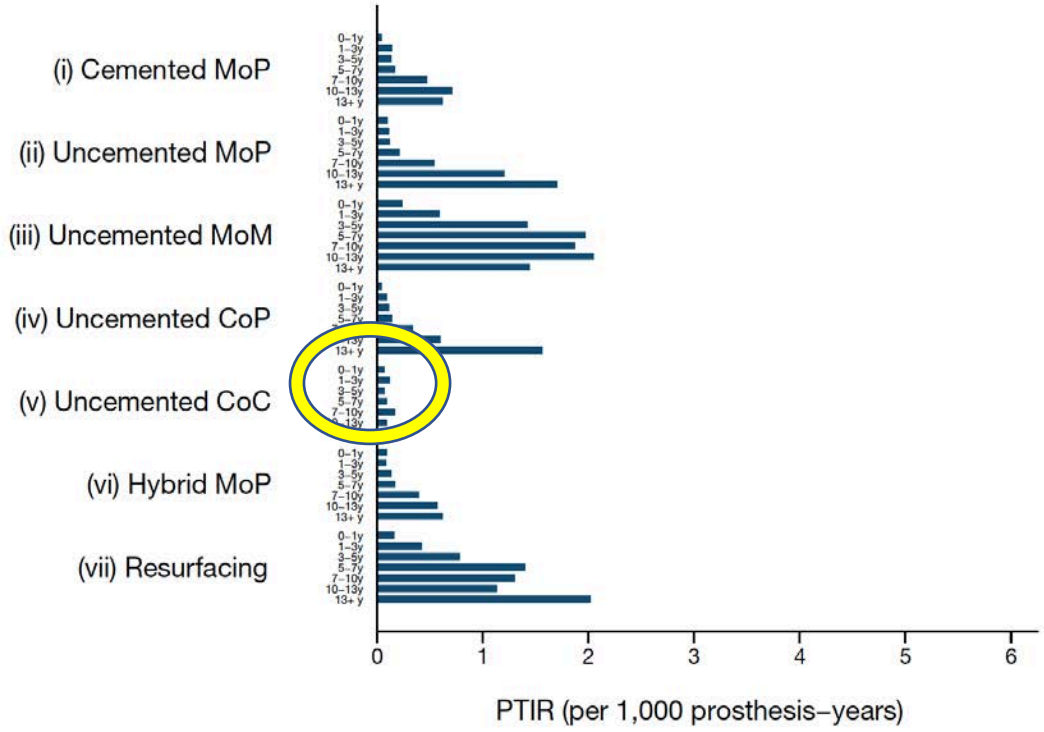
Figure 3.12 (e) PTIR estimates of lysis by fixation and bearing.



Considerable differences between Hip Implant types for Failure due to Lysis

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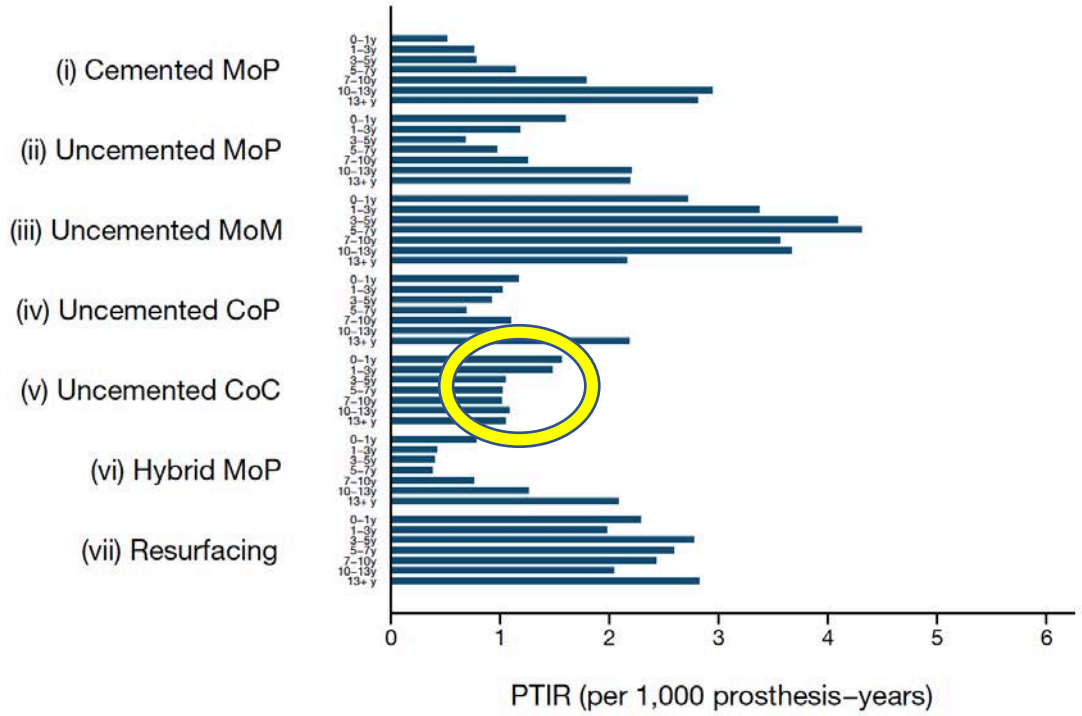
Figure 3.12 (a) PTIR estimates of aseptic loosening by fixation and bearing.



Similarly Failure due to Aseptic Loosening varies a great deal

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What about Implant specific Complications?

- Does Conformity, Trochlear Groove shape or “Stability” play a part in failure of TKR designs?

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For example : Effect of resurfacing the patella

Surgeons may always resurface the patella at knee replacement because they **Believe** from the literature they **know** it is better to do so (or NOT to do so!)

BUT

Is the literature detailed enough to tell us whether we should resurface the patella with THIS implant design but not with THAT one?

