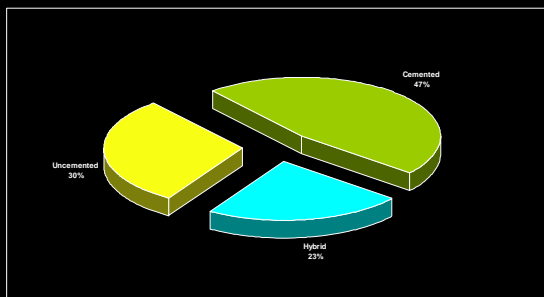


Cemented vs uncemented total hip replacement

Divided opinion in the Orthopaedic community...

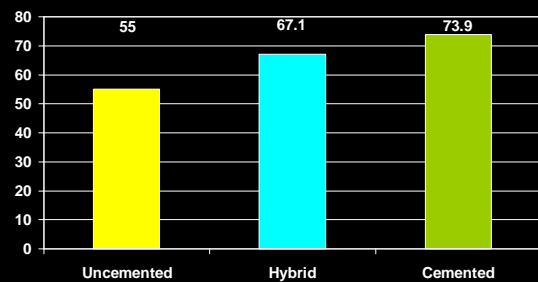


My practice



My practice

Average age



The basics...

Historical perspective

- Mid 19th C-
interposition
arthroplasty
- 1940s Smith-
Petersen vitallium cup
- 1950s- Thompson &
Austin-Moore
hemiarthroplasty



Historical perspective

- Mid 19th C-
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Historical perspective

- Mid 19th C-
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- 1940s Smith-
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- 1950s- Thompson &
Austin-Moore
hemiarthroplasty



Early total hip arthroplasty



Early resurfacing



Metal on metal

- 1960s early metal on metal total hip replacements
- Ring
- McKee-Farrar



Metal on metal

- 1960s early metal on metal total hip replacements
- Ring
- McKee-Farrar



Metal on metal

- 1960s early metal on metal total hip replacements
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Low friction arthroplasty



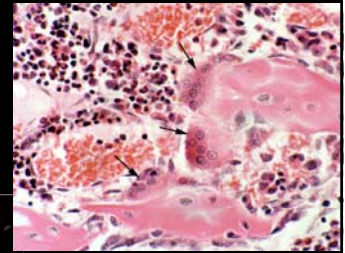
Problems...

- Aseptic loosening & osteolysis



Problems...

- Aseptic loosening & osteolysis



Problems...

- Aseptic loosening & osteolysis
- 'Cement disease'



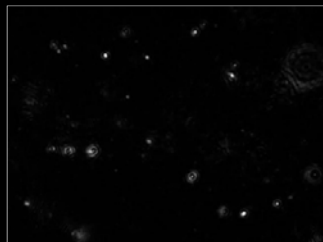
Problems...

- Aseptic loosening & osteolysis
- 'Cement disease'



Problems...

- Aseptic loosening & osteolysis
- 'Cement disease'
- 'Particle disease'



Cemented vs uncemented...

Cemented THR

- Fixation with PMMA
- The 'ultimate custom fit'
- Stainless steel or Co Cr
- Hoop stresses with polished tapers



Cemented THR

- Fixation with PMMA
- The 'ultimate custom fit'
- Stainless steel or Co Cr
- Hoop stresses with polished tapers



Cemented THR

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Cemented THR

- Fixation with PMMA
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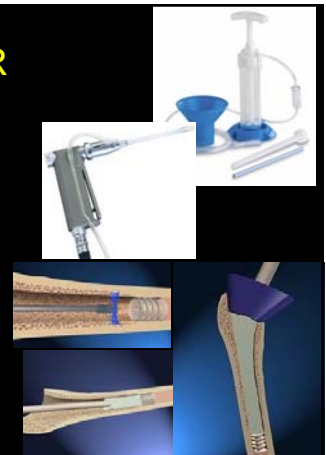
Cemented THR

- Improved cementing techniques
 - First generation
 - Hand mixed
 - Finger packing
- Improved results



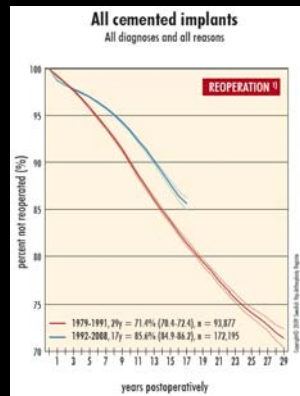
Cemented THR

- Improved cementing techniques
 - Third generation
 - Vacuum mixed
 - Pulse lavage
 - Distal cement restrictor
 - Retrograde canal filling & venting
 - Cement pressurisation
- Improved results



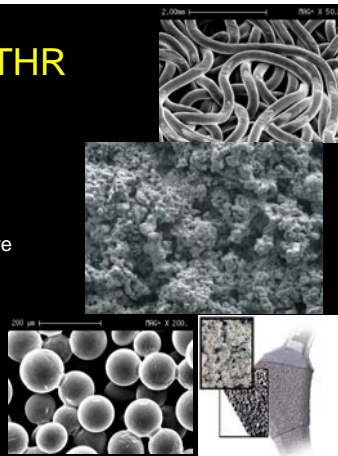
Cemented THR

- Improved cementing techniques
- Improved results



Uncemented THR

- Uncemented
 - Porous surface or hydroxyapatite
 - Titanium alloys
 - Proximal or extensive coating
 - Stress shielding

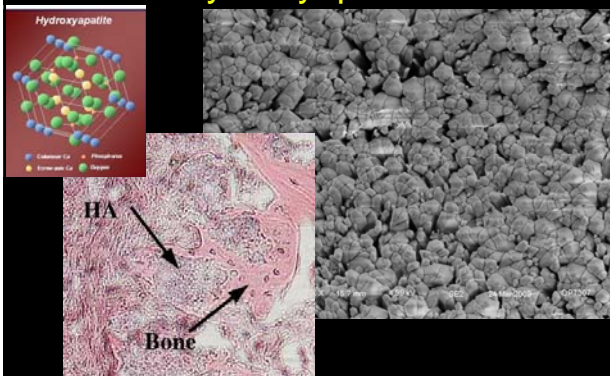


Uncemented THR

- Uncemented
 - Porous surface or hydroxyapatite
 - Titanium alloys
 - Proximal or extensive coating
 - Stress shielding



Calcium hydroxyapatite



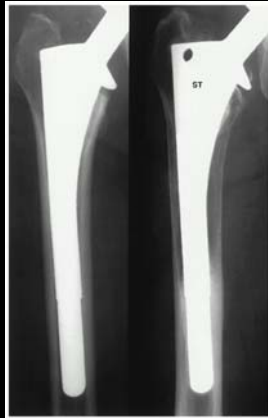
Uncemented THR

- Uncemented
 - Porous surface or hydroxyapatite
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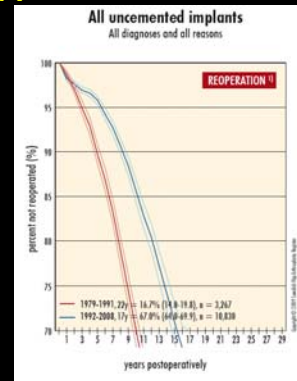
Uncemented THR

- Uncemented
 - Porous surface or hydroxyapatite
 - Titanium alloys
 - Proximal or extensive coating
 - Stress shielding



Uncemented THR

- Improved results



Arguments for & against

Arguments for & against

- Cemented
 - Immediate solid fixation
 - Lower early complication rate
 - Proven, durable results
 - Ease of revision



Arguments for & against

- Cemented
 - Immediate solid fixation
 - Lower early complication rate
 - Proven, durable results
 - Ease of revision



