

Statistical Analysis of NJR data

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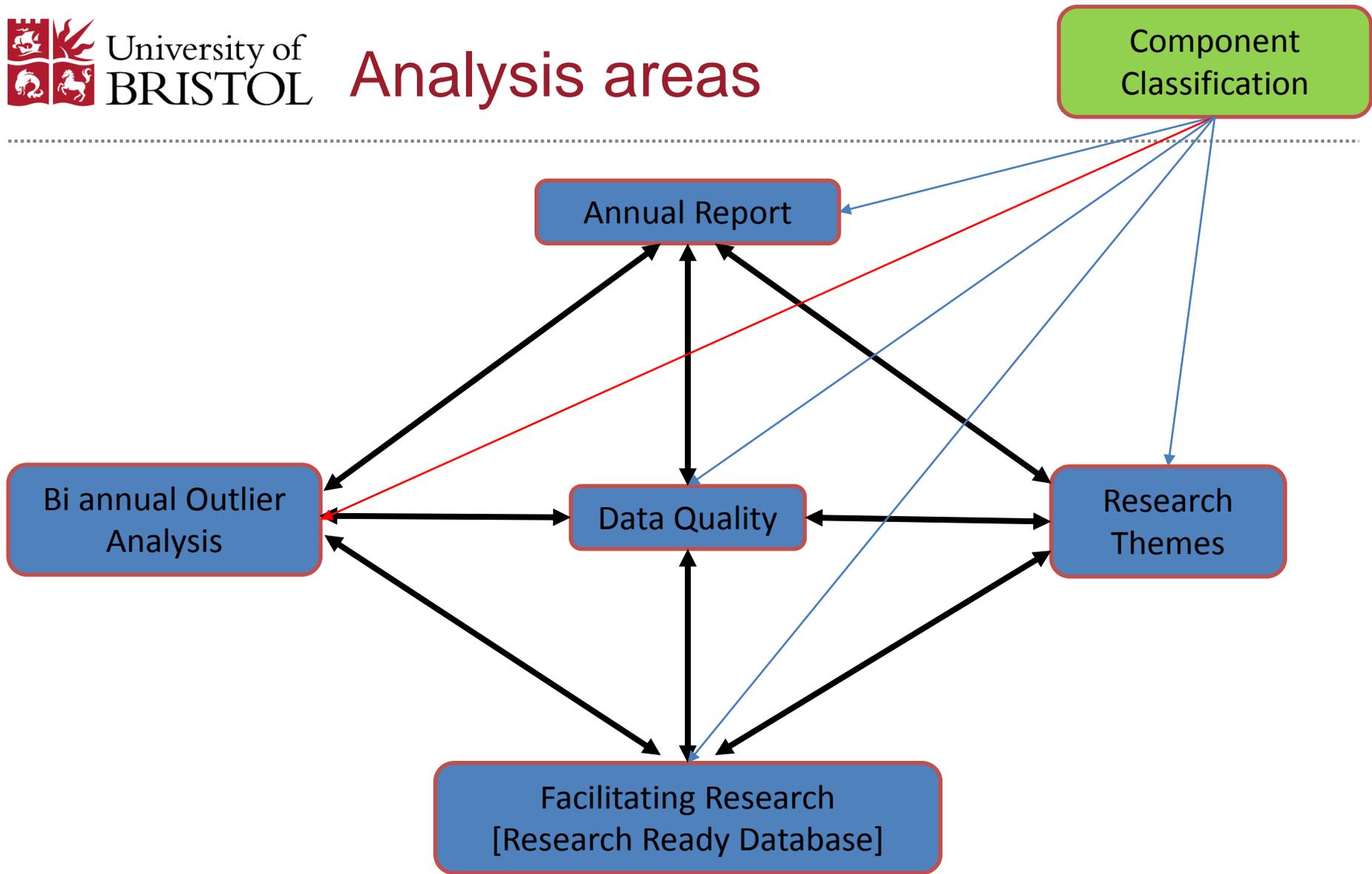
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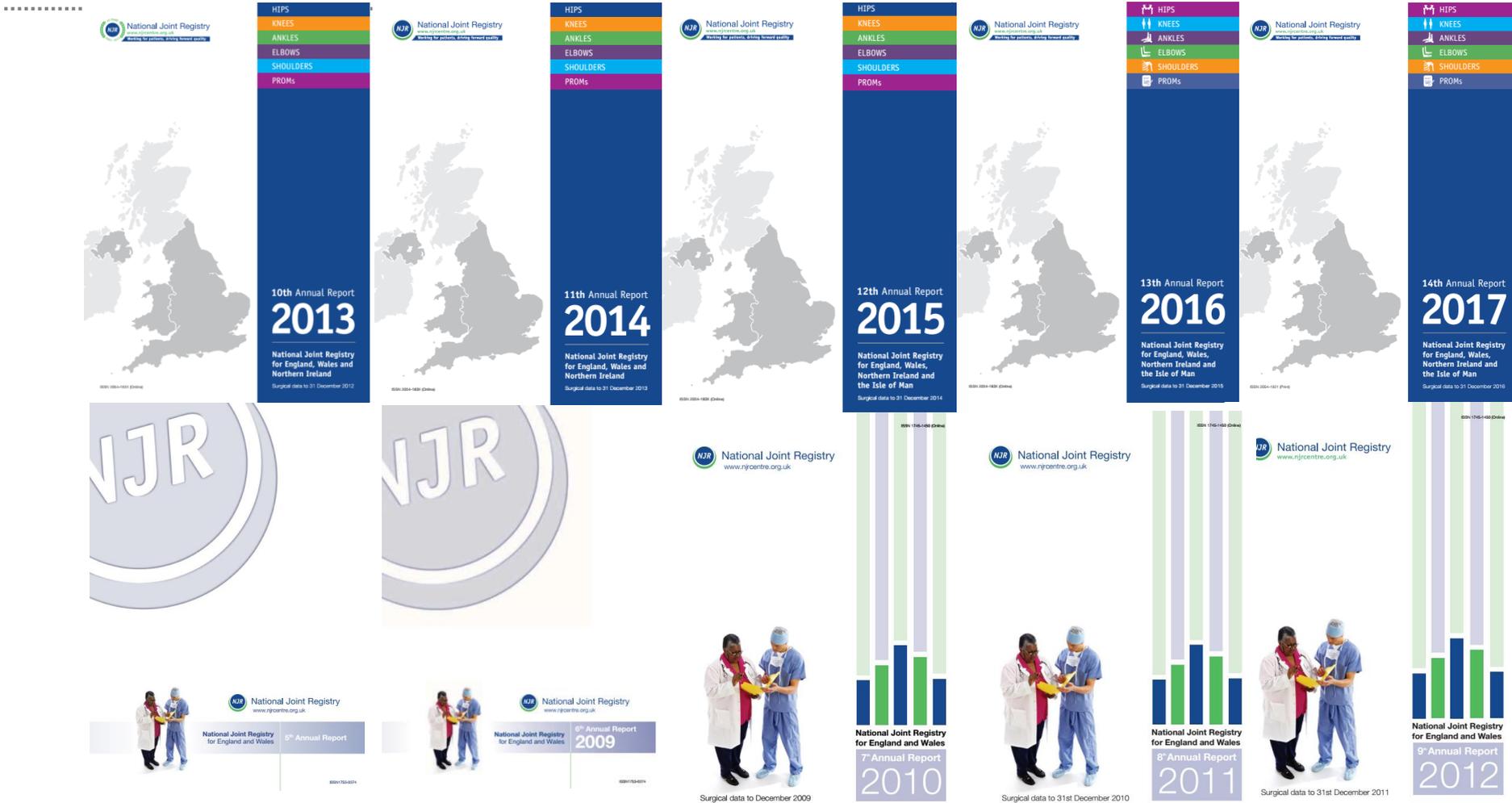