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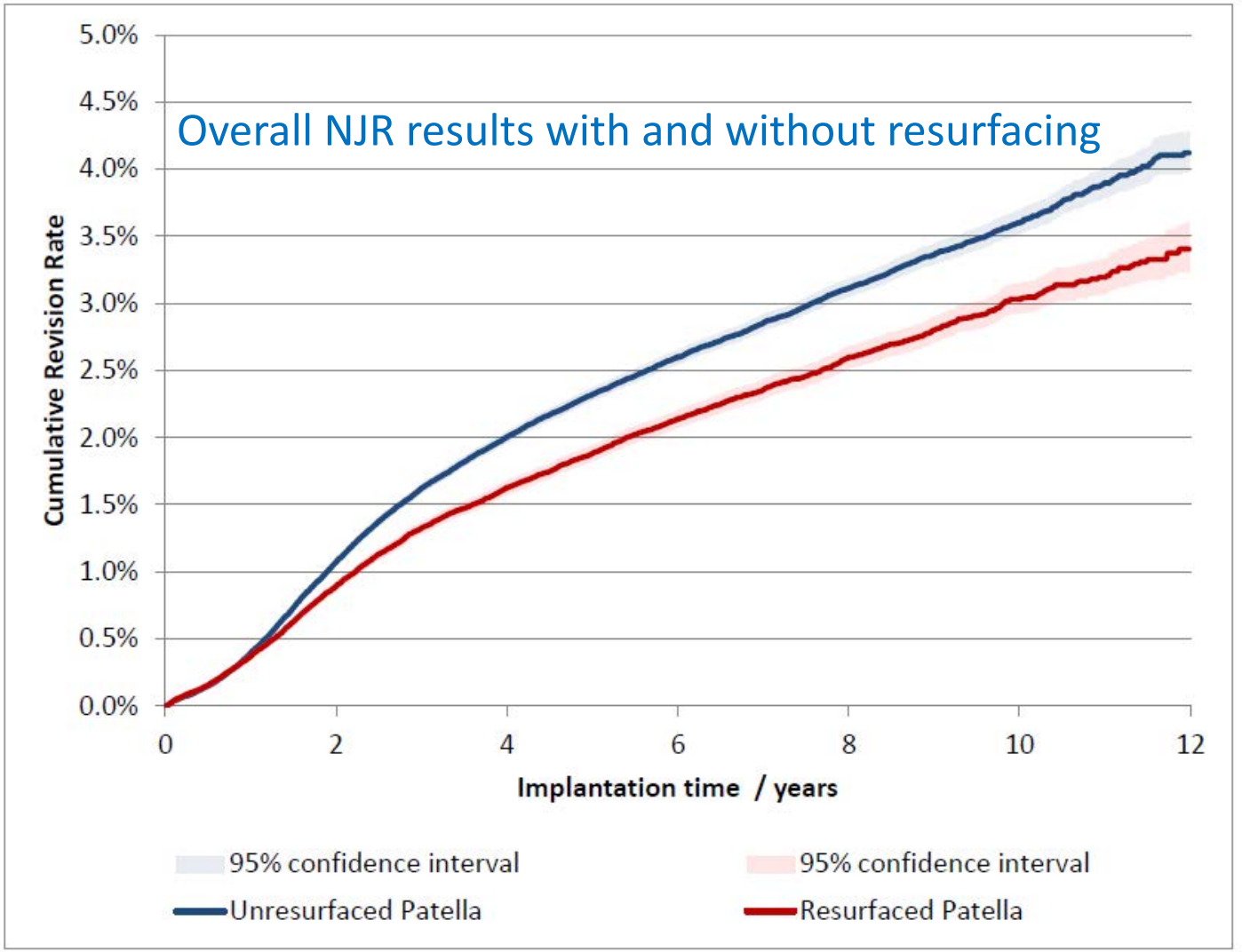
Endpoint: Revision for any reason



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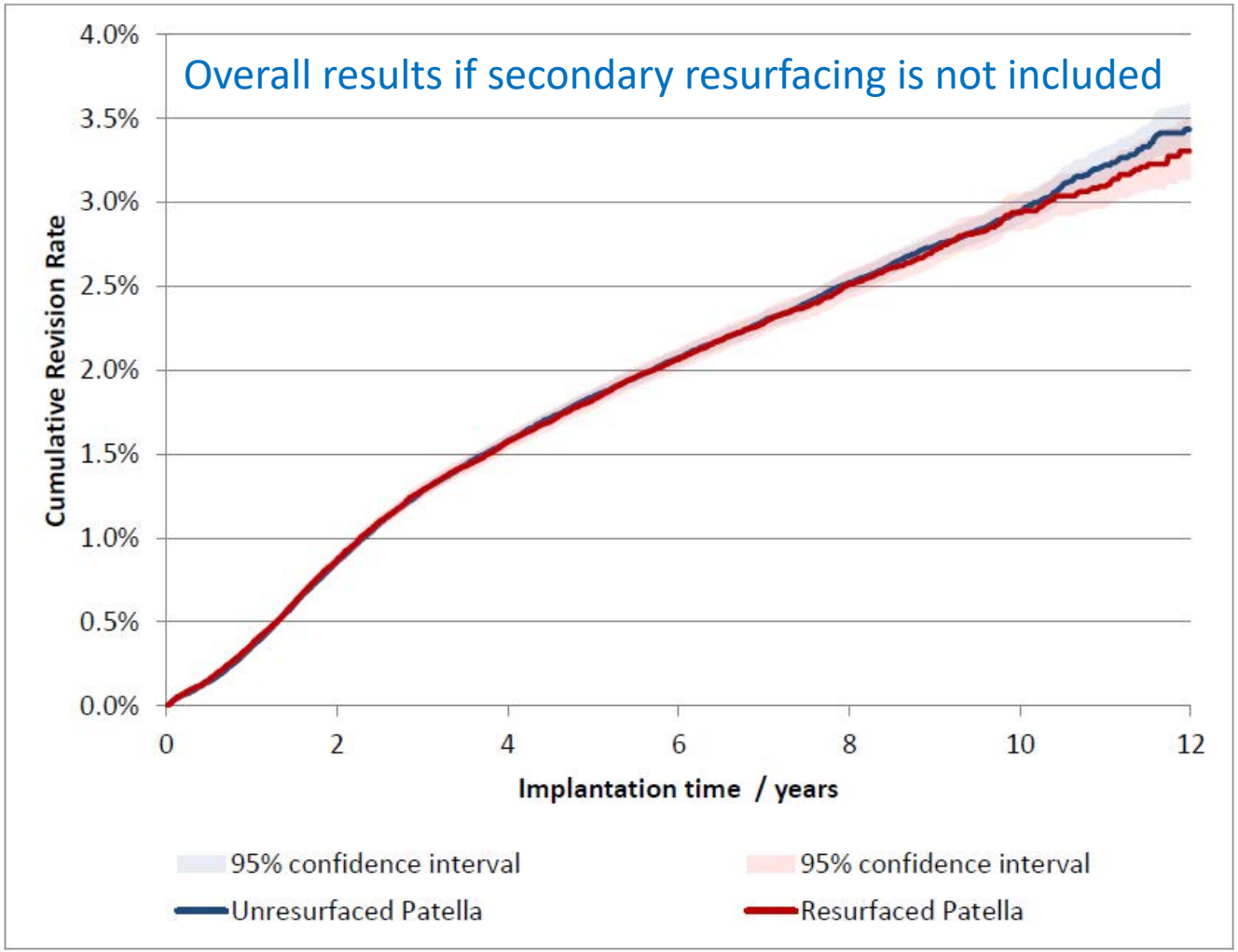
Endpoint: Excluding patella reoperation only



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Implants might have poor outcomes because of *how they are used*

- Some implants may mainly be used by surgeons who DO resurface patellae *(or Don't!)*
- Some Implants may do better WITH patellar resurfacing
- Huge NJR database allows us to find out!!