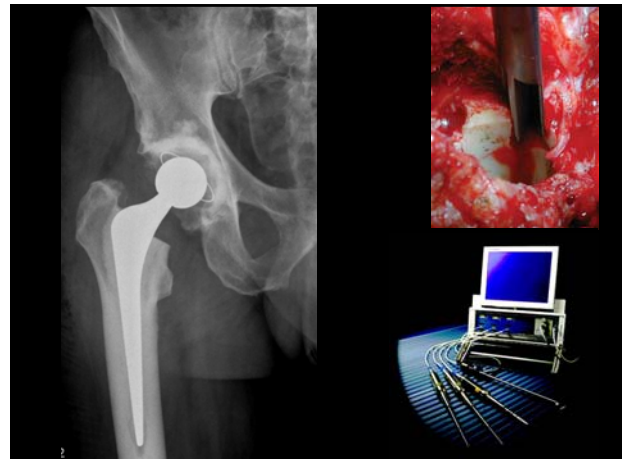
Arguments for & against

- Cemented
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Arguments for & against

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 - Immediate solid fixation
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 - Proven, durable results
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Arguments for & against

- Uncemented
 - Shorter operation time (infection, VTE)
 - Modularity
 - Bearings options
 - Biological fixation
- Revision
 - Can be difficult



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Arguments for & against

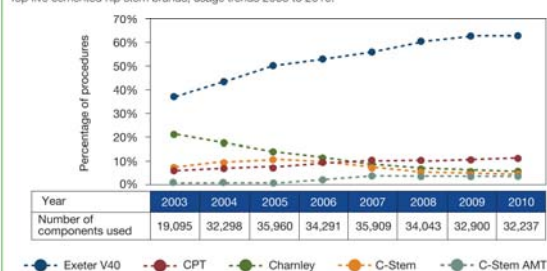
- Uncemented
 - Shorter operation time (infection, VTE)
 - Modularity
 - Bearings options
 - Biological fixation
- Revision
 - Can be difficult



What are we using

Figure 2.8

Top five cemented hip stem brands, usage trends 2003 to 2010.



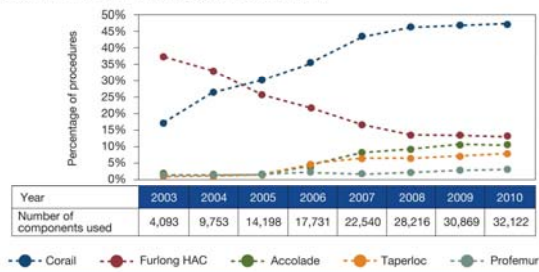
What are we using



What are we using

Figure 2.10

Top five cementless hip stem brands, usage trends 2003 to 2010.



© National Joint Registry 2011

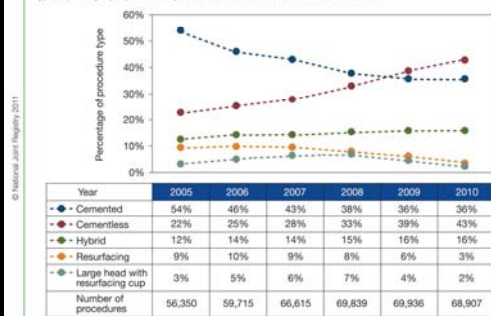
Uncemented



What are we using

Figure 2.3

Type of primary hip replacement procedures undertaken between 2005 and 2010.

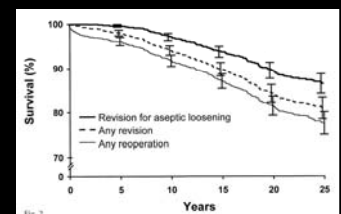


© National Joint Registry 2011

What's the evidence?

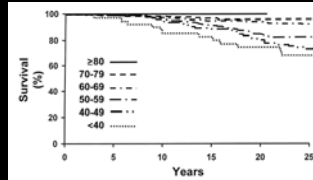
Do cemented hips work?

- Berry et al
JBJS Am 2002;84A:171-177
- 2000 consecutive Charnleys, 25 year FU
- 77.5% no re-operation
- 86.5% no revision for aseptic loosening



Do cemented hips work?

- Berry et al
JBJS Am 2002;84A:171-177
- 2000 consecutive Charnleys, 25 year FU
- 77.5% no re-operation
- 86.5% no revision for aseptic loosening
- Survivorship
 - 100% >80s
 - 68.7% <40s



Do cemented hips work?

- Callaghan et al JBJS-Am 2004;86A:690-95
– 88% survivorship Charnleys at 30years
- Exeter group Ling 2005
– 30 year stem survivorship aseptic loosening 91.5% (83% worst case)
– Cup survivorship 95% at 10; 81% at 20 & 72% at 30 years

Do uncemented hips work?

Published results

Cementless total hip replacement using second-generation components A 12- TO 16-YEAR FOLLOW-UP

VOL. 92-B, No. 12, DECEMBER 2010
J. R. McLaughlin,
K. R. Lee
From Kennedy
Center for the Hip
and Knee, Oakbrook,
Illinois, United
States

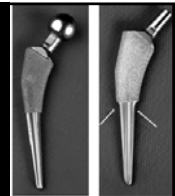


Fig. 1a Fig. 1b
Photographs showing a) the first-generation non-modular Taperloc femoral component and b) the second-generation modular Taperloc component with reduced profile due to the porous coating, cement

Results
There were 123 THRs in 115 patients available for review. A revision for aseptic loosening had been required in three acetabular components (2%) at seven, seven and 11 years post-operatively. No femoral component had required revision for aseptic loosening, but one had needed a further operation following a peri-prosthetic fracture of the femur one year after the initial procedure.

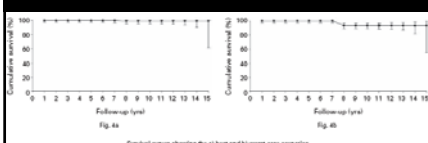
	All hips (n = 172)	Hips in living patients (n = 123)
Femoral components (%)		
Revision loosening	0 (0)	0 (0)
Revision all reasons	1 (1)	1 (1)
Radiological loosening	0 (0)	0 (0)
Total	1 (1)	1 (1)
Acetabular components (%)		
Revision loosening	3 (2)	3 (2)
Revision all reasons	3 (2)	3 (2)
Radiological loosening	0 (0)	0 (0)
Total	3 (2)	3 (2)

Published results

Results of a hydroxyapatite-coated (Furlong) total hip replacement A 13- TO 15-YEAR FOLLOW-UP

We describe the survival of 134 consecutive JRI Furlong hydroxyapatite-coated uncemented total hip replacements. The mean follow-up was for 14.2 years (13 to 15).

The mean total Merle d'Aubigne and Postol score was 7.4 pre-operatively and 15.9 at follow-up. During the study period 22 patients died and six were lost to follow-up. None of the cups was revised. One stem was revised for a periprosthetic fracture following a fall but none was revised for loosening, giving a 99% survival at 13 years. Our findings suggest that the long-term results of these hydroxyapatite-coated prostheses are more than satisfactory.