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1. Implant

- a) Hip Stem
- b) Hip Cup
- c) Hip Constructs (Stem & Cups)
- d) Knee Constructs

2. Consultant /Lead Surgeons / Units

- a) 90 Day Mortality (last 5 years)
- b) Revision (last 5 years, Last 10 years, (Un)Cemented ,
Total (Uni) Knee)

Person Time Incidence Rates

- Calculation:

$$\text{Brand PTIR} = \frac{\text{Number of first revisions of brand over analysis period}}{\text{Total time all implants of this brand have been at risk of revision}}$$

- Alarm

- PTIR 2x the overall group upper 95% CI PTIR
- Non overlapping 95% CI
- N>100 primary operations

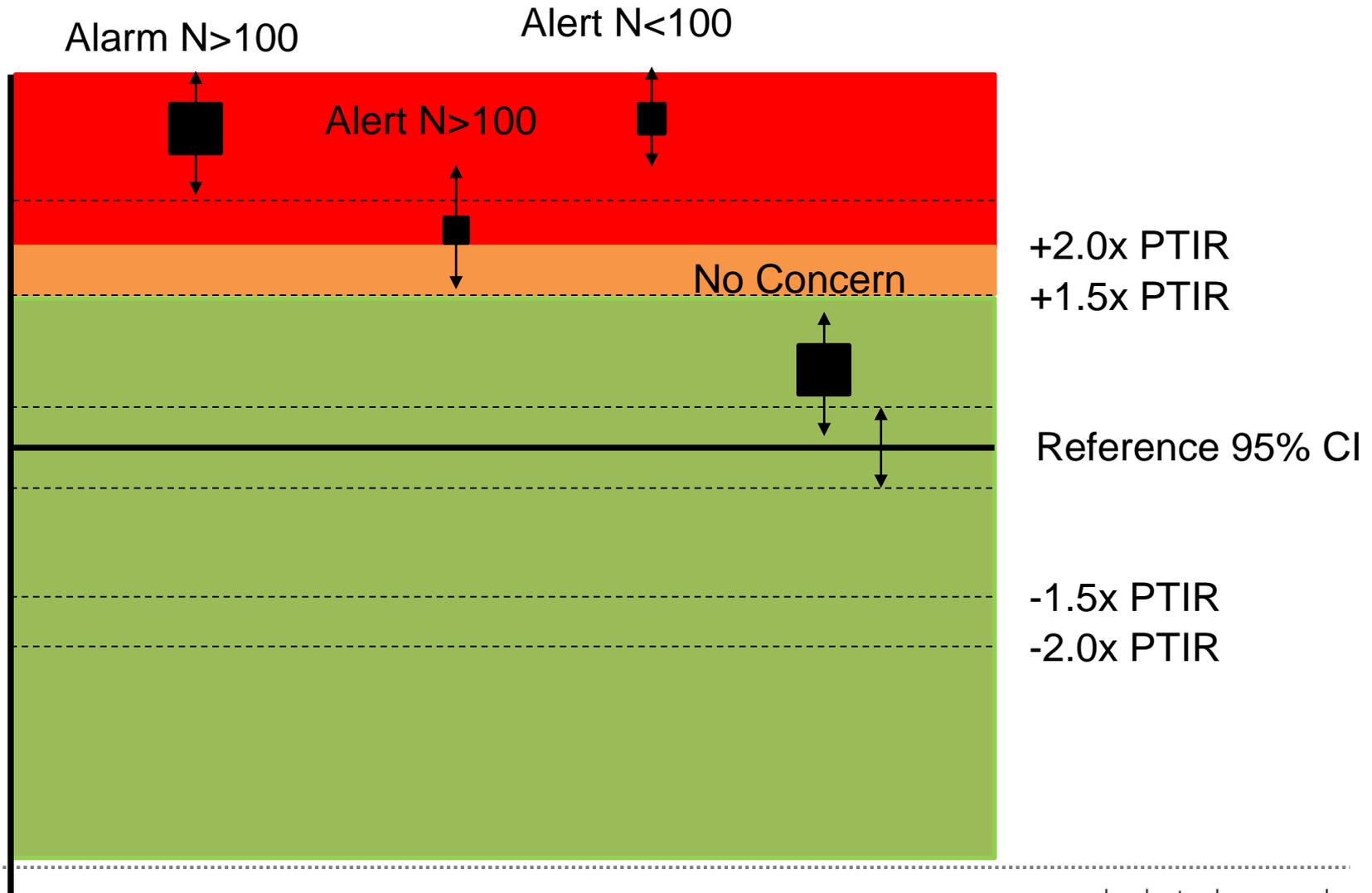
- Alert

- PTIR twice the overall upper 95% CI group PTIR
- Non overlapping 95% CI
- N<100 primary operations

OR

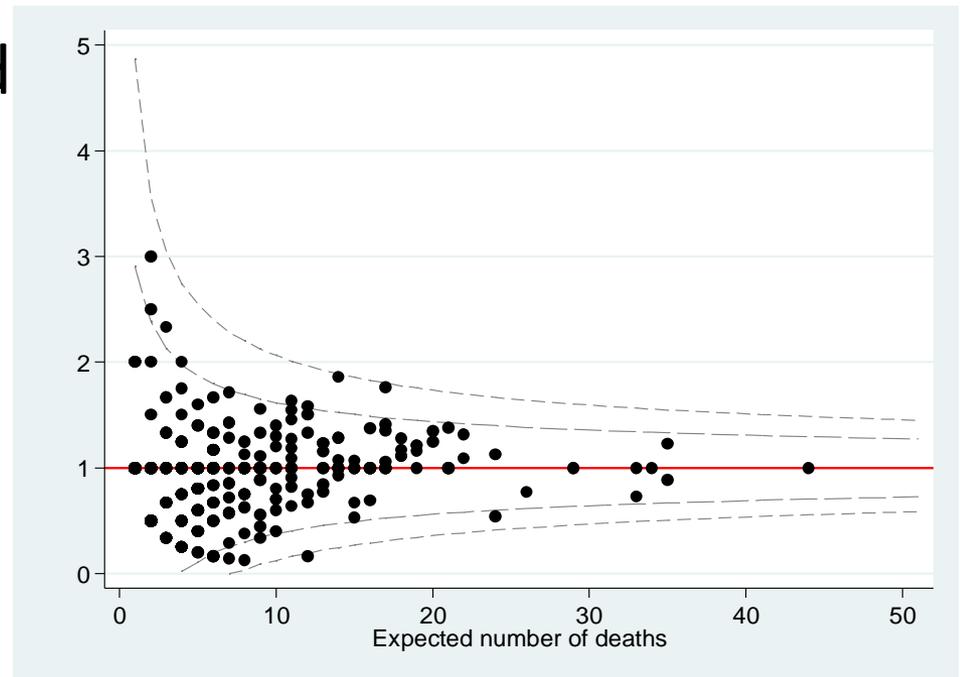
- PTIR 1.5 the overall upper 95% CI group PTIR
- Non overlapping 95% CI
- N>100 primary operations