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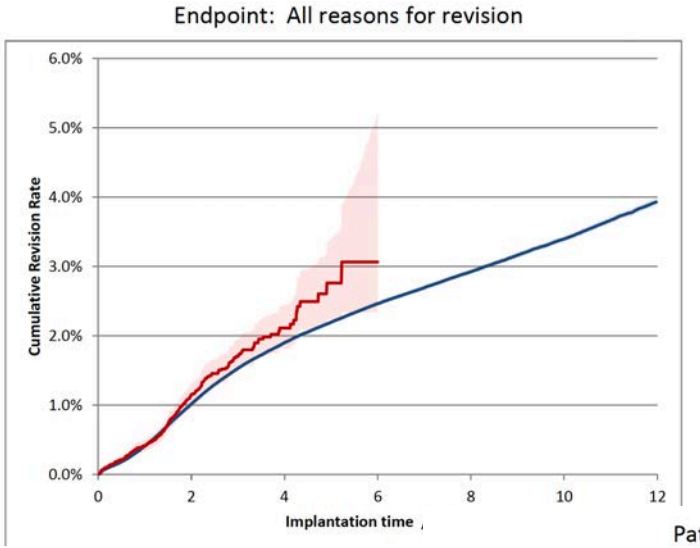

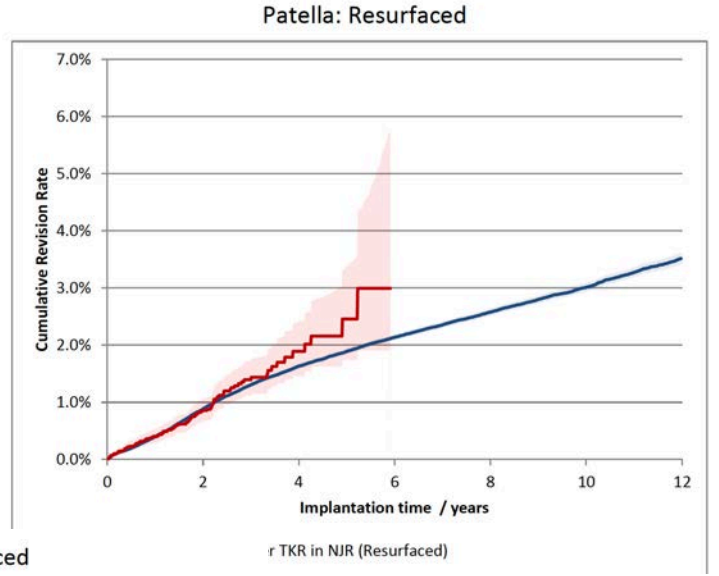

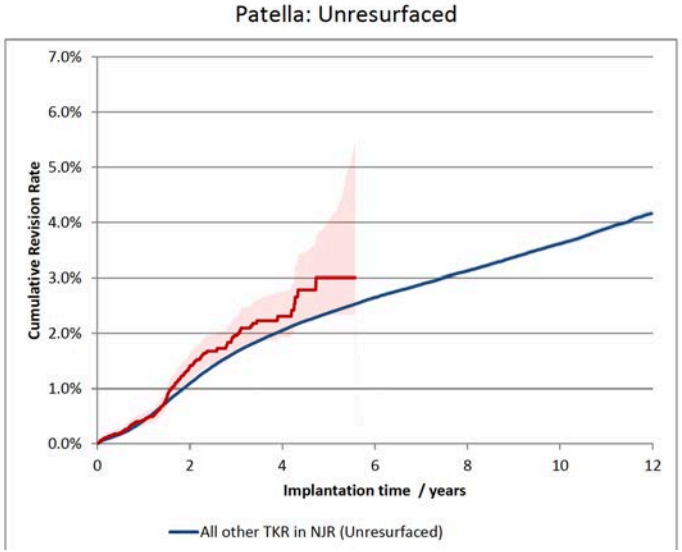

Patellar Friendly- doesn't need resurfacing

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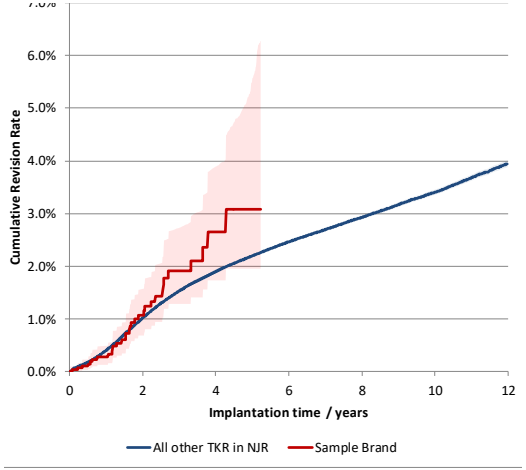
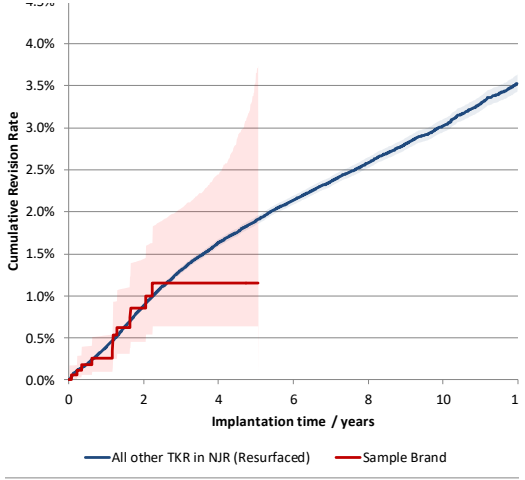
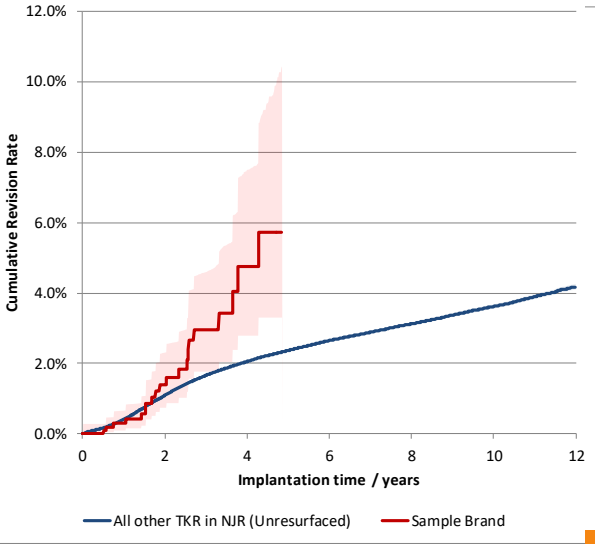
All Combined



Resurfaced



Unresurfaced



Not patellar friendly - needs resurfacing

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Outlier Implants Withdrawn from UK market

Hip

- (p)(m)Profemur Cementless Stem with (m)Profemur L or (m)Profemur Z and Conserve Plus Resurfacing Cup
- Accolade with Mitch TRH Cup
- Anthology with BHR Resurfacing Cup
- ASR 300 cup
- ASR resurfacing cup
- CPCS with BHR Resurfacing Cup
- CPT with Adept Resurfacing Cup
- CPT with BHR Resurfacing Cup
- CPT with Durom Resurfacing Cup
- M2A 38 cup
- Metafix Stem with Cormet 2000 Resurfacing Cup
- R3 used with a metal liner
- Taperfit Cemented Stem with Zimmer Cemented Cup
- Ultima TPS Stem used with Ultima Mom cup (646/651), but from outlier 016: this is now Ultima MoM cup used with anything
- JRI Bicondylar Knee

