

## Supplementary data

Table 1a. Basic data on cemented cups—cup revisions for any reason and aseptic loosening

	CPE	XLPE		CPE	XLPE
<b>All selected cemented cups</b>			<b>Reflection AllPoly (Smith&amp;Nephew, London, UK)</b>		
PE brand	Multiple	Multiple	PE brand	CPE	XLPE
Mean/max follow-up <sup>a</sup>	4.5 / 8.0	2.4 / 8.0	Mean/max follow-up <sup>a</sup>	5.7 / 8.0	4.5 / 8.0
Bilateral cases, %	12.2		Bilateral cases, %	7.4	
Total (revised), n <sup>b</sup>	75,422 (1,009/349)	41,696 (327/74)	Total (revised), n <sup>b</sup>	3,132 (134/88)	3,703 (52/17)
Crude revision rate, % <sup>b</sup>	1.3 / 0.45	0.8 / 0.18	Crude revision rate, % <sup>b</sup>	4.3 / 2.8	1.4 / 0.46
Nation of origin <sup>b</sup>			Nation of origin <sup>b</sup>		
Denmark	4,920 (150/54)	2,180 (48/19)	Denmark	205 (12/8)	7 (1/1)
Norway	16,408 (306/122)	12,622 (94/25)	Norway	1,836 (76/51)	2,222 (29/8)
Sweden	54,094 (553/173)	26,894 (185/30)	Sweden	1,091 (46/29)	1,474 (22/8)
Age, median (range)	72 (20–98)	71 (16–99)	Age, median (range)	73 (20–93)	71 (35–93)
Sex <sup>b</sup>			Sex <sup>b</sup>		
Women	46,609 (585/203)	26,737 (177/52)	Women	2,088 (82/55)	2,440 (29/13)
Men	28,813 (424/146)	14,959 (150/22)	Men	1,044 (52/33)	1,263 (23/4)
Femoral head material <sup>b</sup>			Femoral head material <sup>b</sup>		
Metal	66,086 (919/321)	34,751 (274/57)	Metal	2,913 (120/78)	2,437 (35/11)
Ceramic	9,336 (90/28)	6,945 (53/17)	Ceramic	219 (14/10)	1,266 (17/6)
Femoral head size <sup>b</sup>			Femoral head size <sup>b</sup>		
28 mm	60,346 (865/299)	14,385 (131/30)	28 mm	2,716 (116/78)	1,570 (25/8)
32 mm	5,076 (144/50)	27,311 (196/44)	32 mm	416 (18/10)	2,133 (27/9)
Posterior approach <sup>b</sup>			Posterior approach <sup>b</sup>		
Yes	41,240 (476/164)	16,903 (178/33)	Yes	1,158 (46/26)	1,701 (24/8)
No	34,182 (533/185)	24,793 (149/41)	No	1,974 (88/62)	2,002 (28/11)
Stem fixation <sup>b</sup>			Stem fixation <sup>b</sup>		
Cemented	65,947 (880/291)	28,003 (228/47)	Cemented	2,883 (115/75)	2,525 (35/13)
Uncemented	9,475 (129/58)	13,693 (99/27)	Uncemented	249 (19/13)	1,178 (17/4)
<b>ZCA (Zimmer, Warsaw, In, USA)</b>			<b>Charnley Elite Ogee/Marathon (DePuy, Warsaw, IN, USA)</b>		
PE brand	Zimmer UHWPE	Durasul	PE brand	Enduron	Marathon
Mean/max follow-up <sup>a</sup>	5.8 / 8.0	3.1 / 8.0	Mean/max follow-up <sup>a</sup>	5.2 / 8.0	2.0 / 7.7
Bilateral cases, %	8.8		Bilateral cases, %	9.6	
Total (revised), n <sup>b</sup>	770 (25/12)	11,072 (130/21)	Total (revised), n <sup>b</sup>	7,639 (96/3)6	15,530 (87/18)
Crude revision rate, % <sup>b</sup>	3.2 / 1.6	1.2 / 0.19	Crude revision rate, % <sup>b</sup>	1.3 / 0.47	0.6 / 0.12
Nation of origin <sup>b</sup>			Nation of origin <sup>b</sup>		
Denmark	422 (18/9)	456 (16/3)	Denmark	0 (0/0)	0 (0/0)
Norway	0 (0/0)	16 (1/0)	Norway	2,925 (48/21)	7,693 (54/14)
Sweden	348 (7/3)	10,600 (113/18)	Sweden	4,714 (48/15)	7,837 (33/4)
Age, median (range)	75 (41–95)	72 (19–95)	Age, median (range)	70 (25–96)	70 (16–99)
Sex <sup>b</sup>			Sex <sup>b</sup>		
Women	513 (16/8)	6,932 (73/12)	Women	4,790 (45/15)	9,954 (36/12)
Men	257 (9/4)	4,140 (57/9)	Men	2,849 (51/21)	5,576 (51/6)
Femoral head material <sup>b</sup>			Femoral head material <sup>b</sup>		
Metal	769 (25/12)	10,654 (125/20)	Metal	6,531 (81/31)	11,744 (59/10)
Ceramic	1 (0/0)	418 (5/1)	Ceramic	1,108 (15/5)	3,786 (28/8)
Femoral head size <sup>b</sup>			Femoral head size <sup>b</sup>		
28 mm	625 (18/6)	1,762 (34/7)	28 mm	7,496 (96/36)	8,936 (54/11)
32 mm	145 (7/6)	9,310 (96/14)	32 mm	143 (0/0)	6,594 (33/7)
Posterior approach <sup>b</sup>			Posterior approach <sup>b</sup>		
Yes	651 (23/10)	4,835 (68/9)	Yes	1,198 (14/6)	3,031 (16/5)
No	119 (2/2)	6,237 (62/12)	No	6,441 (82/30)	12,499 (71/13)
Stem fixation <sup>b</sup>			Stem fixation <sup>b</sup>		
Cemented	632 (22/11)	9,570 (104/15)	Cemented	5,160 (70/24)	5,677 (38/6)
Uncemented	138 (3/1)	1,502 (26/6)	Uncemented	2,479 (26/12)	9,853 (49/12)