PTIR- Person Time Incidence Rate

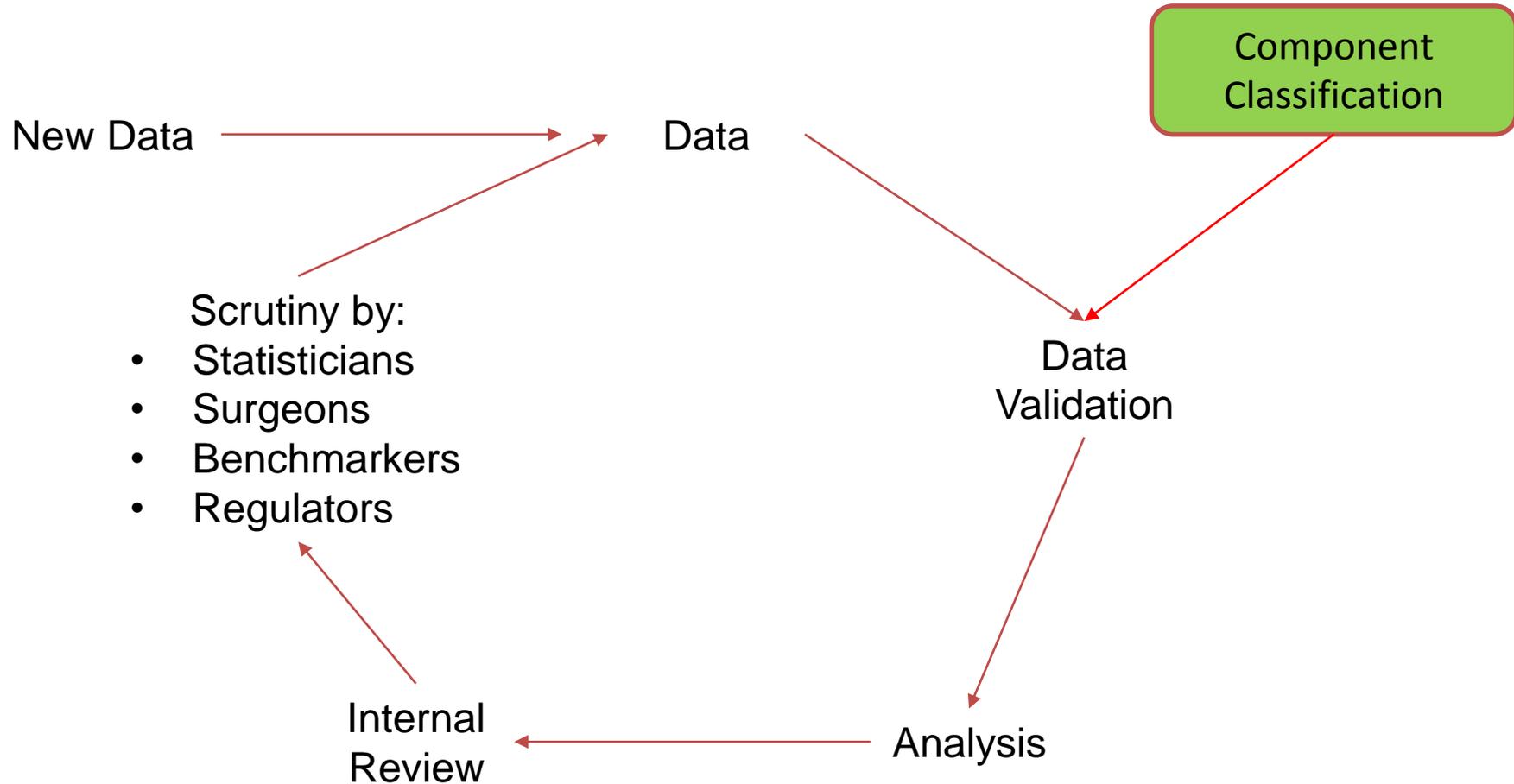




- Funnel Plots
- (SMR | SRR) vs Expected
- Risk adjustment
 - Age
 - Sex
 - Indication
 - ASA
- Stratification by:
 - Hip fixation
 - Knee Type

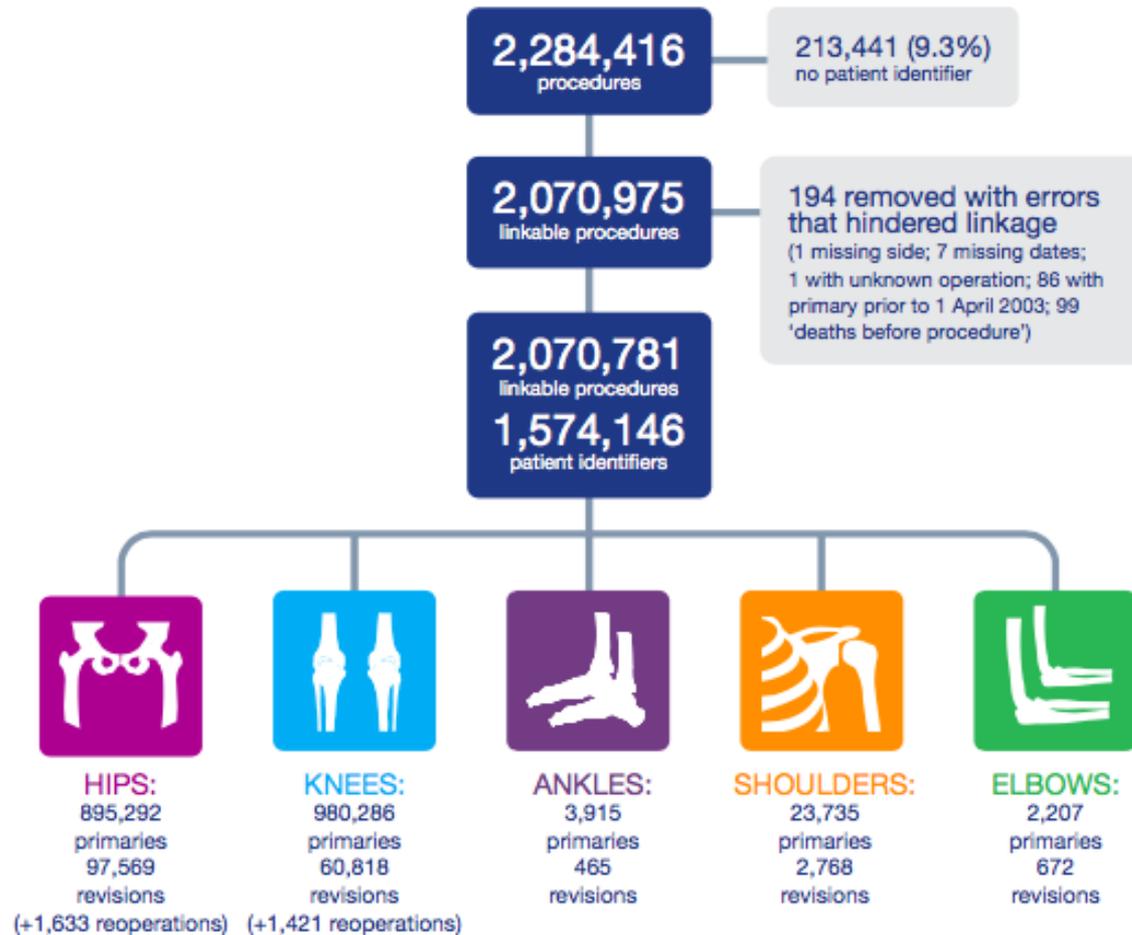


- No Right Answers
 - Desirable Characteristics
 - Sensitivity & Specificity
 - Powerful
 - Accurate
 - Precise
 - Model simplifications
 - Case Mix adjustment
 - **A priori analytical approach**
-