Knee

- St Leger Knee
- Tack

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TKR revision rates by Brand

Brand[1]	Number of knee joints	Median (IQR) age at primary	Percentage (%) male	Time since primary					
				1 year	3 years	5 years	10 years	13 years	15 years
Columbus Cemented	13,650	71 (65-77)	44	0.44 (0.34-0.58)	1.62 (1.40-1.88)	2.33 (2.04-2.66)	3.28 (2.80-3.85)	*3.81 (2.96-4.89)*	
E-Motion Bicondylar Knee	3,333	67 (61-74)	45	0.67 (0.44-1.02)	2.66 (2.15-3.29)	3.53 (2.92-4.26)	4.84 (4.01-5.83)	*5.63 (4.55-6.96)*	
EvolutionMP	1,152	(62-75)	44	0.78 (0.39-1.55)	2.42 (1.53-3.82)	*3.30 (2.01-5.40)*			
Genesis II	74,851	71 (65-77)	42	0.45 (0.40-0.50)	1.55 (1.45-1.65)	2.12 (2.00-2.25)	3.15 (2.96-3.35)	3.45 (3.17-3.75)	*3.45 (3.1[illegible]-3.75)*
Genesis II Oxinium	10,154	59 (54-64)	40	0.55 (0.42-0.72)	2.36 (2.06-2.71)	3.50 (3.11-3.93)	5.95 (5.30-6.67)	7.36 (6.33-8.55)	*7.97 (6.[illegible]-9.76)*
Insall-Burstein II Microport	2,059	71 (63-77)	45	0.34 (0.16-0.72)	1.76 (1.27-2.44)	2.92 (2.26-3.77)	5.11 (4.18-6.23)	6.65 (5.49-[illegible])	*7.13 (5.82-8.72)*
Journey II BCS Oxinium	2,620	65 (58-71)	41	0.70 (0.42-1.17)	3.50 (2.50-4.89)	*3.79 (2.68-5.35)*			
†Kinemax	11,090	71 (64-77)	43	0.25 (0.17-0.36)	1.76 (1.53-2.02)	2.71 (2.42-3.04)	4.76 (4.35-5.20)	5.98 (5.49-6.51)	6.53 (5.96-7.15)
†LCS	2,059	70 (63-76)	41	0.64 (0.37-1.09)	1.83 (1.33-2.52)	2.41 (1.82-3.18)	3.06 (2.38-3.94)	3.42 (2.68-4.36)	4.03 (3.17-5.11)
LCS Complete	27,842	70 (63-76)	44	0.45 (0.38-0.54)	1.69 (1.54-1.86)	2.55 (2.36-2.76)	3.74 (3.48-4.03)	4.55 (4.14-5.01)	
Legion	1,229	71 (65-77)	42	0.42 (0.18-1.02)	1.44 (0.87-2.38)	1.89 (1.18-3.02)			
Maxim	2,200	70 (63-77)	42	0.46 (0.25-0.85)	1.97 (1.46-2.66)	2.81 (2.19-3.62)	5.26 (4.30-6.43)	7.27 (5.86-9.01)	*8.46 (6.62-10.79)*
MRK	13,410	70 (64-77)	44	0.31 (0.23-0.43)	1.22 (1.03-1.45)	1.69 (1.45-1.97)	2.73 (2.35-3.18)	*3.18 (2.62-3.85)*	*4.14 (2.57-6.63)*
Natural Knee II	2,858	70 (64-76)	42	0.32 (0.17-0.61)	1.32 (0.96-1.82)	2.19 (1.70-2.81)	4.00 (3.27-4.90)	6.55 (5.23-8.17)	*7.44 (5.48-10.08)*
Nexgen	163,322	70 (63-76)	43	0.37 (0.34-0.41)	1.40 (1.34-1.47)	2.17 (2.09-2.25)	3.72 (3.58-3.86)	4.53 (4.32-4.75)	5.03 (4.64-5.45)

Beware Confounders!

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Specific Implants results may depend upon sub-type

Brand[1]	Number of knee joints	Median (IQR) age at primary	Percentage (%) male	Time since primary					
				1 year	3 years	5 years	10 years	[illegible]	15 years
Genesis II									
Cemented, unconstrained, fixed	53,312	71 (65-77)	43	0.38 (0.33-0.44)	1.39 (1.29-1.50)	1.91 (1.77-2.05)	2.80 (2.59-3.02)	3.02 (2.76-3.30)	*3.02 (2.76-3.30)*
Cement, posterior-stabilised, fixed	18,866	71 (65-77)	39	0.62 (0.52-0.75)	1.88 (1.67-2.11)	2.61 (2.35-2.90)	3.9 (3.51-4.48)	*4.67 (3.41-6.38)*	
Genesis II Oxinium									
Cemented, unconstrained, fixed	6,428	59 (54-64)	40	0.49 (0.35-0.71)	2.02 (1.68-2.43)	2.93 (2.49-3.44)	4.73 (4.05-5.52)	[illegible] (4.99-7.39)	*6.74 (5.19-8.74)*
Cemented, posterior-stabilised, fixed	3,121	58 (53-63)	41	0.70 (0.46-1.07)	3.16 (2.56-3.90)	4.82 (4.03-5.76)	9.17 (7.63-11.00)	*11.28 (8.41-15.05)*	
Journey II BCS Oxinium									
Cemented, posterior-stabilised, fixed	2,601	65 (58-71)	41	0.66 (0.39-1.11)	3.32 (2.33-4.71)	*3.62 (2.52-5.19)*			
†Kinemax									
Cemented, unconstrained, fixed	10,832	71 (64-77)	43	0.24 (0.17-0.36)	1.78 (1.54-2.05)	2.72 (2.43-3.06)	4.78 (4.37-5.23)	5.99 (5.49-6.53)	6.50 (5.94-7.12)
LCS Complete									
Cemented, unconstrained, mobile	11,803	70 (64-76)	42	0.43 (0.32-0.56)	1.59 (1.37-1.85)	2.60 (2.31-2.93)	4.17 (3.74-4.64)	*5.14 (4.44-5.95)*	
Uncemented hybrid, unconstrained, mobile	15,900	69 (62-75)	46	0.48 (0.38-0.60)	1.78 (1.58-2.01)	2.53 (2.28-2.81)	3.40 (3.07-3.76)	4.14 (3.64-4.72)	
MRK									
Cemented, unconstrained, fixed	13,163	70 (64-77)	44	0.32 (0.23-0.44)	1.23 (1.04-1.46)	1.71 (1.47-1.99)	2.77 (2.38-3.22)	*3.22 (2.66-3.89)*	*4.17 (2.60-6.66)*
NRG									
Cemented, unconstrained, fixed	8,586	70 (64-76)	43	0.36 (0.25-0.51)	1.45 (1.21-1.74)	2.38 (2.05-2.76)	3.69 (3.19-4.27)		
Cemented, posterior-stabilised, fixed	4,806	70 (63-77)	44	0.46 (0.30-0.70)	1.75 (1.42-2.17)	2.48 (2.06-2.97)	3.71 (3.11-4.42)		