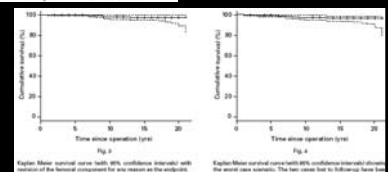


Published results

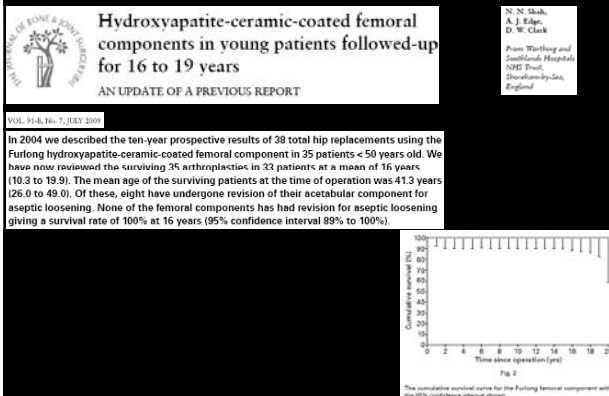
Long-term results of a hydroxyapatite-coated femoral component in total hip replacement A 15- TO 21-YEAR FOLLOW-UP STUDY

VOL. 90-B, No. 1, JANUARY 2008
Between 1986 and 1991 we implanted 321 consecutive Furlong hydroxyapatite-coated femoral components of a total hip replacement in 291 patients. A cemented acetabular

mean follow-up of 17.5 years (15 to 21). Only two patients (0.6%) were lost to follow-up. With revision of the femoral component for any reason as the endpoint, the survival at a mean of 17 years was 97.4% (95% confidence interval 94.1 to 99.5), and with revision for aseptic loosening as the endpoint it was 100%. The survival at a maximum of 21 years with revision of the femoral component for any reason as the endpoint was 97.4% (95%



Published results



Registry data

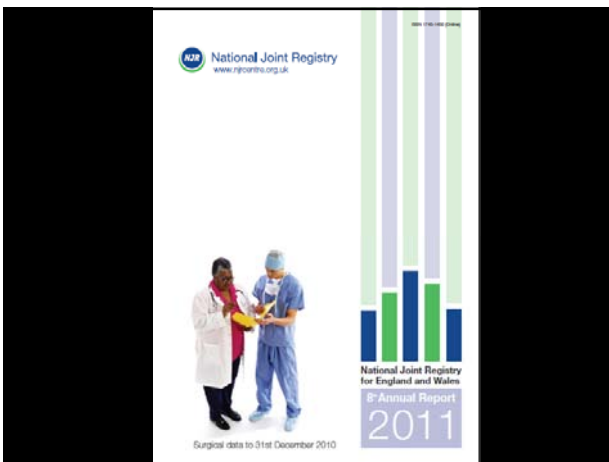


Table 3.4 Summary of NJR data, April 2003 to December 2010.

Year of operation	Primary hip	Revision hip	Primary knee	Revision knee	All
Number of all NJR records					
2003 (April-Dec)	26,432	2,826	24,662	1,157	55,077
2004	48,032	5,238	46,577	2,339	102,186
2005	57,490	6,342	60,704	3,265	127,801
2006	59,715	6,689	62,240	3,755	132,399
2007	66,616	7,436	73,297	4,267	151,636
2008	69,839	7,533	77,208	4,659	159,239
2009	69,936	7,848	78,021	4,963	160,768
2010	68,907	7,852	76,870	5,109	158,738
All years	466,967	51,764	499,579	29,534	1,047,844

Increasing numbers

Figure 1.4

Total hip and knee joint replacement procedures entered into the NJR, 2006/07 to 2010/11, recorded by the country in which the procedure took place.

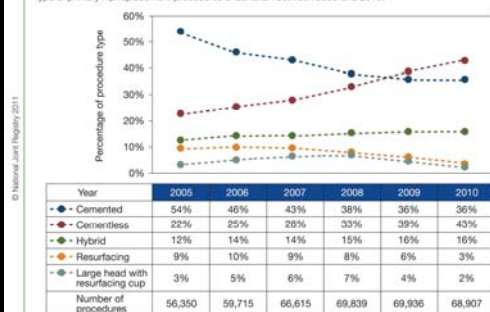
Source: Procedures entered into the NJR 1st April 2006 to 31st March 2011.



Trend towards uncemented THR

Figure 2.3

Type of primary hip replacement procedures undertaken between 2005 and 2010.



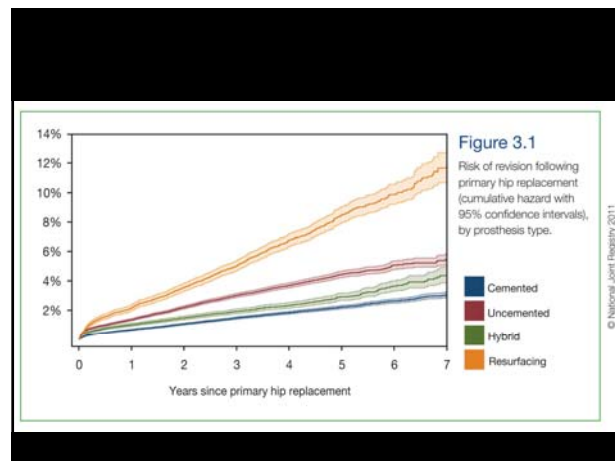
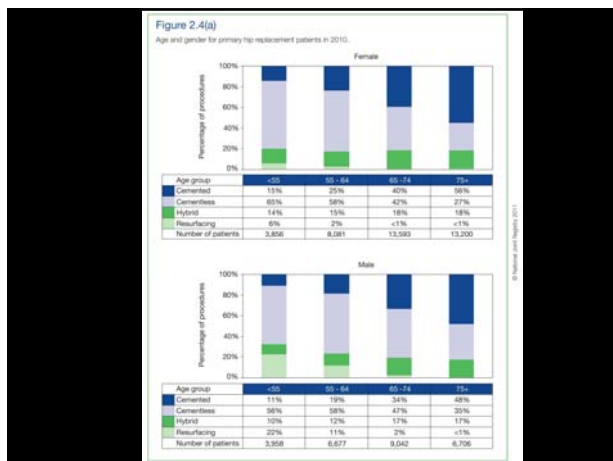
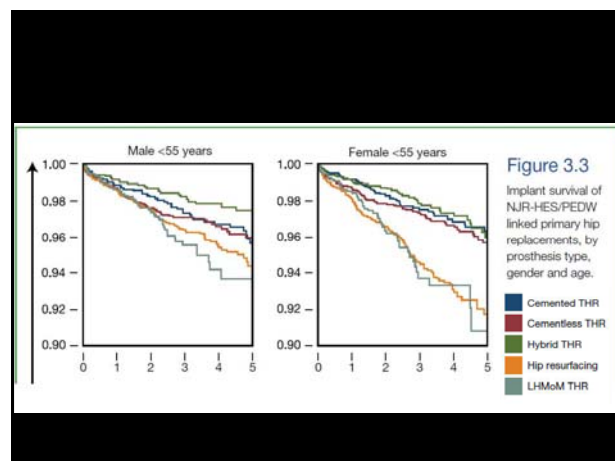
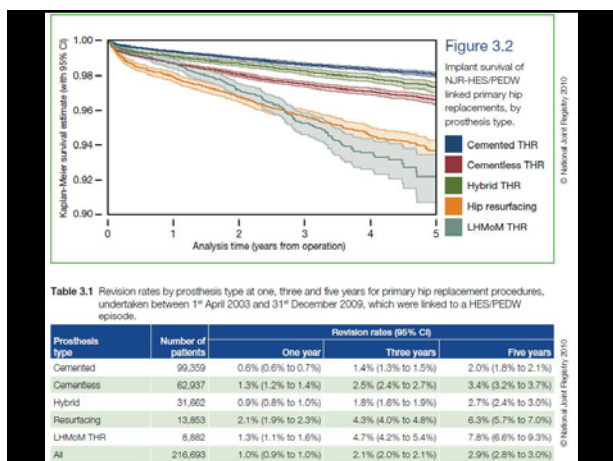
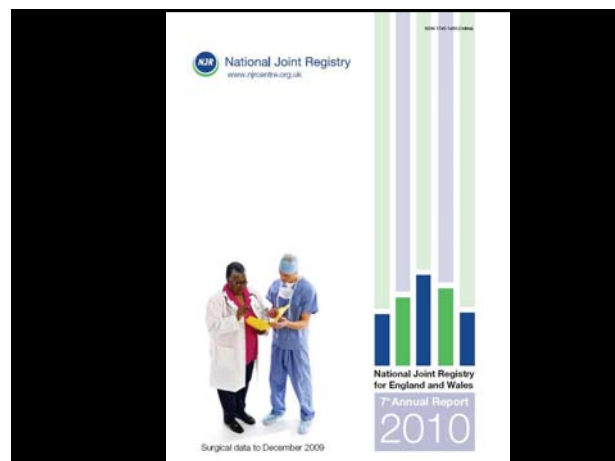


Table 3.9 Estimated revision rates following primary hip replacement, by prosthesis type (95% confidence intervals).