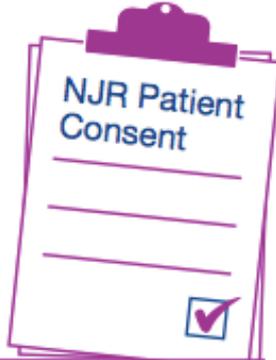


- Annual report content determined by Editorial Committee
- Sections
 - Clinical activity
 - Hip
 - Knee
 - Ankle
 - Elbow
 - Shoulder

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Hips



recorded on the NJR
since April 2003

101,651
replacement
procedures

 **3.5%**
(98,211 in 2015)

60% 

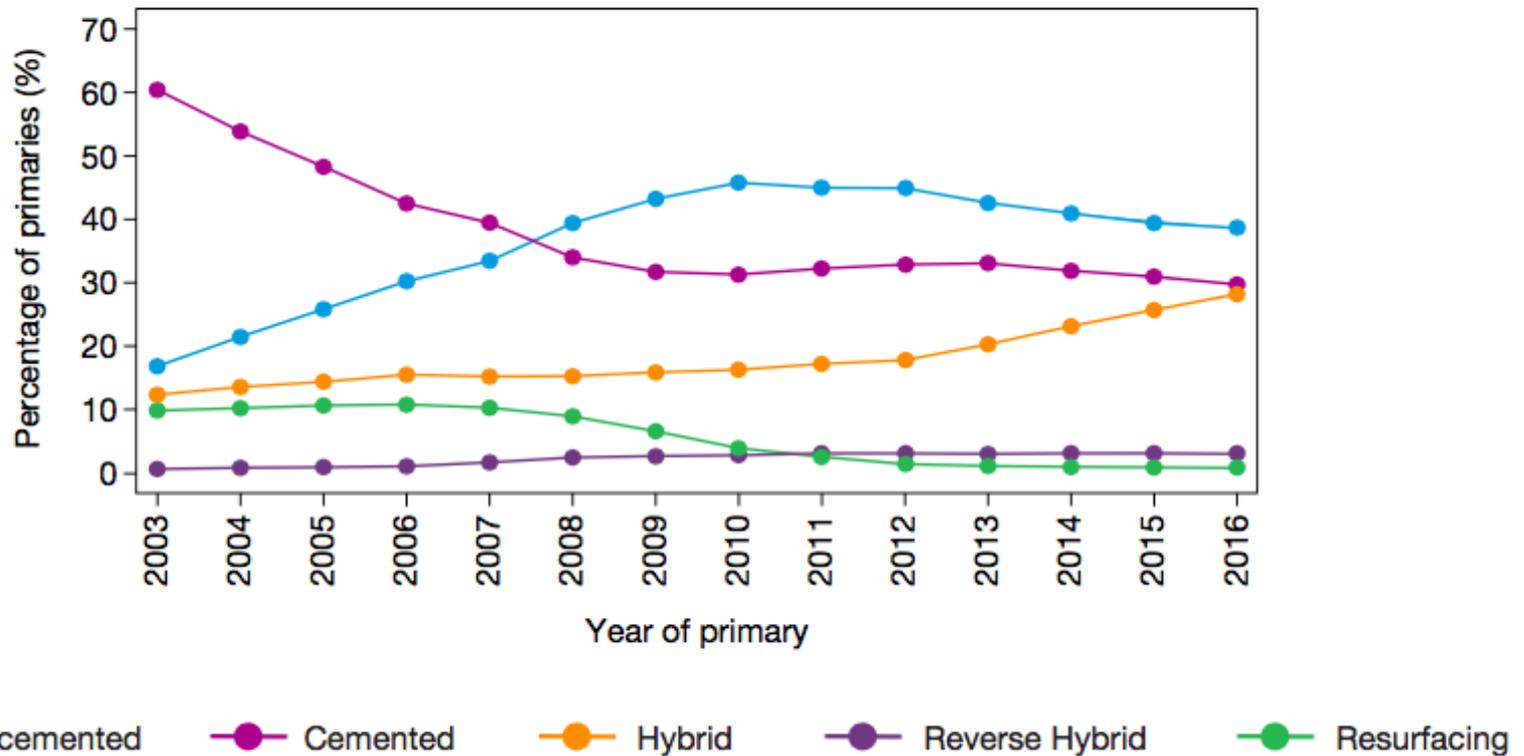
average ages:



67.6 **69.8**

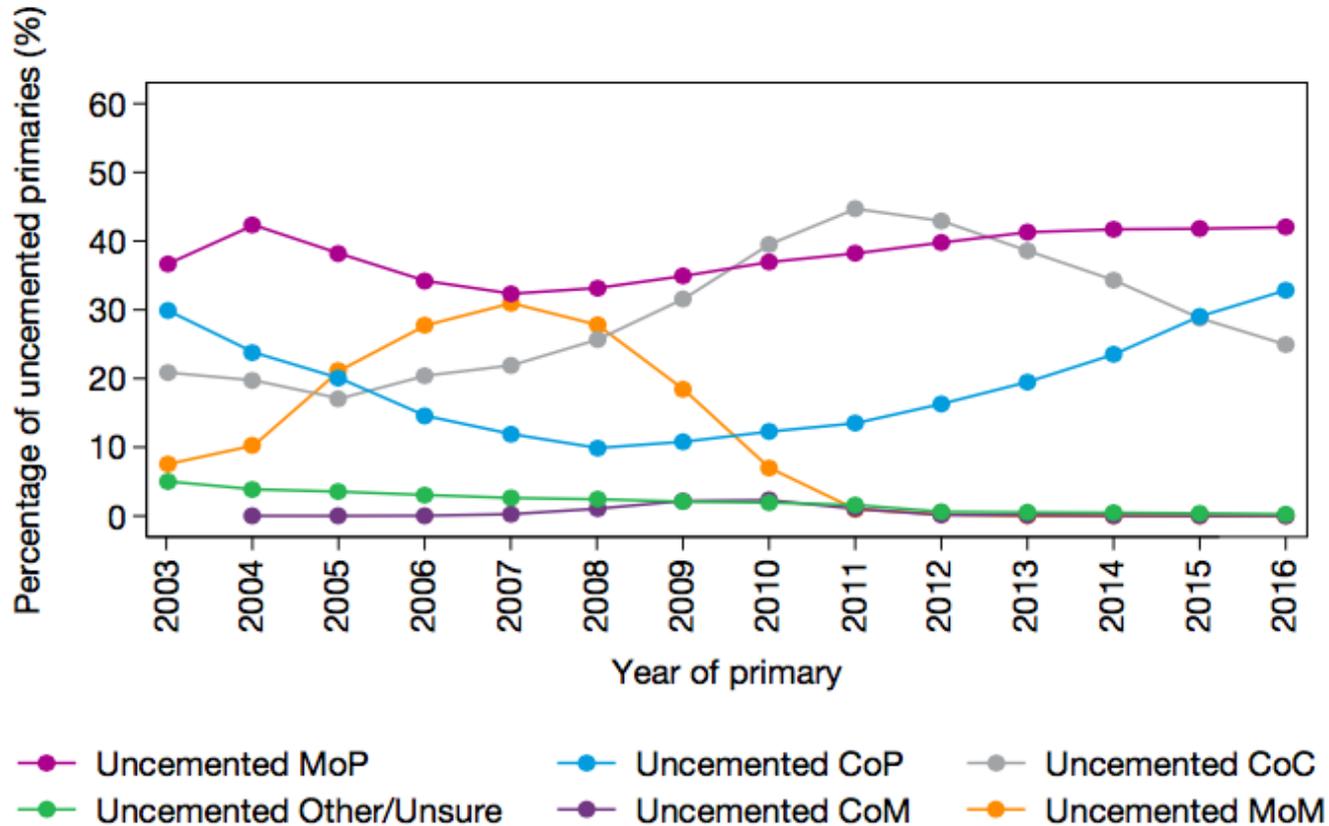
Fixation Trends

Temporal changes in percentages of each fixation method used in primary hip replacements.