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UNI Implants by Brand

Brand[1]	Number of knee joints	Median (IQR) age at primary	Percentage (%) male	Time since primary					
				1 year	3 years	5 years	10 years	13 years	15 years
All unicompartmental knee replacements	122,910	63 (56-70)	50	1.08 (1.02-1.14)	4.17 (4.05-4.29)	6.44 (6.28-6.60)	12.11 (11.84-12.39)	16.28 (15.84-16.73)	19.13 (18.32-19.97)
Unicondylar									
AMC/Uniglide	3,013	64 (57-71)	51	2.35 (1.87-2.96)	6.17 (5.35-7.11)	7.82 (6.89-8.88)	13.34 (11.95-14.89)	*19.01 (16.36-22.04)*	*19.01 (16.36-22.04)*
Journey Uni Oxinium	1,031	61 (55-68)	57	1.60 (0.95-2.70)	3.98 (2.70-5.84)	*6.79 (4.58-9.99)*			
†MG Uni	2,394	63 (56-70)	54	0.92 (0.61-1.40)	3.96 (3.25-4.82)	5.99 (5.10-7.03)	10.18 (8.99-11.52)	12.40 (10.92-14.07)	*14.90 (12.58-17.61)*
Oxford Partial Knee	68,098	64 (57-71)	53	1.14 (1.06-1.23)	3.90 (3.75-4.06)	5.96 (5.76-6.17)	11.32 (10.99-11.66)	15.36 (14.82-15.92)	18.36 (17.34-19.44)
*Physica ZUK	14,973	63 (56-70)	55	0.34 (0.26-0.46)	2.19 (1.93-2.48)	3.45 (3.08-3.86)	6.74 (5.87-7.75)	*8.84 (6.79-11.46)*	
†Preservation	1,524	62 (56-69)	55	2.57 (1.88-3.50)	8.09 (6.82-9.58)	11.61 (10.09-13.34)	17.78 (15.90-19.85)	23.29 (20.94-25.86)	*25.11 (22.32-28.18)*
Sigma HP (Uni)	10,445	63 (55-70)	57	0.75 (0.60-0.95)	3.21 (2.84-3.62)	4.62 (4.14-5.16)	*6.93 (6.03-7.97)*		
Triathlon Uni	1,235	62 (55-69)	54	1.44 (0.88-2.34)	5.12 (3.86-6.76)	8.23 (6.43-10.50)			

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Data on Surgeon Outcomes

- Funnel plots showing surgeons their own positions against every other surgeon for revision rates
- Similar plots for mortality
- Bar chart plots for PROMs, Satisfaction and Demographics
- Volume and scope of practice data

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Overall improvements have occurred in THR revision rate in last decade

The Revision rate rose gradually until 2008 and then slowly improved each year since

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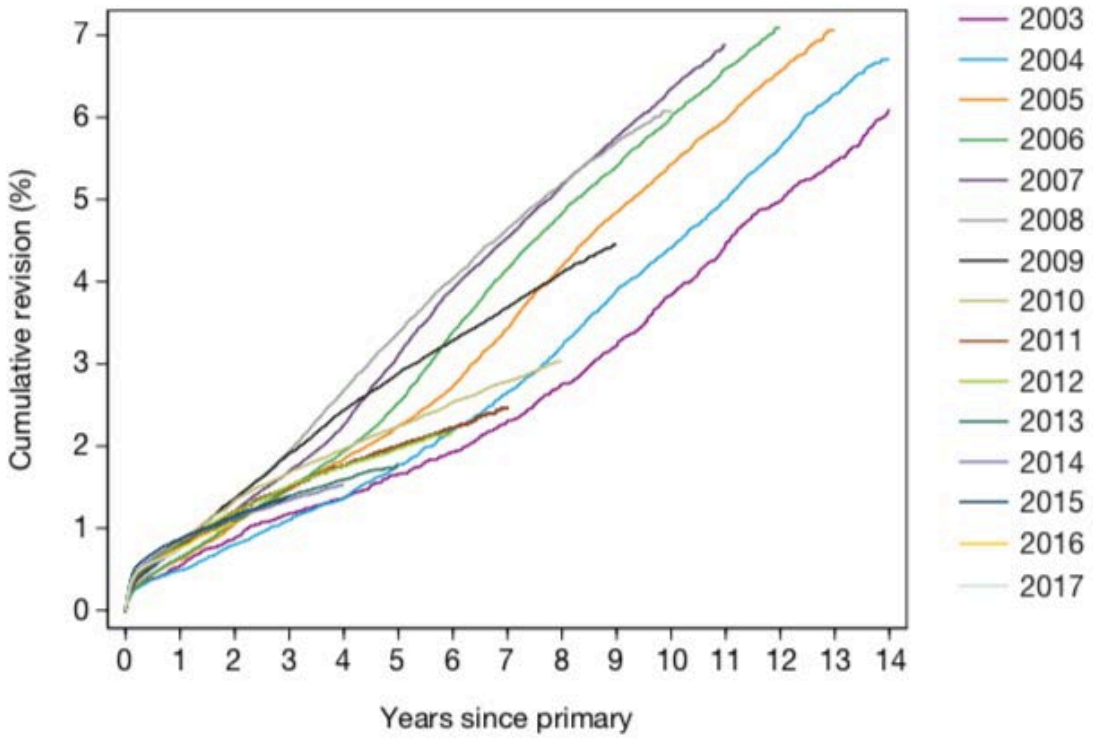
CRR Hips by year of Primary

Figure 3.5 (a) KM estimates of cumulative **revision** by **year**, in primary hip replacements.



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People attributed this to Metal-on - Metal but was there another reason?