<sup>a</sup> The longest follow-up time with both polyethylene groups within a cup category, each still having >100 hips at risk.

<sup>b</sup> Total number of cups (revisions for any reason/revisions for aseptic loosening at end of follow-up).

Table 1b. Basic data on uncemented cups—cup revisions for any reason and aseptic loosening

	CPE	XLPE		CPE	XLPE
<b>All uncemented cups</b>			<b>Trilogy (Zimmer, Warsaw, In, USA)</b>		
PE brand	Multiple	Multiple	PE brand	Zimmer UHWPE	Longevity
Mean/max follow-up <sup>a</sup>	7.0 / 11	3.6 / 11	Mean/max follow-up <sup>a</sup>	7.6 / 11	4.7 / 11
Bilateral cases, %		11.9	Bilateral cases, %		11.2
Total (revised), n <sup>b</sup>	17,674 (555/75)	28,574 (512/53)	Total (revised), n <sup>b</sup>	6,330 (228/29)	11,095 (248/31)
Crude revision rate, % <sup>b</sup>	3.1 / 0.42	1.8 / 0.19	Crude revision rate, % <sup>b</sup>	3.6 / 0.44	2.2 / 0.28
Nation of origin <sup>b</sup>			Nation of origin <sup>b</sup>		
Denmark	13,046 (431/45)	11,371 (289/33)	Denmark	5,339 (206/26)	4,326 (144/23)
Norway	1,815 (55/11)	5,124 (61/10)	Norway	292 (5/2)	1,320 (17/3)
Sweden	2,813 (69/19)	12,079 (162/10)	Sweden	699 (17/1)	5,449 (87/5)
Age, median (range)	67 (14–96)	64 (16–96)	Age, median (range)	67 (31–96)	63 (18–95)
Sex <sup>b</sup>			Sex <sup>b</sup>		
Women	10,067 (292/44)	16,492 (271/29)	Women	3,543 (118/17)	6,118 (125/16)
Men	7,607 (263/31)	12,082 (241/24)	Men	2,787 (110/12)	4,977 (123/15)
HA coated cup <sup>b</sup>			HA coated cup <sup>b</sup>		
Yes	6,349 (177/22)	12,800 (213/16))	Yes	1,577 (47/11)	6,306 (113/9)
No	11,325 (378/53)	15,774 (299/37)	No	4,753 (181/18)	4,789 (135/22)
Femoral head material <sup>b</sup>			Femoral head material <sup>b</sup>		
Metal	11,527 (388/51)	20,598 (364/28)	Metal	5,454 (206/27)	8,653 (192/26)
Ceramic	6,147 (167/21)	7,976 (148/15)	Ceramic	876 (22/2)	2,442 (56/5)
Femoral head size <sup>b</sup>			Femoral head size <sup>b</sup>		
28 mm	16,314 (517/71)	8,790 (217/19)	28 mm	6,137 (219/28)	4,777 (126/13)
32 mm	1,360 (38/4)	19,784 (295/34)	32 mm	193 (9/1)	6,318 (122/18)
Posterior approach <sup>b</sup>			Posterior approach <sup>b</sup>		
Yes	13,222 (431/42)	18,210 (359/39)	Yes	5,638 (208/23)	6,657 (186/26)
No	4,452 (124/33)	10,364 (153/14)	No	692 (20/6)	4,438 (62/5)
Stem fixation <sup>b</sup>			Stem fixation <sup>b</sup>		
Cemented	6,339 (200/27)	3,837 (94/13)	Cemented	2,867 (97/16)	2,004 (61/12)
Uncemented	11,335 (355/48)	24,737 (418/40)	Uncemented	3,463 (131/13)	9,091 (187/19)
<sup>a</sup> The longest follow-up time with both polyethylene groups within a cup category, each still having >100 hips at risk.			<sup>b</sup> Total number of cups (revisions for any reason/revisions for aseptic loosening at end of follow-up).		