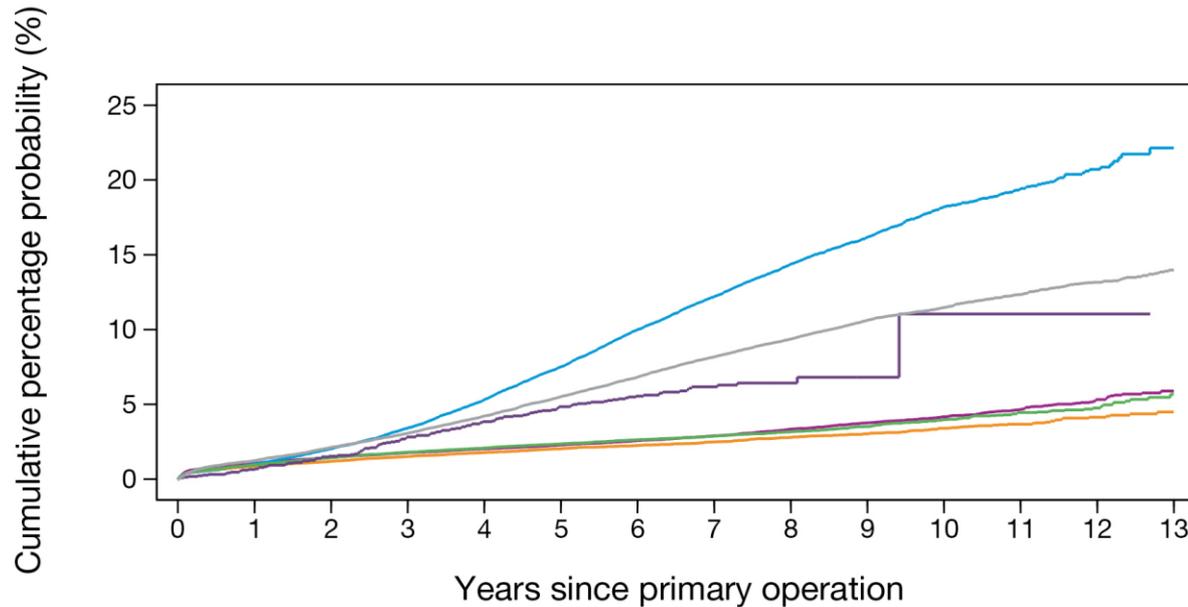
Bearings Trends

Temporal changes in percentages of each bearing surface used in **uncemented** primary hip replacements.



Revision Outcomes by Fixation and Bearing

Comparison of cumulative probability of revision (Kaplan-Meier estimates) for **uncemented** primary hip replacements with different bearing surfaces.

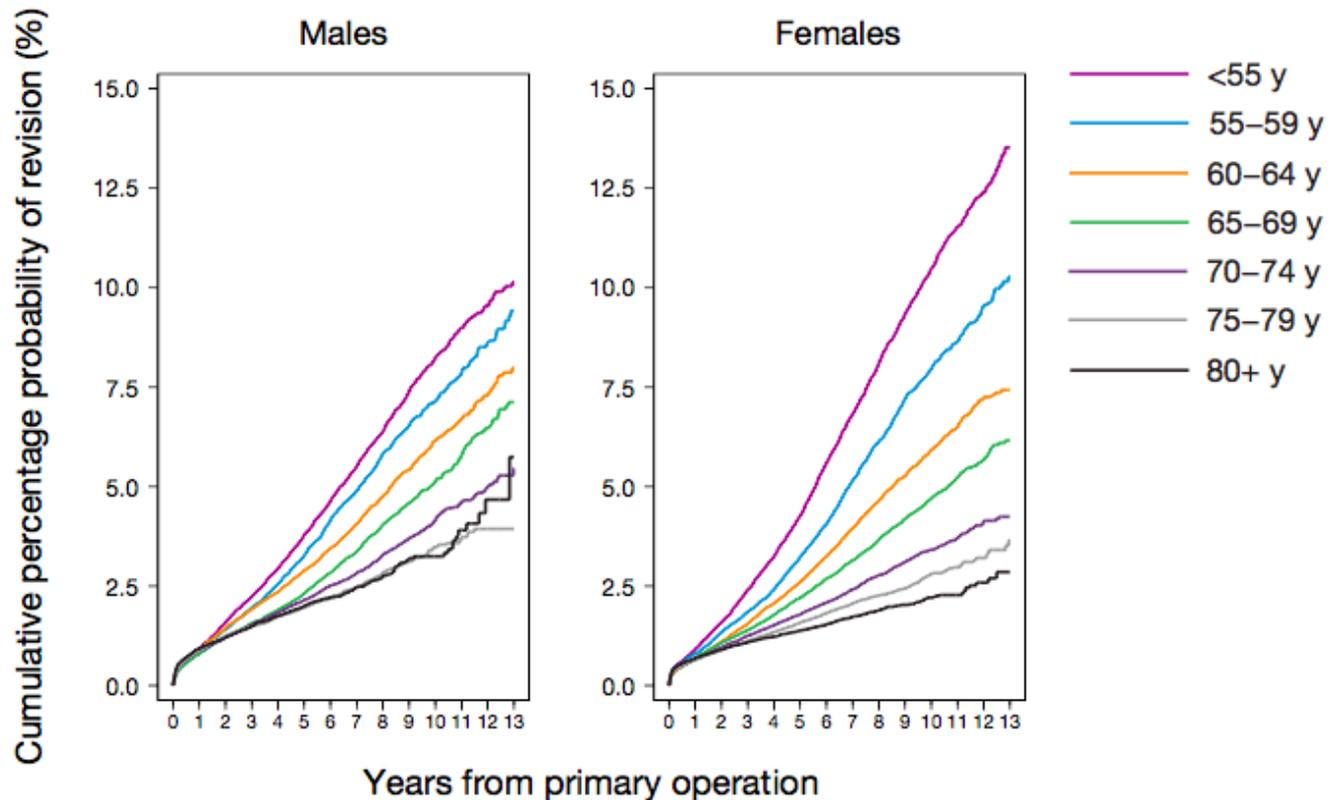


Number at risk

Uncemented MoP	133,873	116,605	100,644	84,375	69,229	54,834	42,228	30,868	21,562	14,098	8,860	5,043	2,189	541
Uncemented MoM	28,816	28,217	27,656	26,900	25,954	24,816	23,386	20,500	15,445	9,576	4,858	2,062	554	117
Uncemented CoP	64,644	52,666	42,380	33,774	26,897	21,086	16,552	12,657	9,584	7,200	5,025	3,209	1,596	522
Uncemented CoC	113,185	103,237	92,499	79,621	66,197	51,211	36,764	24,569	15,867	9,626	5,592	2,933	1,387	400
Uncemented CoM	2,155	2,125	2,087	2,034	1,959	1,860	1,523	840	290	47	7	1	1	0
Resurfacing	39,318	38,098	36,900	35,618	34,223	32,599	30,236	27,116	22,648	17,096	11,569	7,102	3,558	1,178

