

CORAIL/Trident (Shell) Total Conventional Hip Investigation

Note: This analysis compares the CORAIL/Trident (Shell) femoral stem/acetabular combination with all other total conventional hip prostheses.

This combination has been identified as having a significantly higher rate of revision. For a detailed explanation of the process used by the Registry that results in identification of prostheses that have a higher than anticipated rate of revision please refer to the Prostheses with Higher than Anticipated Rates of Revision chapter of the most recent AOANJRR Annual Report, <https://aoanjrr.sahmri.com/annual-reports-2024>.

Note: Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator. Procedures using prostheses with no recorded use in 2023 are excluded from the comparator.

TABLE 1

Revision Rate of Primary Total Conventional Hip Replacement

The revision rate of the CORAIL/Trident (Shell) total conventional hip combination is compared to all other total conventional hip prostheses.

Table 1: Revision Rates of Primary Total Conventional Hip Replacement

| Component | N Revised | N Total | Obs. Years | Revisions/100 Obs. Yrs (95% CI) |
|------------------------------|--------------|---------------|----------------|------------------------------------|
| CORAIL/Trident (Shell) | 30 | 680 | 3097 | 0.97 (0.65, 1.38) |
| Other Total Conventional Hip | 19220 | 537865 | 3451601 | 0.56 (0.55, 0.56) |
| TOTAL | 19250 | 538545 | 3454698 | 0.56 (0.55, 0.57) |

Note: Prostheses no longer used in 2023 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

TABLE 2

Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

The yearly cumulative percent revision of the CORAIL/Trident (Shell) total conventional hip combination is compared to all other total conventional hip prostheses.

Table 2: Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

| CPR | 1 Yr | 2 Yrs | 3 Yrs | 4 Yrs | 5 Yrs | 6 Yrs | 7 Yrs | 8 Yrs |
|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| CORAIL/Trident (Shell) | 2.7 (1.7, 4.3) | 3.5 (2.3, 5.2) | 4.0 (2.7, 5.9) | 4.3 (2.9, 6.3) | 4.6 (3.1, 6.8) | 4.6 (3.1, 6.8) | 4.6 (3.1, 6.8) | 5.3 (3.5, 8.0) |
| Other Total Conventional Hip | 1.7 (1.7, 1.8) | 2.2 (2.1, 2.2) | 2.5 (2.5, 2.5) | 2.8 (2.7, 2.8) | 3.1 (3.0, 3.1) | 3.3 (3.3, 3.4) | 3.6 (3.6, 3.7) | 3.9 (3.8, 4.0) |

| CPR | 9 Yrs | 10 Yrs | 11 Yrs | 12 Yrs | 13 Yrs | 14 Yrs | 15 Yrs | 16 Yrs |
|------------------------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|----------------|
| CORAIL/Trident (Shell) | 6.8 (4.4, 10.6) | 6.8 (4.4, 10.6) | 6.8 (4.4, 10.6) | 6.8 (4.4, 10.6) | | | | |
| Other Total Conventional Hip | 4.2 (4.2, 4.3) | 4.5 (4.5, 4.6) | 4.9 (4.8, 5.0) | 5.3 (5.2, 5.4) | 5.7 (5.6, 5.8) | 6.0 (5.9, 6.2) | 6.5 (6.3, 6.6) | 6.9 (6.7, 7.0) |

| CPR | 17 Yrs | 18 Yrs | 19 Yrs | 20 Yrs | 21 Yrs | 22 Yrs | 23 Yrs |
|------------------------------|----------------|----------------|----------------|----------------|----------------|-----------------|------------------|
| CORAIL/Trident (Shell) | | | | | | | |
| Other Total Conventional Hip | 7.3 (7.1, 7.4) | 7.6 (7.5, 7.8) | 8.2 (8.0, 8.4) | 8.5 (8.2, 8.7) | 9.0 (8.7, 9.3) | 9.7 (9.2, 10.1) | 10.3 (9.5, 11.2) |

Note: Prostheses no longer used in 2023 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