	Prosthesis type				All
	Cemented	Uncemented	Hybrid	Resurfacing	
30 days	0.16% (0.16%-0.21%)	0.50% (0.46%-0.55%)	0.36% (0.31%-0.42%)	0.45% (0.37%-0.55%)	0.34% (0.32%-0.36%)
90 days	0.34% (0.31%-0.38%)	0.78% (0.73%-0.84%)	0.56% (0.49%-0.63%)	1.13% (0.99%-1.28%)	0.58% (0.55%-0.61%)
Year 1	0.67% (0.62%-0.71%)	1.37% (1.30%-1.45%)	1.03% (0.93%-1.13%)	2.17% (1.98%-2.38%)	1.07% (1.03%-1.10%)
Year 2	1.07% (1.01%-1.13%)	2.20% (2.11%-2.31%)	1.48% (1.30%-1.61%)	3.55% (3.30%-3.85%)	1.69% (1.64%-1.74%)
Year 3	1.48% (1.41%-1.56%)	3.02% (2.89%-3.16%)	1.93% (1.79%-2.09%)	5.01% (4.69%-5.35%)	2.32% (2.25%-2.38%)
Year 4	1.84% (1.75%-1.93%)	3.70% (3.54%-3.86%)	2.34% (2.16%-2.53%)	6.74% (6.33%-7.18%)	2.89% (2.81%-2.97%)
Year 5	2.23% (2.12%-2.34%)	4.44% (4.24%-4.66%)	2.92% (2.69%-3.18%)	8.48% (7.95%-9.04%)	3.50% (3.40%-3.60%)
Year 6	2.64% (2.50%-2.78%)	5.07% (4.79%-5.35%)	3.64% (3.30%-4.01%)	9.88% (9.22%-10.59%)	4.07% (3.95%-4.20%)
Year 7	3.08% (2.89%-3.28%)	5.46% (5.09%-5.85%)	4.36% (3.86%-4.93%)	11.81% (10.80%-12.90%)	4.65% (4.48%-4.83%)
Base	132,511 (44.1%)	102,688 (34.2%)	43,933 (14.6%)	21,242 (7.1%)	300,374 (100%)



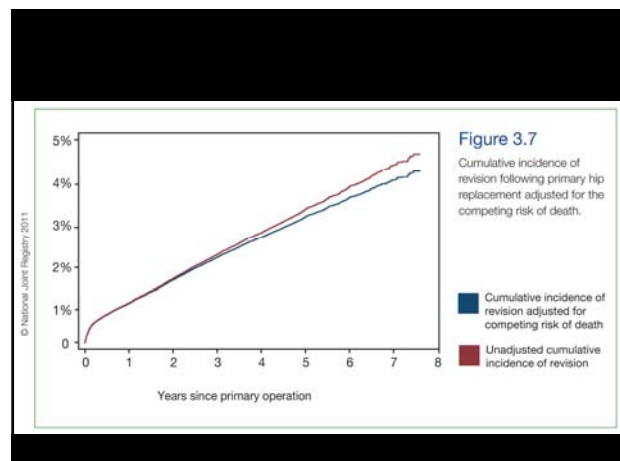
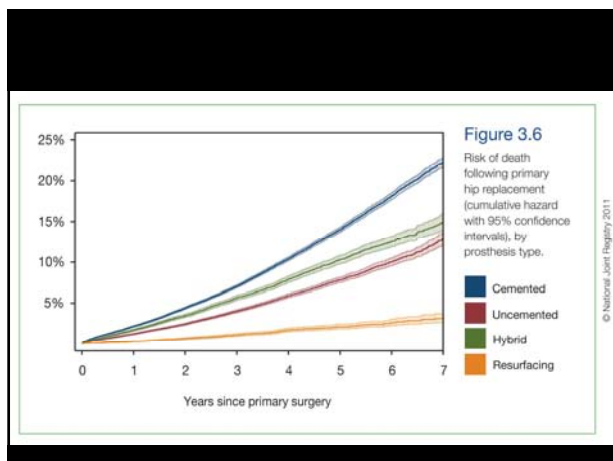
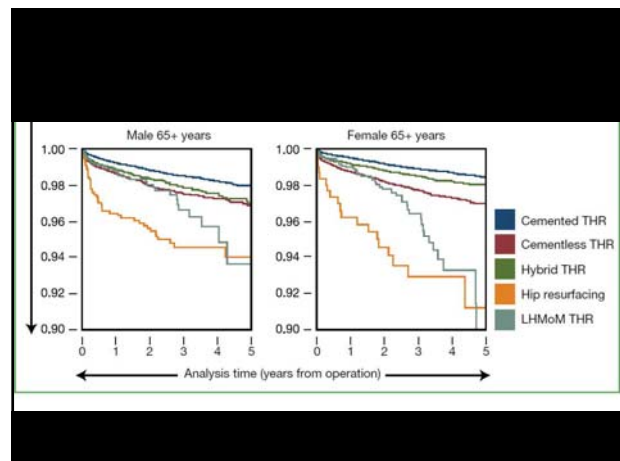
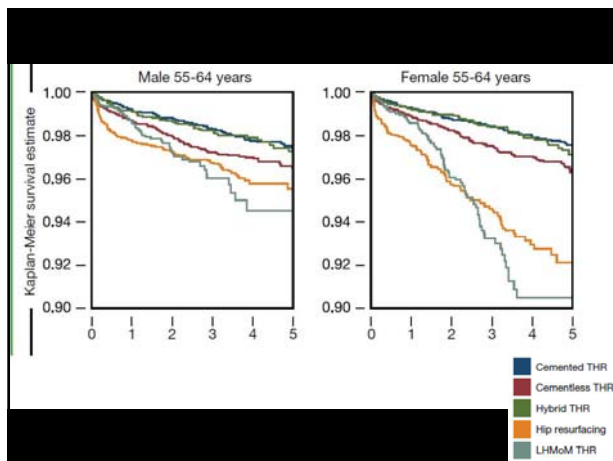


Table 3.16 Estimated revision rates by hip prosthesis type (based on adjusted multivariable competing risks model for a patient aged under 60 with ASA<3 and osteoarthritis) (95% confidence intervals).