NJR started feeding back data about their practice to surgeons in 2008

- 1 year later the 1 year revision rate improved

- 3 years later the 3 year revision rate improved
- Etc etc

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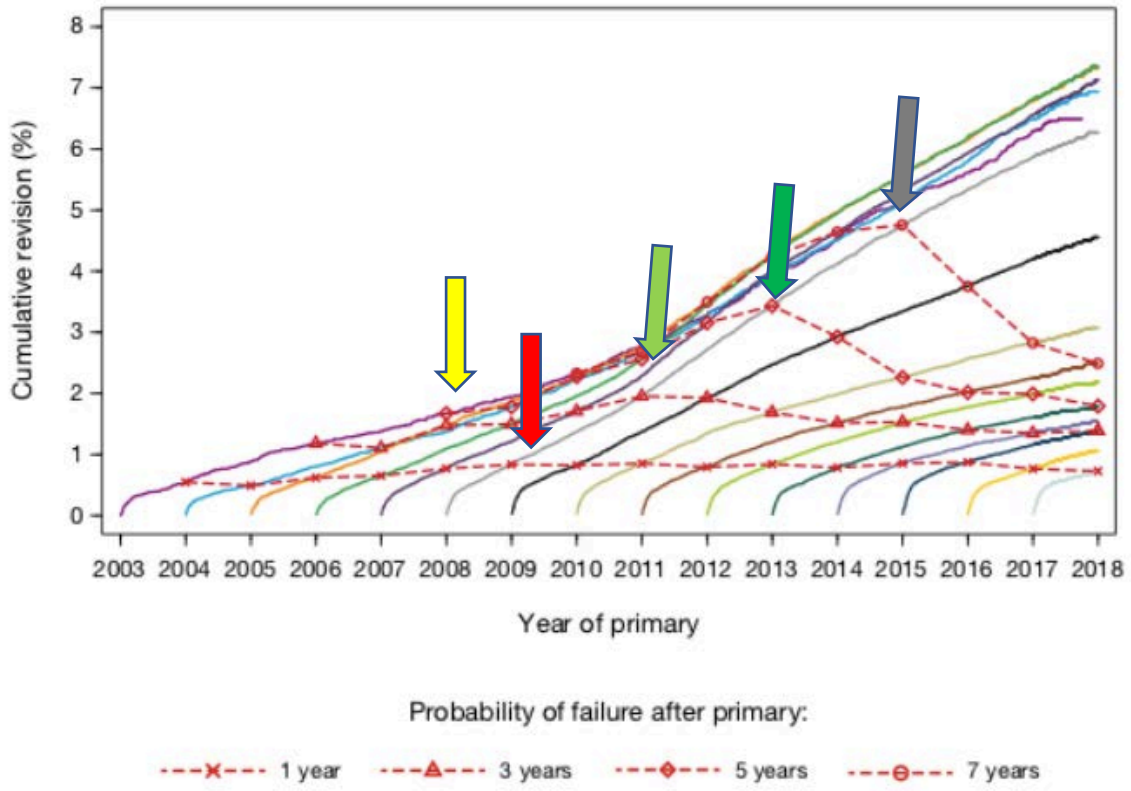
Figure 3.5 (b) KM estimates of cumulative revision by year, in primary hip replacements plotted by year of primary.



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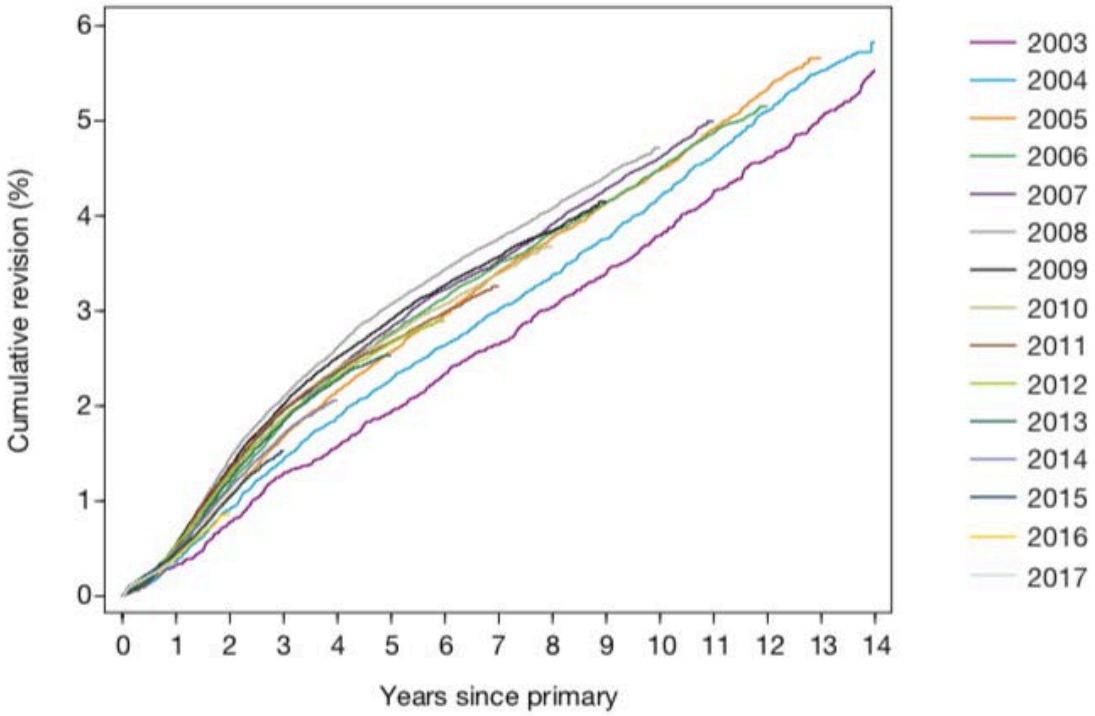
Results for Primary Knees shows improvement since 2008 WITHOUT any Metal-on-Metal issue!

Figure 3.19 (a) KM estimates of cumulative **revision** by **year**, in primary knee replacements.



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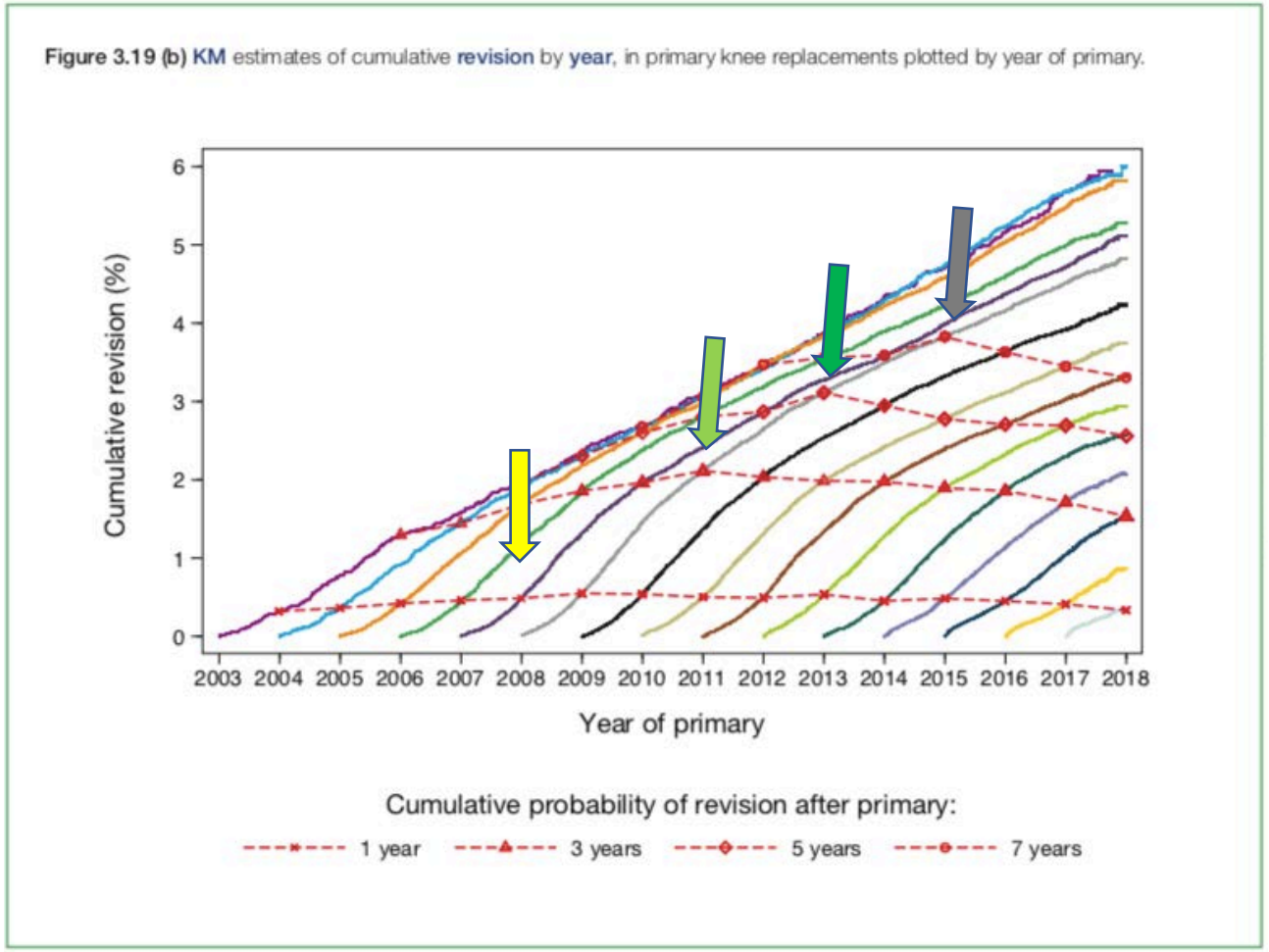
Revision rate peaking at 3,5 and 7 years after introducing surgeon feedback in 2008