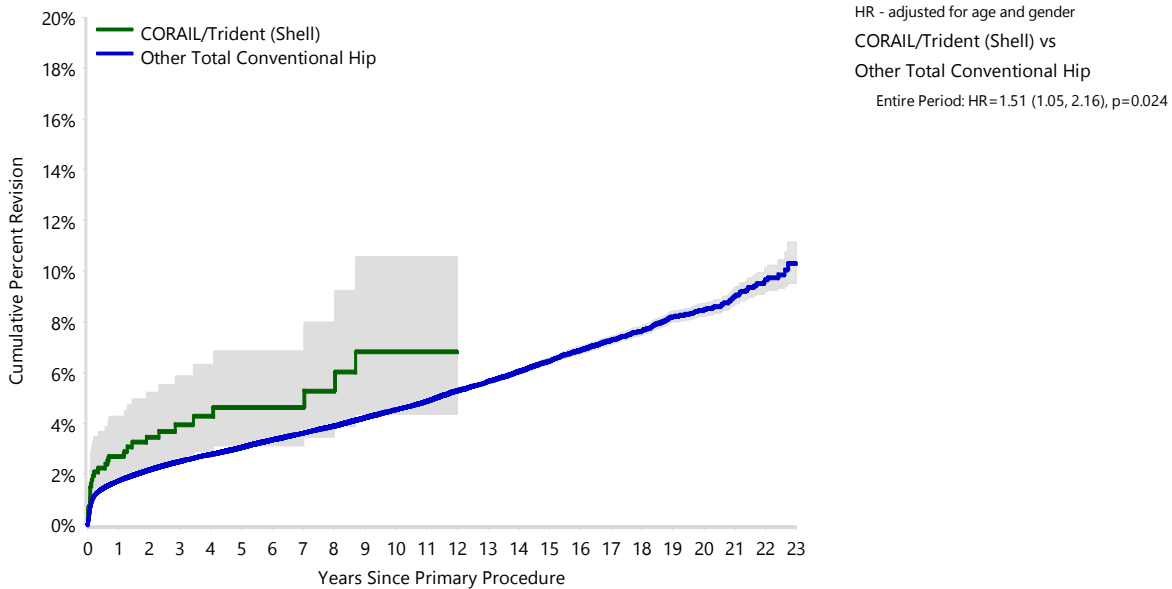
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Conventional Hip Replacement

The yearly cumulative percent revision of the CORAIL/Trident (Shell) total conventional hip combination is compared to all other total conventional hip prostheses. In addition, hazard ratios are reported.

Hazard ratios are reported for specific time periods during which the hazard ratio is constant. This is done to enable more specific and valid comparisons of the risk of revision over time. The pattern of variation in risk has important implications with respect to the underlying reasons for any difference.

Figure 1: Cumulative Percent Revision of Primary Total Conventional Hip Replacement



| Number at Risk | 0 Yr | 1 Yr | 2 Yrs | 3 Yrs | 4 Yrs | 5 Yrs | 6 Yrs | 7 Yrs | 8 Yrs | 9 Yrs | 10 Yrs | 11 Yrs |
|------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| CORAIL/Trident (Shell) | 680 | 572 | 467 | 341 | 272 | 218 | 181 | 146 | 130 | 115 | 99 | 77 |
| Other Total Conventional Hip | 537865 | 475077 | 425342 | 376830 | 332642 | 288764 | 247611 | 209478 | 174447 | 143189 | 117729 | 96177 |

| Number at Risk | 12 Yrs | 13 Yrs | 14 Yrs | 15 Yrs | 16 Yrs | 17 Yrs | 18 Yrs | 19 Yrs | 20 Yrs | 21 Yrs | 22 Yrs | 23 Yrs |
|------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| CORAIL/Trident (Shell) | 56 | 37 | 27 | 18 | 16 | 5 | 3 | 1 | 1 | 1 | 0 | 0 |
| Other Total Conventional Hip | 77762 | 61568 | 47671 | 35964 | 26843 | 20091 | 14820 | 10048 | 6170 | 3221 | 1205 | 203 |

Note: Prostheses no longer used in 2023 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

TABLE 3**Primary Diagnosis for Revised Primary Total Conventional Hip Replacement**

This table identifies the diagnosis of the primary procedure which was subsequently revised. This information is provided as there is a variation on outcome depending on the primary diagnosis. It is therefore important when considering the reasons for a higher than anticipated rate of revision that there is identification of the primary diagnosis. This information should be compared to the primary diagnosis for the revisions of all other total conventional hip prostheses.