	Prosthesis type				Metal-on-metal stemmed prostheses
	Cemented	Uncemented	Hybrid	Resurfacing	
Male aged under 60					
Year 1	1.05% (0.91%-1.22%)	1.37% (1.23%-1.54%)	1.06% (0.87%-1.31%)	1.68% (1.50%-1.88%)	1.28% (1.10%-1.50%)
Year 3	2.12% (1.84%-2.44%)	2.67% (2.40%-2.96%)	1.89% (1.55%-2.29%)	3.74% (3.41%-4.10%)	3.73% (3.27%-4.26%)
Year 5	3.25% (2.83%-3.72%)	3.64% (3.28%-4.04%)	2.79% (2.30%-3.37%)	6.05% (5.55%-6.60%)	6.70% (5.88%-7.62%)
Base	3.076	7.171	1.943	8.765	3.223
Female aged under 60					
Year 1	0.83% (0.72%-0.96%)	1.23% (1.11%-1.37%)	0.83% (0.68%-1.01%)	2.91% (2.61%-3.25%)	1.72% (1.48%-2.01%)
Year 3	1.67% (1.45%-1.92%)	2.40% (2.17%-2.65%)	1.48% (1.22%-1.79%)	6.43% (5.88%-7.03%)	4.99% (4.40%-5.65%)
Year 5	2.57% (2.24%-2.95%)	3.27% (2.96%-3.62%)	2.19% (1.82%-2.64%)	10.33% (9.50%-11.22%)	8.92% (7.90%-10.06%)
Base	4.742	10.342	3.315	4.880	2.854

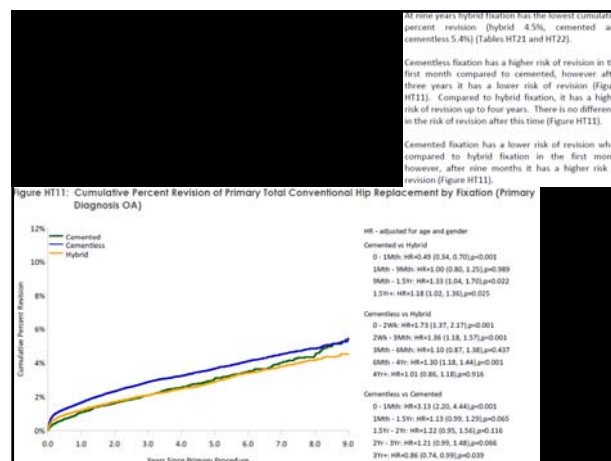
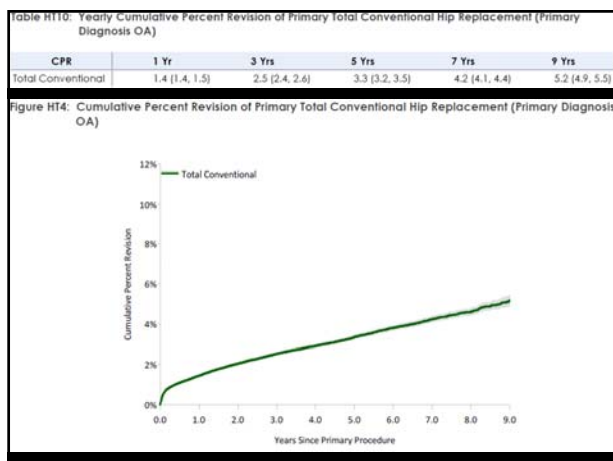
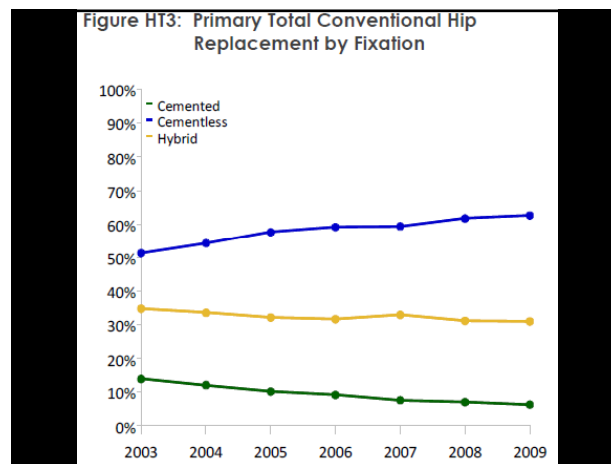
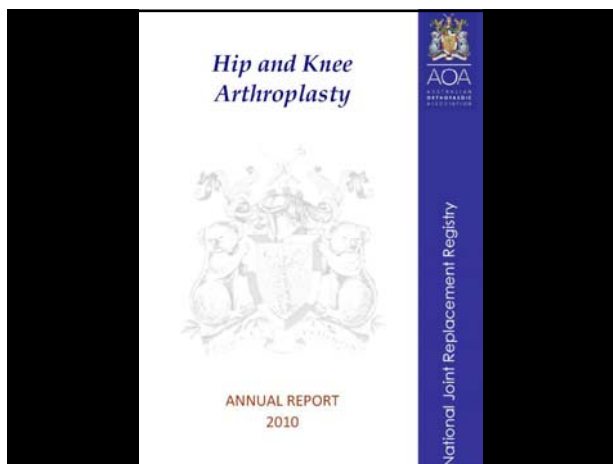
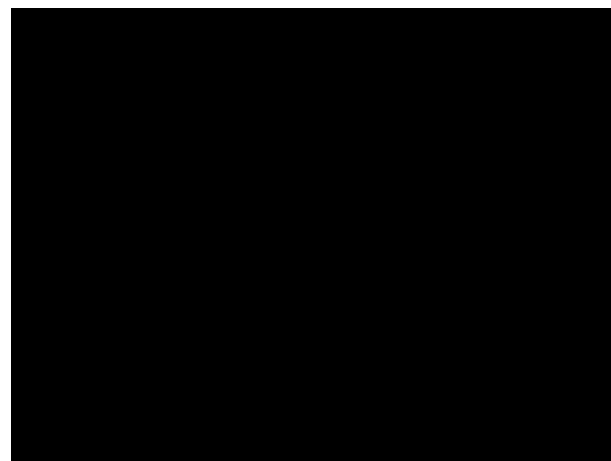
Table 2.4 Patient characteristics for primary hip replacement (continued)

	Primary total hip replacement cemented n(%)	Primary total hip replacement uncemented n(%)	Primary total hip replacement hybrid n(%)	Primary resurfacing n(%)	Total n(%)
Age					
Mean age	65.8	65.7	65.8	65.8	65.8
SD	7.1	7.1	7.1	7.1	7.1
Range	45-92	45-92	45-92	45-92	45-92
Gender					
Male	15,339 (88%)	15,339 (88%)	15,339 (88%)	15,339 (88%)	15,339 (88%)
Female	1,661 (12%)	1,661 (12%)	1,661 (12%)	1,661 (12%)	1,661 (12%)
Pre-operative physical status					
P1 - R and healthy	3,081 (17%)	3,081 (17%)	3,081 (17%)	3,081 (17%)	3,081 (17%)
P2 - mild disease not impacting	12,274 (70%)	12,274 (70%)	12,274 (70%)	12,274 (70%)	12,274 (70%)
P3 - independent systemic disease	4,522 (26%)	4,522 (26%)	4,522 (26%)	4,522 (26%)	4,522 (26%)
P4 - dependent systemic disease	167 (1%)	167 (1%)	167 (1%)	167 (1%)	167 (1%)
P5 - expected to die within 24 hours with or without an operation	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
ASA					
ASA 1	15,339 (88%)	15,339 (88%)	15,339 (88%)	15,339 (88%)	15,339 (88%)
ASA 2	1,661 (12%)	1,661 (12%)	1,661 (12%)	1,661 (12%)	1,661 (12%)
ASA 3	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Indication for surgery					
Osteoarthritis	22,000 (98%)	22,000 (98%)	22,000 (98%)	22,000 (98%)	22,000 (98%)
Post-traumatic	447 (2%)	447 (2%)	447 (2%)	447 (2%)	447 (2%)
Proximal femoral fracture	549 (2%)	549 (2%)	549 (2%)	549 (2%)	549 (2%)
Compartmental osteolysis	132 (1%)	132 (1%)	132 (1%)	132 (1%)	132 (1%)
Inflammatory arthropathy	357 (1%)	357 (1%)	357 (1%)	357 (1%)	357 (1%)
Patellar hemipatella	81 (0%)	81 (0%)	81 (0%)	81 (0%)	81 (0%)
Trauma - chronic	280 (1%)	280 (1%)	280 (1%)	280 (1%)	280 (1%)
Post-traumatic	24 (0%)	24 (0%)	24 (0%)	24 (0%)	24 (0%)
Proximal femoral fracture	13 (0%)	13 (0%)	13 (0%)	13 (0%)	13 (0%)
Proximal femoral fracture	25 (0%)	25 (0%)	25 (0%)	25 (0%)	25 (0%)
Other	359 (2%)	359 (2%)	359 (2%)	359 (2%)	359 (2%)
Time					
Baseline	85 (0%)	85 (0%)	85 (0%)	85 (0%)	85 (0%)
1st follow-up	10,000 (45%)	10,000 (45%)	10,000 (45%)	10,000 (45%)	10,000 (45%)
2nd follow-up	10,000 (45%)	10,000 (45%)	10,000 (45%)	10,000 (45%)	10,000 (45%)
3rd follow-up	10,000 (45%)	10,000 (45%)	10,000 (45%)	10,000 (45%)	10,000 (45%)