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Informing surgeons about their practice and letting them see how they perform in comparison to each other has been followed by the surgeons changing practice and the revision rate decreasing

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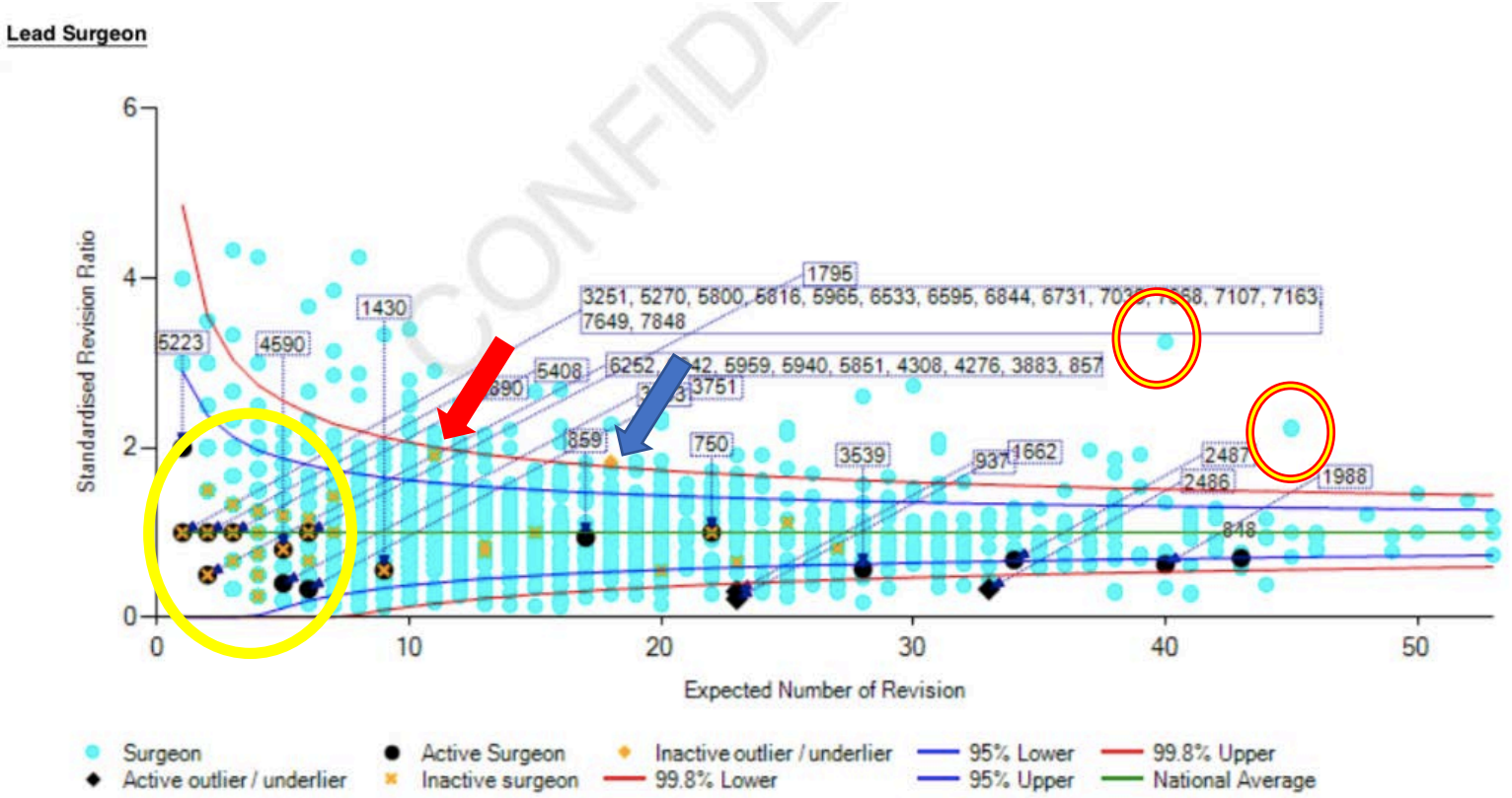
Arrows showing surgeons who have stopped doing THR and red circles those who did a lot of M-o-M



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Outlier Surgeons – what has happened ?