Table 2a. Adjusted risk ratios of cup revision for any reason, including all cemented cups, and sub-analyses of designs used with both polyethylene types in sufficient numbers (see text)

Predictor	All cemented cups HR (95% CI)	ZCA HR (95% CI)	Reflection AllPoly		Charnley Ogee / Marathon HR (95% CI)
			0–4 years HR (95% CI)	4–7.5 years HR (95% CI)	
Polyethylene (PE / XLPE)	0.94 (0.81–1.1)	1.6 (0.94–2.6)	1.8 (1.1–3.0)	7.8 (3.0–20)	1.1 (0.74–1.5)
p-value	0.4	0.09	0.03	< 0.001	0.8
Age (continuous)			0.96 (0.94–0.98)	0.95 (0.92–0.97)	0.99 (0.97–1.0)
p-value			0.001	< 0.001	0.3
Age quartiles <sup>b</sup>	Stratified <sup>a</sup>	Stratified <sup>a</sup>			
Sex (female/male)	0.79 (0.71–0.88)	0.78 (0.56–1.1)	0.75 (0.51–1.1)	0.82 (0.51–1.3)	0.44 (0.33–0.59)
p-value	<0.001	0.1	0.1	0.4	< 0.001
Femoral head material (ceramic/metal)	0.77(0.64–0.92)	1.1 (0.43–2.9)	1.0 (0.54–2.0)	0.63 (0.25–1.6)	1.5 (1.0–2.3)
p-value	0.005	0.8	0.9	0.3	0.03
Femoral head size (32 mm / 28 mm)	0.94 (0.81–1.1)	0.93 (0.62–1.4)	1.1 (0.65–2.0)	1.4 (0.68–3.0)	0.89 (0.57–1.4)
p-value	0.4	0.7	0.7	0.4	0.6
Posterior approach (yes/no)	Stratified <sup>a</sup>	1.3 (0.91–1.8)	0.99 (0.65–1.5)	Stratified <sup>a</sup>	1.0 (0.67–1.5)
p-value		0.2	1.0		1.0
Stem fixation (uncemented/cemented)	1.0 (0.87–1.2)	1.3 (0.86–2.1)	0.96 (0.51–1.8)	1.6 (0.70–3.5)	0.62 (0.43–0.89)
p-value	0.8	0.2	0.9	0.3	0.009

<sup>a</sup> Entered as stratifying factor because of violation of the proportional hazards assumption.

<sup>b</sup> (<65, 65–71, 71–77, >77)

Table 2b. Adjusted risk ratios of aseptic loosening revision for cemented cups included, and subanalyses of designs used with both polyethylene types in sufficient numbers (see text)