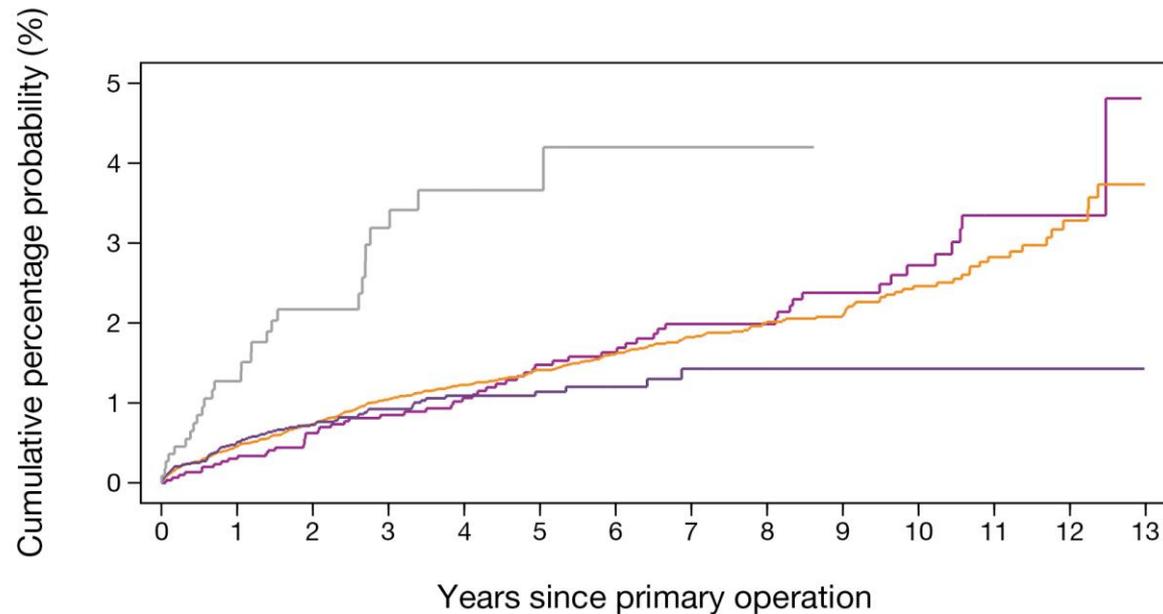
Outcomes by Patient Age and Gender

Cumulative probability of revision (Kaplan-Meier) for the whole cohort of primary hip replacements broken down by age separately for each gender.



Effect of head size on cumulative revision rates after primary hip replacement using different bearing groups (only head sizes used in >500 hips are shown):

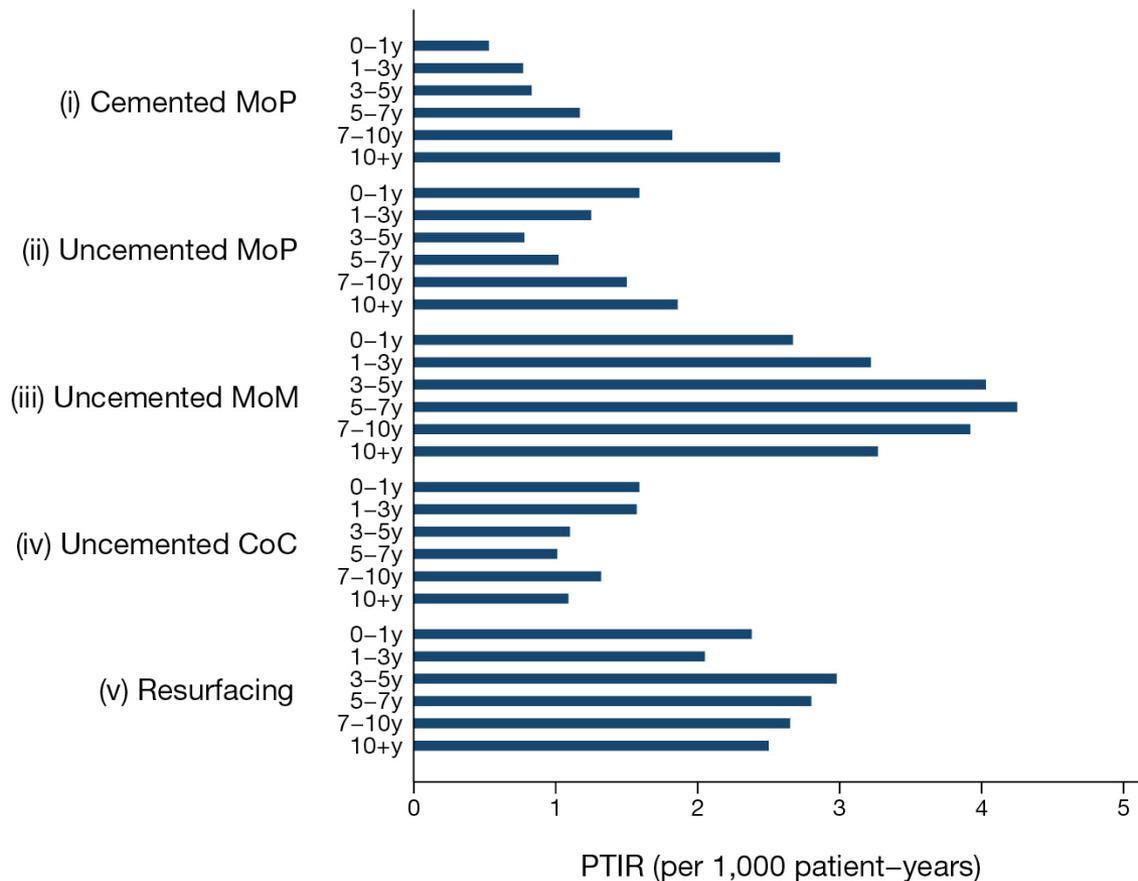
(d) **Ceramic-on-polyethylene cemented monobloc cups**