- Many surgeons have changed their practice having seen their results
- Some have stopped using particular implants
- Some have simply stopped because they were not doing very many cases
- Some have stopped doing a certain procedure eg UKR

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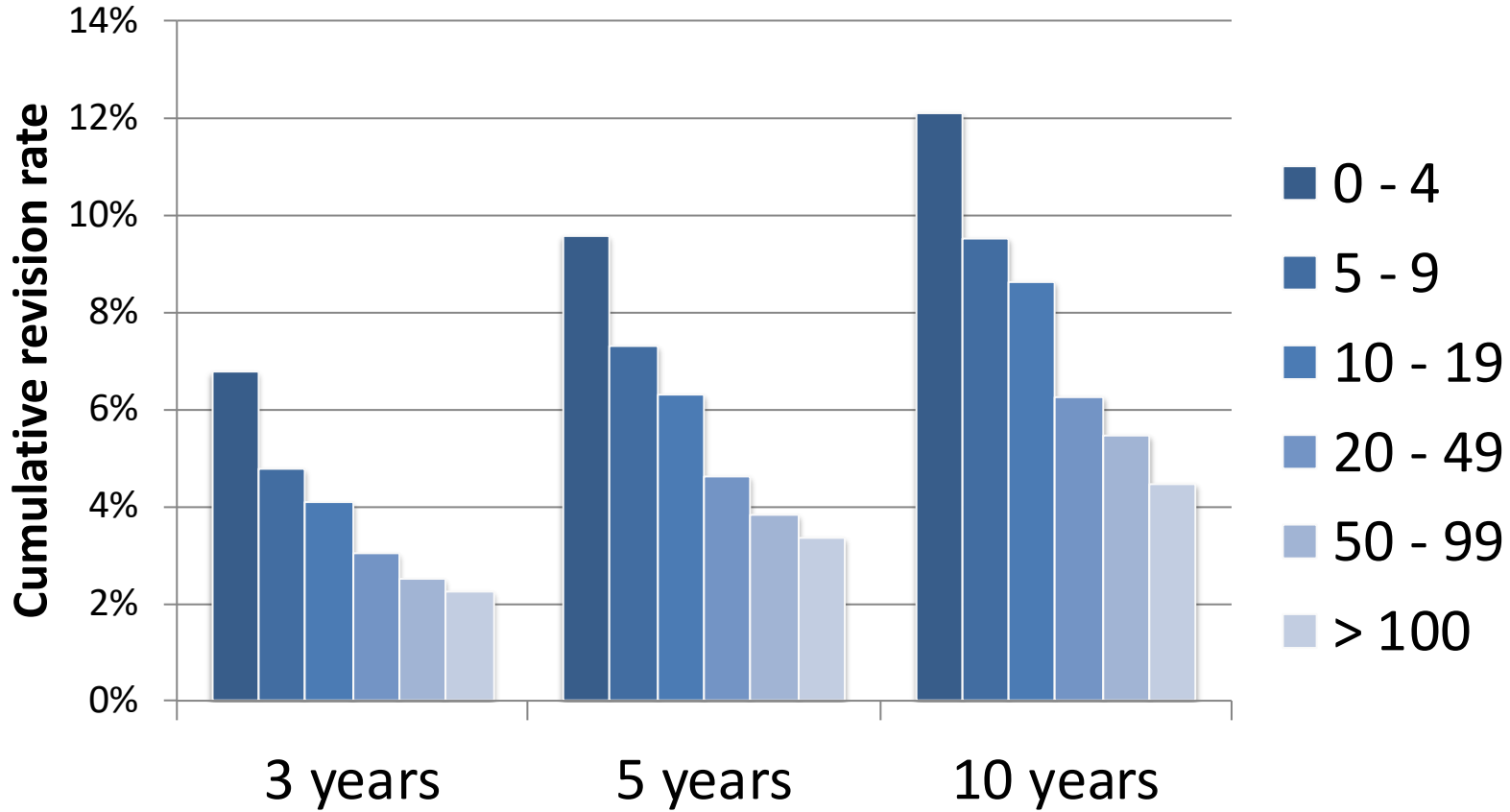
Unicondylar knee revision rate vs. surgeon annual volume



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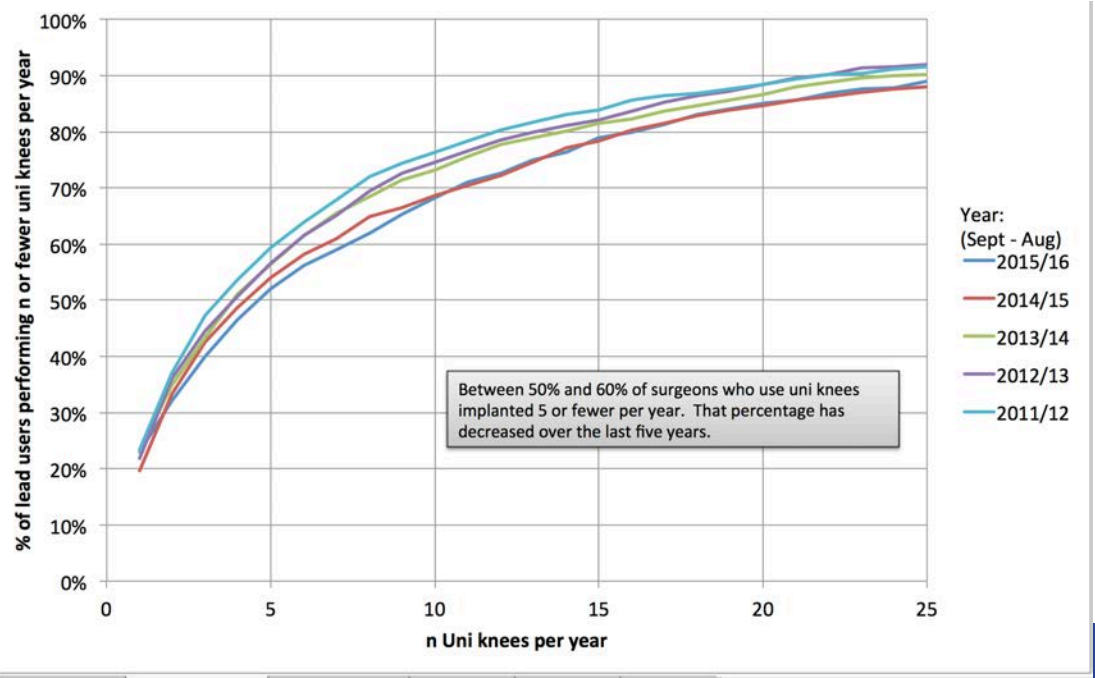
Clear relationship between doing few UNIs and a high revision rate

- Little by little the number of surgeons doing very few UNIs has decreased, each year over the last decade



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Benefits for Patients

- Improved safety due to careful implant monitoring
- Improved choice due to available data about Hospitals and Surgeons

Data for April 2003 - August 2018

Click on the i to find out more about the quality measure and its source data

HOW TO INTERPRET THIS CHART

Patient Outcomes Quality Measure	This Hospital	Patient Records Analysed	This Hospital Ratio	National Ratio	Worse than Expected / EXPECTED RANGE / NATIONAL AVERAGE / Better than Expected
90 Day Mortality: Operations Aug13-Aug18	OK As Expected	2626	1.00	1.00	
Revision Rate: Operations Apr03-Aug18	Better Than Expected	5156	0.64	1.00	
Revision Rate: Operations Aug13-Aug18	Better Than Expected	2674	0.43	1.00	

- Improved understanding of potential risks and benefits of surgery from publications and Decision Aid

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Benefits for Surgeons

- Access to data about their own practice
- Information for Annual Appraisal Process

- Warning about poorly performing implants
- Access to Outcome and complications data about **their operations**
- Comparative data about **their own revision rates**
- EARLY warning about potential problems

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Thank You

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