Table 3.22 Revision rates (all causes) for main hip stem and cup combinations (95% confidence intervals)

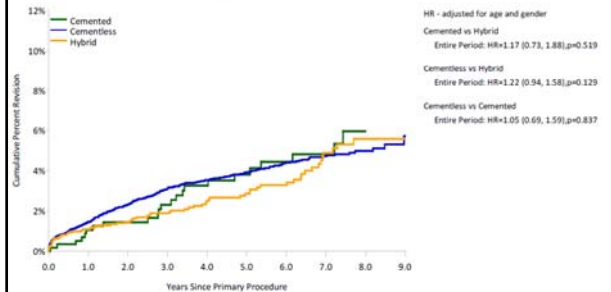
Combination: stem, cup	Number of patients	Revision rate at 1 year	Revision rate at 3 years	Revision rate at 5 years
Cemented composite beam stems and cemented cups				
Charley Cemented Stem, Charley Cemented Cup	9,209	0.20% (0.20%-0.43%)	0.80% (0.62%-1.02%)	1.38% (1.12%-1.68%)
Charley Cemented Stem, Charley Cup	7,968	0.20% (0.20%-0.48%)	1.12% (0.88%-1.40%)	1.71% (1.40%-2.10%)
Stamirex Modular, Stamirex Junction	2,718	0.26% (0.13%-0.55%)	0.83% (0.52%-1.34%)	1.10% (0.67%-1.80%)
Cemented upper slip stems and cemented cups				
G Stem Cemented Stem, Elite Plus Cup	3,036	0.48% (0.28%-0.80%)	0.92% (0.62%-1.36%)	1.22% (0.82%-1.80%)
GPT 2CA	5,798	0.69% (0.45%-0.98%)	1.04% (0.79%-1.38%)	1.68% (1.27%-2.22%)
Exeter V40, Contamcorary	37,955	0.38% (0.32%-0.45%)	0.86% (0.76%-0.96%)	1.26% (1.10%-1.44%)
Exeter V40, Elite Plus	4,155	0.29% (0.19%-0.53%)	0.64% (0.41%-1.02%)	0.70% (0.45%-1.09%)
Cemented Cup	13,248	0.26% (0.18%-0.38%)	0.67% (0.53%-0.86%)	0.98% (0.78%-1.22%)
Exeter V40, Elite Plus Cup	11,267	0.54% (0.42%-0.70%)	1.04% (0.85%-1.27%)	1.64% (1.36%-1.98%)
Cemented upper slip stems and uncemented cups				
OPT, Trilogy	5,802	0.78% (0.58%-1.00%)	1.13% (0.88%-1.40%)	1.83% (1.37%-2.47%)
Exeter V40, Triody	18,358	0.52% (0.42%-0.64%)	1.01% (0.85%-1.20%)	1.69% (1.39%-2.07%)
Exeter V40, Trilogy	7,791	0.50% (0.36%-0.69%)	0.88% (0.73%-1.07%)	1.35% (1.04%-1.76%)
Uncemented stems and uncemented cups				
Acetabular, Triody	10,519	0.36% (0.17%-1.18%)	1.03% (0.72%-2.21%)	2.35% (1.82%-3.27%)
Qnap, Duralac Cementless	4,333	0.75% (0.52%-1.07%)	1.77% (1.38%-2.28%)	2.95% (2.04%-3.92%)
Qnap, Private	40,879	0.75% (0.67%-0.85%)	1.73% (1.67%-1.81%)	2.29% (2.04%-2.57%)
Futing HMC, CSP	13,330	0.88% (0.74%-1.07%)	1.88% (1.67%-2.12%)	2.02% (1.77%-2.33%)
Futing HMC, CSP Plus	6,357	1.21% (0.95%-1.54%)	2.10% (1.81%-2.73%)	4.52% (3.54%-5.77%)
SLP, PMA Cementless Stem, PFP, PMA	3,583	1.16% (0.89%-1.58%)	2.82% (2.26%-3.52%)	4.52% (3.54%-5.77%)
Trilogy Cementless Stem, Exeter	4,959	0.80% (0.57%-1.11%)	1.64% (1.24%-2.08%)	1.81% (1.13%-2.30%)
Uncemented stems and uncemented cup				
Cup, AHA Resurfacing Cup	2,543	0.94% (0.69%-1.40%)	4.84% (3.88%-6.07%)	11.94% (9.05%-16.18%)
Other				
Other combination	97,307	0.67% (0.62%-0.72%)	1.51% (1.42%-1.60%)	2.16% (2.04%-2.29%)
Uncemented combination	38,506	0.77% (0.69%-0.87%)	1.82% (1.68%-1.98%)	2.26% (2.06%-2.49%)
All	345,358	0.64% (0.61%-0.68%)	1.38% (1.32%-1.42%)	2.03% (1.92%-2.08%)

Note: For some brands it is not always possible to estimate five year revision rates.



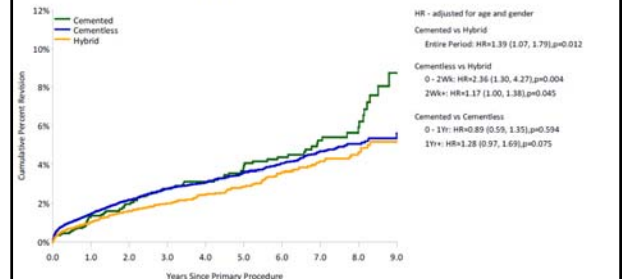
There are age related differences in the risk of revision for cemented and cementless fixation. The risk of revision for cemented fixation decreases with increasing age. The risk of revision for cementless fixation increases with increasing age. The risk for hybrid fixation does not vary with age (Tables HT23 and HT24 and Figures HT12-HT14).

Figure HT12: Cumulative Percent Revision of Primary Total Conventional Hip Replacement for Patients Aged <55 Years by Fixation (Primary Diagnosis OA)



There are age related differences in the risk of revision for cemented and cementless fixation. The risk of revision for cemented fixation decreases with increasing age. The risk of revision for cementless fixation increases with increasing age. The risk for hybrid fixation does not vary with age (Tables HT23 and HT24 and Figures HT12-HT14).

Figure HT13: Cumulative Percent Revision of Primary Total Conventional Hip Replacement for Patients Aged 55-64 Years by Fixation (Primary Diagnosis OA)



There are age related differences in the risk of revision for cemented and cementless fixation. The risk of revision for cemented fixation decreases with increasing age. The risk of revision for cementless fixation increases with increasing age. The risk for hybrid fixation does not vary with age (Tables HT23 and HT24 and Figures HT12-HT14).