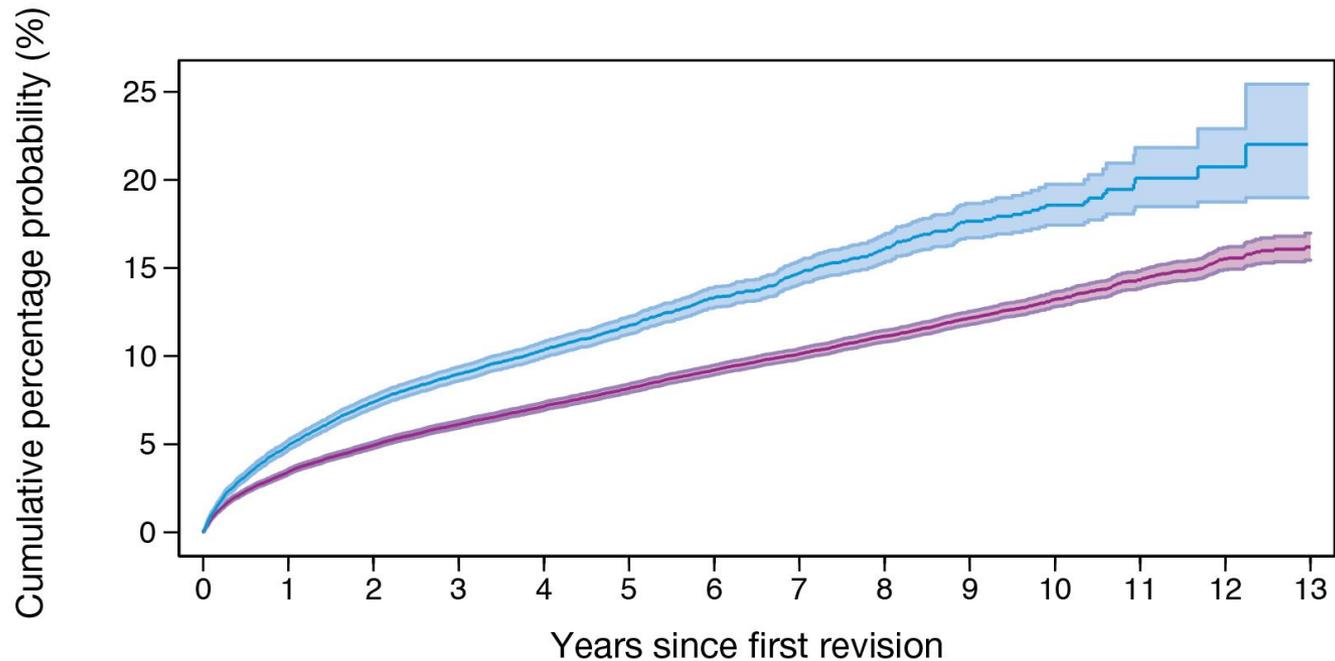
Number at risk

— Head size = 22.25mm	3,030	2,904	2,713	2,484	2,254	2,011	1,750	1,533	1,311	1,038	747	448	177	0
— Head size = 28mm	25,760	22,779	19,822	16,742	13,995	11,435	9,201	7,137	5,372	3,787	2,488	1,548	804	278
— Head size = 32mm	9,801	7,738	5,842	4,152	2,907	1,906	1,212	721	378	169	103	49	19	6
— Head size = 36mm	1,114	833	602	431	302	182	97	32	6	0	0	0	0	0

Change in PTIR with time from primary hip replacement, for **aseptic loosening** for selected fixation/bearing sub-groups.



Kaplan-Meier estimates of the cumulative probability of a hip re-revision, shown separately for those with documented primaries in the NJR* and the remainder (shaded area indicate point-wise 95% CIs).



Number at risk

— Primary not in the NJR	61,096	53,207	47,015	40,608	34,374	28,124	22,673	17,854	13,583	9,652	6,187	3,691	1,839	586
— Primary in the NJR	24,103	19,731	16,189	12,984	9,994	6,921	4,572	3,008	1,848	1,048	510	240	82	16

Revision by Fixation, Bearing and Age

Fixation/ bearing types	Age at primary (years)	Males						Females							
		n	Years from primary operation					n	Years from primary operation						
			1 year	3 years	5 years	7 years	10 years		13 years	1 year	3 years	5 years	7 years	10 years	13 years
All cases	55-64	89,239	0.90 (0.84-0.97)	1.94 (1.84-2.04)	3.04 (2.91-3.17)	4.40 (4.23-4.58)	6.57 (6.31-6.83)	8.60 (8.12-9.11)	108,096	0.73 (0.68-0.78)	1.67 (1.59-1.75)	2.85 (2.74-2.97)	4.42 (4.27-4.59)	6.74 (6.50-6.98)	8.61 (8.20-9.04)
All cemented	55-64	15,008	0.64 (0.52-0.78)	1.47 (1.28-1.69)	2.06 (1.82-2.33)	2.85 (2.54-3.20)	4.71 (4.21-5.26)	6.66 (5.76-7.71)	24,386	0.44 (0.36-0.53)	1.12 (0.98-1.27)	1.76 (1.58-1.96)	2.58 (2.34-2.84)	4.17 (3.80-4.57)	5.85 (5.21-6.55)
MoP	55-64	9,785	0.64 (0.50-0.83)	1.70 (1.45-2.00)	2.38 (2.07-2.74)	3.18 (2.79-3.62)	5.12 (4.52-5.79)	7.23 (6.19-8.43)	16,945	0.48 (0.39-0.60)	1.20 (1.04-1.39)	1.80 (1.59-2.04)	2.54 (2.27-2.85)	4.13 (3.72-4.59)	5.59 (4.93-6.35)
CoP	55-64	4,593	0.62 (0.43-0.91)	0.91 (0.66-1.25)	1.12 (0.82-1.53)	1.44 (1.06-1.97)	2.20 (1.52-3.17)	2.72 (1.68-4.39)	6,685	0.28 (0.18-0.45)	0.76 (0.56-1.04)	1.19 (0.91-1.56)	1.67 (1.28-2.16)	2.47 (1.82-3.33)	5.23 (3.33-8.17)
All uncemented	55-64	46,888	0.94 (0.85-1.03)	2.05 (1.91-2.19)	3.26 (3.08-3.45)	4.93 (4.67-5.20)	7.61 (7.19-8.06)	9.74 (8.91-10.64)	54,882	0.84 (0.76-0.92)	1.83 (1.71-1.95)	3.08 (2.91-3.25)	4.85 (4.62-5.10)	7.52 (7.14-7.92)	9.17 (8.51-9.89)
MoP	55-64	11,172	1.03 (0.85-1.24)	2.13 (1.85-2.44)	2.83 (2.49-3.21)	3.73 (3.29-4.22)	5.33 (4.65-6.11)	7.72 (6.28-9.47)	14,516	0.81 (0.68-0.97)	1.74 (1.52-1.98)	2.27 (2.01-2.56)	3.04 (2.70-3.41)	4.56 (4.01-5.18)	6.76 (5.53-8.26)
MoM	55-64	5,109	0.84 (0.63-1.14)	3.04 (2.61-3.56)	6.56 (5.91-7.29)	10.96 (10.11-11.87)	17.07 (15.84-18.38)	19.03 (17.33-20.88)	4,807	0.88 (0.65-1.18)	3.61 (3.11-4.18)	8.91 (8.13-9.76)	15.42 (14.41-16.50)	22.09 (20.77-23.47)	25.13 (23.01-27.40)
CoP	55-64	9,842	0.87 (0.70-1.08)	1.52 (1.27-1.83)	2.16 (1.82-2.57)	2.77 (2.32-3.30)	3.56 (2.95-4.29)	5.48 (4.25-7.06)	12,037	0.69 (0.56-0.86)	1.44 (1.22-1.70)	2.05 (1.76-2.39)	2.59 (2.23-3.02)	3.92 (3.28-4.67)	4.58 (3.75-5.61)
CoC	55-64	19,837	0.94 (0.81-1.09)	1.85 (1.67-2.06)	2.51 (2.27-2.76)	3.07 (2.78-3.39)	4.15 (3.63-4.74)	6.11 (4.51-8.25)	22,257	0.90 (0.78-1.03)	1.59 (1.43-1.77)	2.15 (1.95-2.37)	2.63 (2.39-2.91)	3.61 (3.18-4.09)	4.31 (3.65-5.10)
All hybrid	55-64	13,962	0.79 (0.66-0.96)	1.55 (1.34-1.79)	2.31 (2.03-2.63)	2.94 (2.59-3.33)	4.50 (3.94-5.13)	6.71 (5.55-8.11)	21,467	0.56 (0.47-0.68)	1.15 (1.00-1.31)	1.81 (1.61-2.04)	2.51 (2.25-2.81)	3.59 (3.21-4.01)	5.15 (4.35-6.09)
MoP	55-64	5,009	1.02 (0.77-1.34)	1.78 (1.43-2.22)	2.50 (2.05-3.04)	2.85 (2.34-3.47)	4.69 (3.83-5.73)	7.59 (5.76-9.97)	8,537	0.68 (0.52-0.88)	1.18 (0.96-1.45)	1.88 (1.58-2.24)	2.57 (2.18-3.02)	3.50 (2.97-4.12)	5.18 (4.17-6.44)
CoP	55-64	4,651	0.67 (0.46-0.96)	1.29 (0.95-1.75)	1.63 (1.19-2.23)	1.89 (1.35-2.63)	2.85 (1.81-4.47)	5.31 (2.98-9.35)	6,700	0.57 (0.41-0.79)	1.09 (0.83-1.43)	1.36 (1.03-1.79)	1.71 (1.27-2.31)	2.59 (1.81-3.72)	6.25 (3.17-12.15)
CoC	55-64	3,778	0.59 (0.39-0.89)	1.09 (0.80-1.49)	1.84 (1.42-2.39)	2.30 (1.79-2.95)	3.00 (2.31-3.90)	3.54 (2.61-4.81)	5,552	0.38 (0.25-0.59)	0.90 (0.67-1.20)	1.34 (1.05-1.71)	1.74 (1.38-2.19)	2.25 (1.78-2.85)	2.64 (1.96-3.54)
All reverse hybrid	55-64	1,760	0.97 (0.59-1.58)	2.24 (1.58-3.16)	3.09 (2.23-4.26)	3.68 (2.66-5.09)	6.25 (3.92-9.89)		2,780	0.79 (0.51-1.20)	1.63 (1.19-2.23)	2.29 (1.72-3.05)	3.03 (2.28-4.00)	4.84 (3.33-7.00)	5.70 (3.70-8.74)
MoP	55-64	670	0.96 (0.43-2.12)	1.74 (0.94-3.23)	2.98 (1.73-5.11)	3.48 (2.02-5.96)	7.43 (3.78-14.33)		1,165	1.06 (0.60-1.86)	1.82 (1.16-2.85)	2.88 (1.94-4.25)	3.83 (2.62-5.59)	7.04 (4.40-11.17)	
All resurfacing (MoM)	55-64	11,617	1.22 (1.04-1.44)	2.42 (2.15-2.72)	3.96 (3.61-4.34)	5.60 (5.18-6.06)	7.54 (7.01-8.11)	9.36 (8.45-10.37)	4,577	1.62 (1.29-2.03)	4.49 (3.93-5.13)	8.59 (7.81-9.45)	12.91 (11.96-13.94)	17.58 (16.43-18.80)	21.06 (19.38-22.86)