Table 3: Primary Diagnosis for Revised Primary Total Conventional Hip Replacement

| Primary Diagnosis | CORAIL/Trident (Shell) | | Other Total Conventional Hip | |
|------------------------------|------------------------|--------------|------------------------------|--------------|
| | Number | Percent | Number | Percent |
| Osteoarthritis | 26 | 86.7 | 15926 | 82.9 |
| Fractured Neck Of Femur | 2 | 6.7 | 1418 | 7.4 |
| Osteonecrosis | 1 | 3.3 | 858 | 4.5 |
| Developmental Dysplasia | 1 | 3.3 | 319 | 1.7 |
| Rheumatoid Arthritis | | | 208 | 1.1 |
| Failed Internal Fixation | | | 151 | 0.8 |
| Tumour | | | 149 | 0.8 |
| Other Inflammatory Arthritis | | | 106 | 0.6 |
| Fracture/Dislocation | | | 53 | 0.3 |
| Other | | | 17 | 0.1 |
| Arthrodesis Takedown | | | 15 | 0.1 |
| TOTAL | 30 | 100.0 | 19220 | 100.0 |

Note: Prostheses no longer used in 2023 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

TABLE 4

Reasons for Revision

This is reported in two ways: a percentage of primary procedures revised and as a percentage of all revision procedures.

% Primaries Revised: This shows the proportional contribution of each revision diagnosis as a percentage of the total number of primary procedures. This percentage can be used to approximate the risk of being revised for that diagnosis. Differing percentages between groups, with the same distribution of follow up time, may identify problems of concern.

% Revisions: The number of revisions for each diagnosis is expressed as a percentage of the total number of revisions. This shows the distribution of reasons for revision within a group but cannot be used as a comparison between groups.

Table 4: Primary Total Conventional Hip Replacement - Reason for Revision (Follow-up Limited to 21.7 Years)

| Revision Diagnosis | CORAIL/Trident (Shell) | | | Other Total Conventional Hip | | |
|------------------------------------|------------------------|---------------------|--------------|------------------------------|---------------------|--------------|
| | Number | % Primaries Revised | % Revisions | Number | % Primaries Revised | % Revisions |
| Infection | 12 | 1.8 | 40.0 | 4492 | 0.8 | 23.4 |
| Prosthesis Dislocation/Instability | 2 | 0.3 | 6.7 | 4379 | 0.8 | 22.8 |
| Fracture | 4 | 0.6 | 13.3 | 4260 | 0.8 | 22.2 |
| Loosening | 11 | 1.6 | 36.7 | 3818 | 0.7 | 19.9 |
| Pain | | | | 336 | 0.1 | 1.7 |
| Leg Length Discrepancy | | | | 291 | 0.1 | 1.5 |
| Malposition | | | | 269 | 0.1 | 1.4 |
| Lysis | | | | 216 | 0.0 | 1.1 |
| Implant Breakage Stem | | | | 192 | 0.0 | 1.0 |
| Implant Breakage Acetabular Insert | | | | 131 | 0.0 | 0.7 |
| Wear Acetabular Insert | | | | 112 | 0.0 | 0.6 |
| Incorrect Sizing | | | | 103 | 0.0 | 0.5 |
| Metal Related Pathology | | | | 84 | 0.0 | 0.4 |
| Implant Breakage Acetabular | | | | 72 | 0.0 | 0.4 |
| Wear Head | | | | 48 | 0.0 | 0.2 |
| Tumour | | | | 44 | 0.0 | 0.2 |
| Implant Breakage Head | | | | 33 | 0.0 | 0.2 |
| Heterotopic Bone | | | | 26 | 0.0 | 0.1 |
| Wear Acetabulum | | | | 11 | 0.0 | 0.1 |
| Osteonecrosis | | | | 2 | 0.0 | 0.0 |
| Progression Of Disease | | | | 2 | 0.0 | 0.0 |
| Synovitis | | | | 1 | 0.0 | 0.0 |
| Other | 1 | 0.1 | 3.3 | 292 | 0.1 | 1.5 |
| N Revision | 30 | 4.4 | 100.0 | 19214 | 3.6 | 100.0 |
| N Primary | 680 | | | 537865 | | |