Figure HT15: Cumulative Percent Revision of Primary Total Conventional Hip Replacement for Patients Aged ≥75 Years by Fixation (Primary Diagnosis OA)

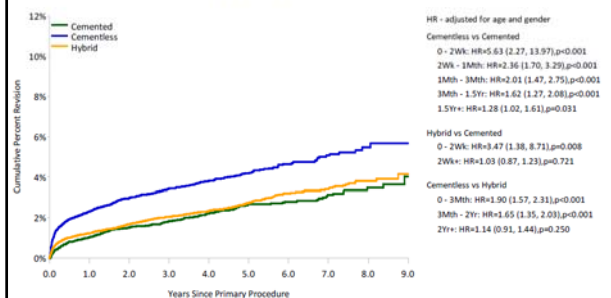


Figure HT16: Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Type of Femoral Neck (Primary Diagnosis OA)

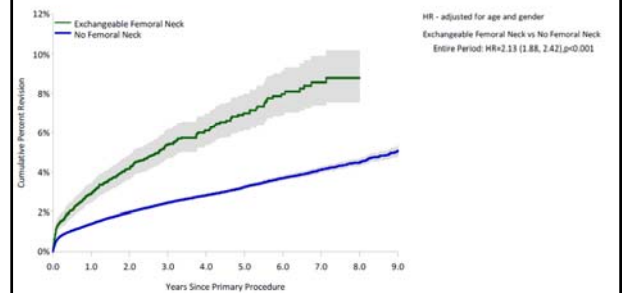
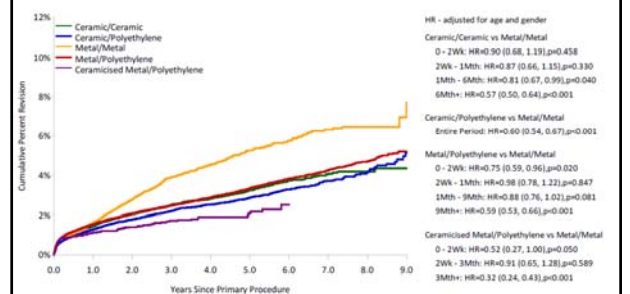
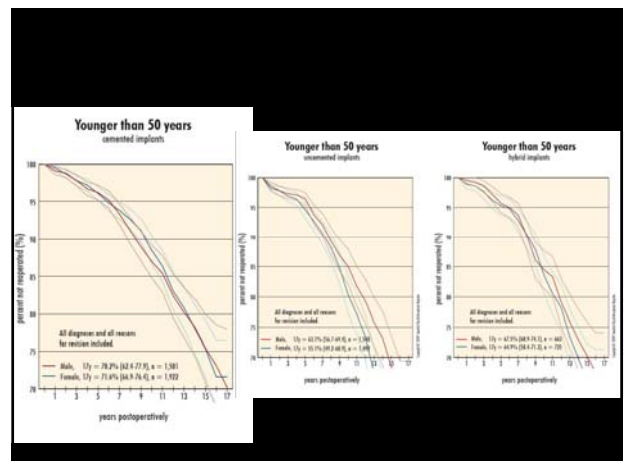
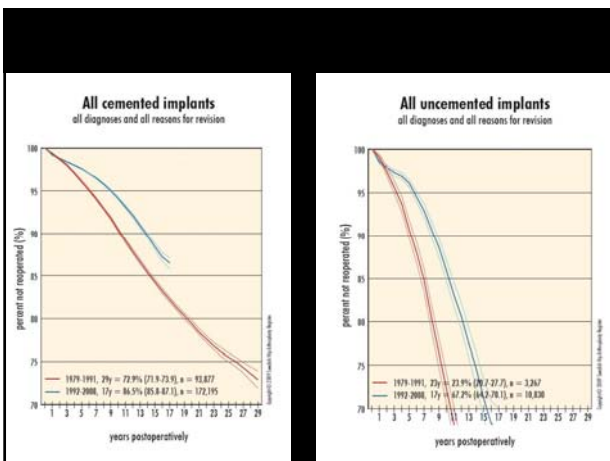
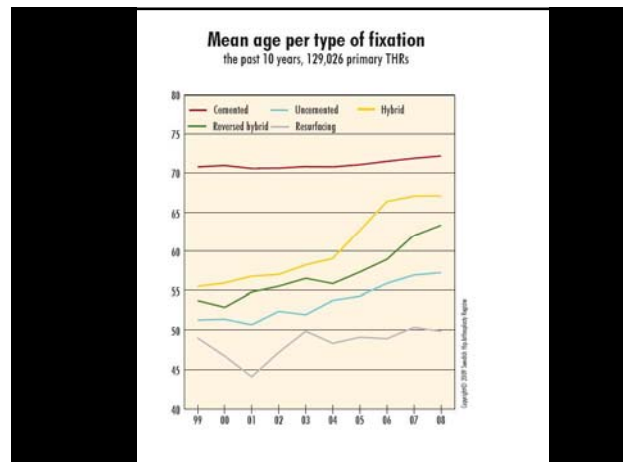
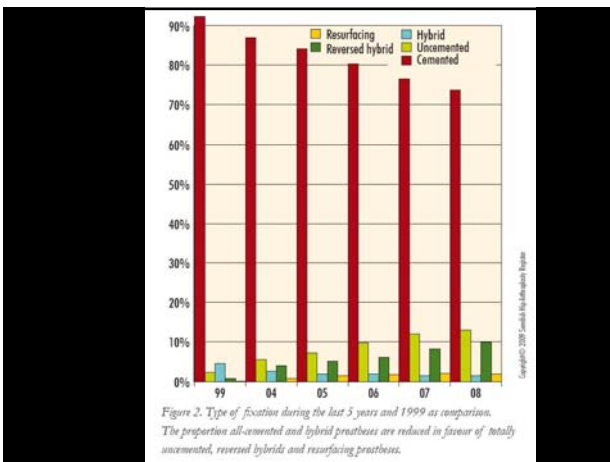
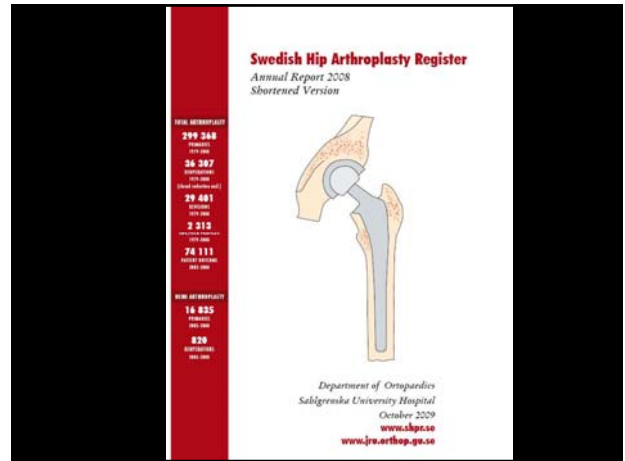
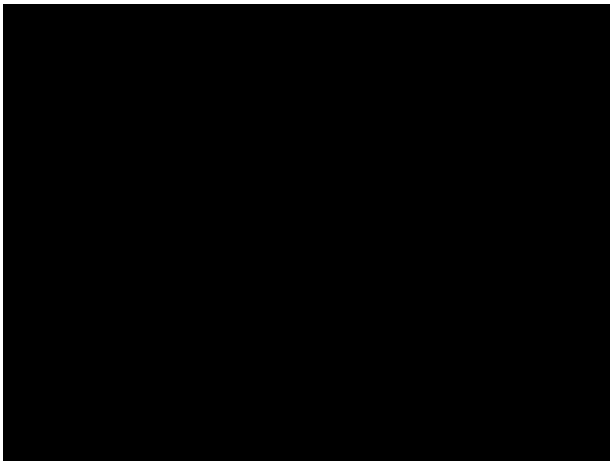
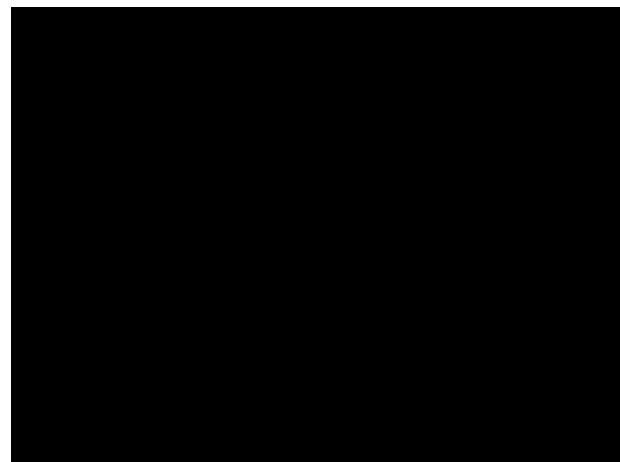
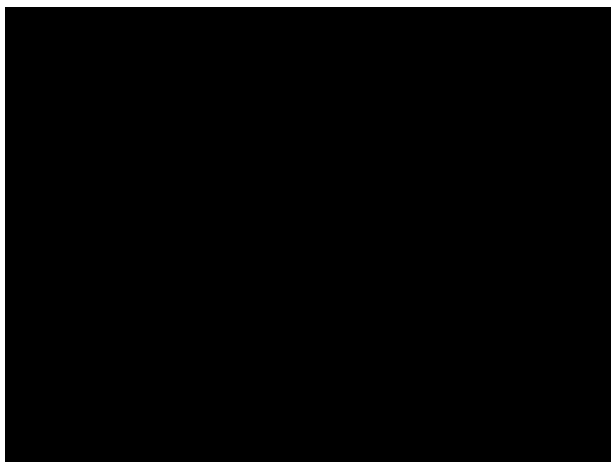
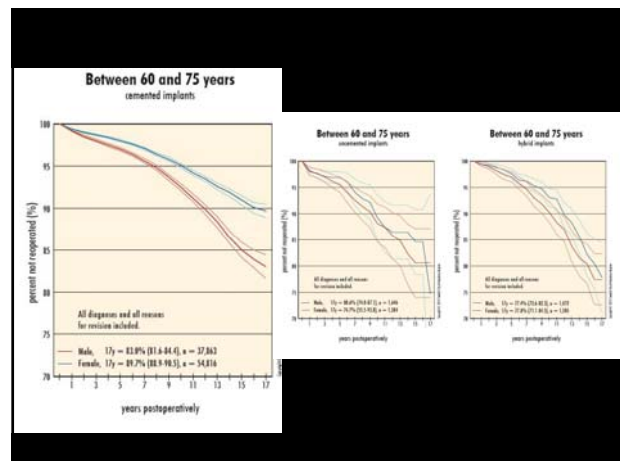
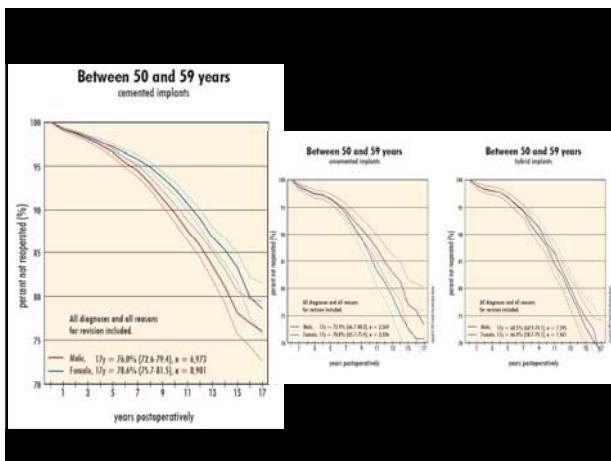