Revision by Stem/Cup Brand Combinations over time

Stem/cup brand	n	Median (IQR) age at primary	Percentage (%) males	Cumulative percentage probability of revision (95% CI) at:					
				1 year	3 years	5 years	7 years	10 years	13 years
Cemented									
Charnley Cemented Stem / Charnley Ogee	10,076	73 (67-78)	38%	0.37 (0.27-0.52)	1.18 (0.98-1.42)	1.88 (1.62-2.18)	2.49 (2.18-2.85)	3.93 (3.48-4.43)	5.28 (4.57-6.10)
Charnley Cemented Stem / Charnley Cemented Cup	4,510	72 (66-78)	38%	0.31 (0.19-0.53)	1.11 (0.83-1.46)	1.72 (1.37-2.16)	2.31 (1.89-2.83)	3.52 (2.94-4.21)	4.90 (4.02-5.98)
Charnley Cemented Stem / Charnley and Elite Plus LPW	6,590	74 (68-79)	29%	0.34 (0.22-0.51)	0.72 (0.53-0.96)	1.12 (0.88-1.42)	1.51 (1.22-1.86)	2.43 (2.01-2.94)	2.90 (2.38-3.52)
C-Stem Cemented Stem / Elite Plus Ogee	4,912	72 (66-77)	40%	0.36 (0.22-0.57)	0.82 (0.60-1.14)	1.08 (0.81-1.45)	1.44 (1.10-1.89)	2.31 (1.78-3.00)	2.85 (2.13-3.80)
C-Stem Cemented Stem / Marathon	6,025	67 (59-75)	41%	0.37 (0.24-0.57)	0.96 (0.71-1.30)	1.28 (0.95-1.72)	2.07 (1.44-2.97)		
MS-30 / Original ME Muller Low Profile C	3,164	74 (67-80)	31%	0.22 (0.11-0.47)	0.49 (0.29-0.83)	0.81 (0.52-1.26)	1.07 (0.69-1.65)	1.65 (1.01-2.70)	2.57 (1.19-5.50)
Muller Straight Stem Original / ME Muller Low Profile C	2,644	74 (69-79)	30%	0.46 (0.26-0.81)	0.88 (0.58-1.36)	1.13 (0.76-1.68)	1.94 (1.36-2.77)	2.34 (1.64-3.33)	3.10 (2.01-4.78)
Stanmore Modular Stem / Stanmore-Arcorn Cup	5,181	75 (70-80)	29%	0.43 (0.29-0.66)	1.11 (0.85-1.45)	1.59 (1.26-2.00)	1.95 (1.56-2.43)	2.45 (1.95-3.07)	4.10 (3.00-5.58)
CPT / Elite Plus Ogee	2,955	73 (67-79)	36%	0.65 (0.42-1.02)	1.42 (1.04-1.93)	1.90 (1.44-2.51)	2.39 (1.83-3.12)	3.15 (2.36-4.21)	3.53 (2.53-4.91)
CPT / ZCA	12,996	76 (71-81)	30%	0.78 (0.64-0.95)	1.34 (1.14-1.57)	2.01 (1.74-2.32)	2.57 (2.24-2.94)	3.58 (3.09-4.15)	4.42 (3.65-5.34)
Exeter V40 / Exeter Contemporary Flanged	69,842	74 (68-79)	34%	0.40 (0.36-0.46)	0.86 (0.79-0.94)	1.22 (1.12-1.32)	1.57 (1.45-1.69)	2.27 (2.07-2.48)	3.54 (2.94-4.25)
Exeter V40 / Elite Plus Ogee	23,535	74 (69-80)	35%	0.34 (0.28-0.43)	0.77 (0.66-0.90)	1.11 (0.97-1.27)	1.51 (1.33-1.71)	2.15 (1.89-2.44)	2.71 (2.26-3.25)
Exeter V40 / Exeter Duration	16,726	73 (67-79)	32%	0.58 (0.48-0.71)	1.19 (1.03-1.37)	1.65 (1.46-1.87)	2.43 (2.17-2.72)	3.63 (3.26-4.05)	5.30 (4.49-6.25)
Exeter V40 / Opera	2,820	74 (68-80)	32%	0.40 (0.22-0.71)	0.81 (0.53-1.23)	1.16 (0.81-1.66)	1.56 (1.12-2.18)	3.18 (2.27-4.44)	5.24 (3.58-7.64)



NJR Reports

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Working for patients, driving forward quality

 **HIPS**  **KNEES**  **ANKLES**  **ELBOWS**  **SHOULDERS**

INTRODUCTION TO NJR REPORTS

EXECUTIVE SUMMARY

ANNUAL PROGRESS

HIGHLIGHTS: OUR WORK

HIPS

All Procedures - Activity

Primary Procedures - Patient Characteristics

Primary Procedures - Surgical Technique

Primary Procedures - Components

Revision Procedures - Patient Characteristics

Revision Procedures - Components

KNEES



Welcome to NJR Reports

This website contains all of the NJR's 14th Annual Report information, data and analyses on hip, knee, ankle, elbow and shoulder joint replacement surgery



- Covers additional information such as:
 - Surgical approach
 - Bone cement type
 - Thromboprophylaxis
 - Intra-operative events
 - Revision procedures