Predictor	All cemented cups HR (95% CI)	ZCA HR (95% CI)	Reflection AllPoly HR (95% CI)	Charnley Ogee / Marathon HR (95% CI)
Polyethylene (PE / XLPE)	1.2 (0.89–1.6)	6.1 (2.3–16)	5.3 (2.8–10)	1.4 (0.67–2.8)
p-value	0.2	< 0.001	< 0.001	0.4
Age (continuous)		0.99 (0.95–1.0)	0.94 (0.92–0.96)	0.97 (0.94–1.0)
p-value		0.6	< 0.001	0.09
Age quartiles <sup>b</sup>	Stratified <sup>a</sup>			
Sex (female/male)	0.95 (0.78–1.2)	0.87 (0.43–1.7)	1.0 (0.66–1.5)	0.65 (0.37–1.2)
p-value	0.6	0.7	1.0	0.1
Femoral head material (ceramic/metal)	0.68 (0.49–0.94)	0.97 (0.10–8.9)	0.96 (0.47–2.0)	1.7 (0.80–3.5)
p-value	0.02	1.0	0.9	0.2
Femoral head size (32 mm / 28 mm)	1.3 (1.0–1.7)	Stratified <sup>a</sup>	1.8 (1.0–3.3)	0.95 (0.37–2.5)
p-value	0.04		0.04	0.9
Posterior approach (yes/no)	Stratified <sup>a</sup>	Stratified <sup>a</sup>	0.57 (0.36–0.90)	1.6 (0.77–3.1)
p-value			0.02	0.2
Stem fixation (uncemented/cemented)	1.3 (0.96–1.6)	Stratified <sup>a</sup>	1.0 (0.52–2.1)	0.80 (0.39–1.6)
p-value	0.09		0.9	0.5

<sup>a</sup> Entered as stratifying factor because of violation of the proportional hazards assumption.

<sup>b</sup> (<65, 65–71, 71–77, >77)

**Table 3a. Adjusted risk ratios of cup revision for all reasons, including uncemented cups and one uncemented cup design, used with both polyethylene types in sufficient numbers (see text)**

Predictor	All uncemented cups		Trilogy	
	Hazard ratio (95% CI)	p-value	Hazard ratio (95% CI)	p-value
Polyethylene (PE / XLPE)	1.0 (0.86–1.2)	0.9	0.91 (0.73–1.2)	0.5
Age (continuous)			0.98 (0.96–1.0)	0.3
Age quartiles <sup>b</sup>	Stratified <sup>a</sup>			
Sex (female/male)	0.83 (0.74–0.94)	0.003	0.80 (0.67–0.96)	0.02
HA coated cup (yes/no)	0.81 (0.72–0.93)	0.002	0.69 (0.56–0.85)	0.001
Femoral head material (ceramic/metal)	0.85 (0.75–0.97)	0.02	0.76 (0.59–0.99)	0.04
Femoral head size (32 mm / 28 mm)	0.79 (0.67–0.93)	0.005	0.97 (0.76–1.3)	0.8
Posterior approach (yes/no)	1.4 (1.2–1.6)	< 0.001	1.7 (1.3–2.2)	<0.001
Stem fixation (uncemented/cemented)	Stratified <sup>a</sup>		Stratified <sup>a</sup>	

<sup>a</sup> Entered as stratifying factor because of violation of the proportional hazards assumption.  
<sup>b</sup> (<58, 58–64, 64–72, >72)

**Table 3b. Adjusted risk ratios of aseptic loosening revision for all uncemented cups included and one uncemented cup design, used with both polyethylene types in sufficient numbers (see text)**

Predictor	All uncemented cups		Trilogy	
	Hazard ratio (95% CI)	p-value	Hazard ratio (95% CI)	p-value
Polyethylene (PE / XLPE)	1.5 (0.93–2.3)	0.1	0.89 (0.45–1.7)	0.7
Age (continuous)			0.98 (0.96–1.0)	0.3
Age quartiles <sup>b</sup>	Stratified <sup>a</sup>			
Sex (female/male)	1.0 (0.73–1.4)	0.9	0.89 (0.53–1.5)	0.7
HA coated cup (yes/no)	0.62 (0.42–0.90)	0.01	0.60 (0.32–1.1)	0.1
Femoral head material (ceramic/metal)	0.83 (0.57–1.2)	0.3	0.59 (0.26–1.4)	0.2
Femoral head size (32 mm / 28 mm)	1.2 (0.70–1.9)	0.6	1.4 (0.71–3.0)	0.3
Posterior approach (yes/no)	Stratified <sup>a</sup>		Stratified <sup>a</sup>	
Stem fixation (uncemented/cemented)	Stratified <sup>a</sup>		Stratified <sup>a</sup>	

<sup>a</sup> Entered as stratifying factor because of violation of the proportional hazards assumption.  
<sup>b</sup> (<58, 58–64, 64–72, >72)