Figure HT18: Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Bearing Surface (Primary Diagnosis OA)







Cemented vs uncemented- decision making

- Cemented Exeter
- Bearing type
- Method of fixation



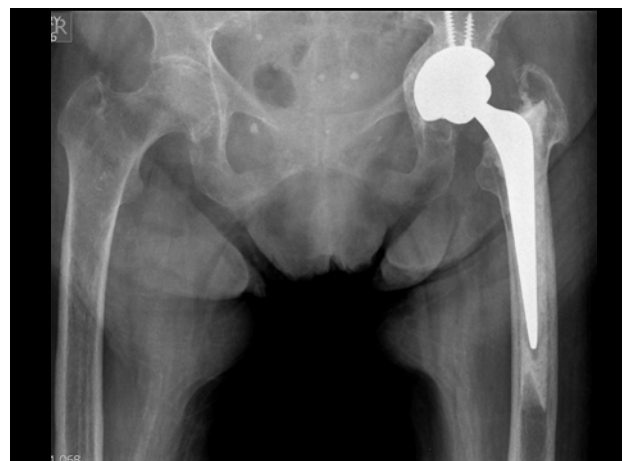
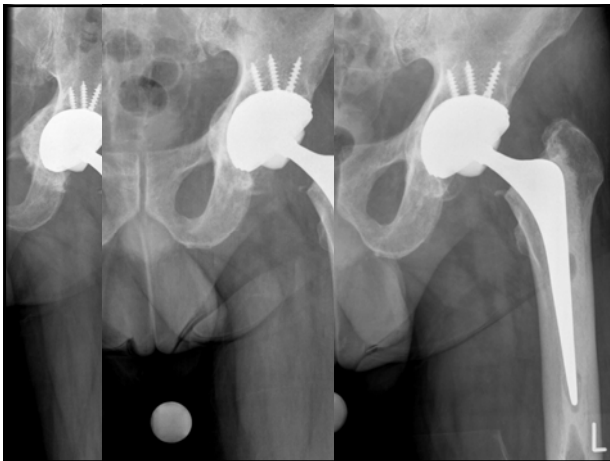
Cemented vs uncemented- decision making

- Cemented Exeter
- Bearing type
 - Life expectancy (>15-20 years)
 - Functional level
- Method of fixation



Cemented vs uncemented- decision making

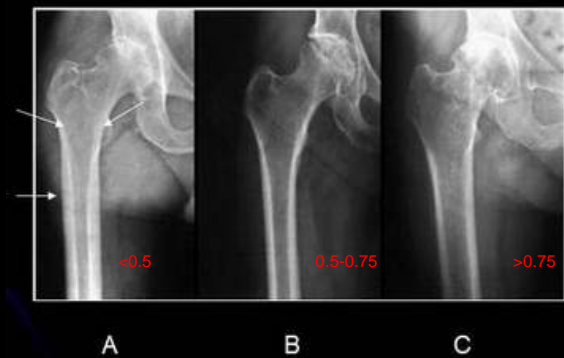
- Cemented Exeter
- Bearing type
- Method of fixation
 - Cup
 - Stem
 - Life expectancy
 - Bony anatomy-acetabulum



Cemented vs uncemented- decision making

- Cemented Exeter
- Bearing type
- Method of fixation
 - Cup
 - Stem
 - Life expectancy
 - Bony anatomy- femur

Dorr's Classification



Cemented vs uncemented- decision making

- | | |
|----------------------|--------------------------|
| • Cemented Exeter | • Young age |
| • Bearing type | • Long life expectancy |
| • Method of fixation | • High functional demand |
| | • Good femoral bone |