Note: This table is restricted to revisions within 21.7 years for all groups to allow a time-matched comparison of revisions.

Note: Prostheses no longer used in 2023 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

FIGURE 2

Cumulative Incidence Revision Diagnosis of Primary Total Conventional Hip Replacement

This figure details the cumulative incidence of the most common reasons for revision. The five most common reasons for revision are included as long as each of these reasons account for more than 10 procedures or at least 5% of all revisions for the CORAIL/Trident (Shell) total conventional hip combination. A comparative graph is provided of the cumulative incidence for the same reasons for revisions for all other total conventional hip prostheses.

Figure 2: Cumulative Incidence Revision Diagnosis for Primary Total Conventional Hip Replacement

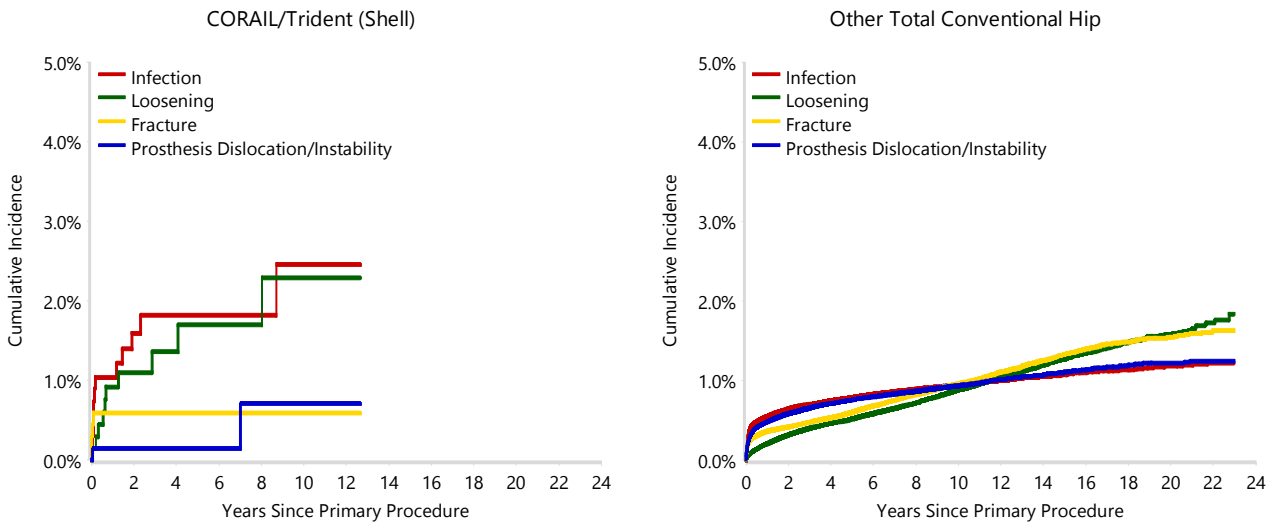


TABLE 5

Type of Revision Performed for Primary Total Conventional Hip Replacement

This analysis identifies the components used in the revision of the CORAIL/Trident (Shell) total conventional hip combination and compares it to the components used in the revision of all other total conventional hip prostheses.

The reason this analysis is undertaken is to identify whether there is one or more components which are being replaced that differ from the components replaced for revisions of all other total conventional hip prostheses i.e. is there a difference in the type of revision undertaken for the CORAIL/Trident (Shell) total conventional hip combination compared to all other total conventional hip prostheses.

Table 5: Primary Total Conventional Hip Replacement - Type of Revision (Follow-up Limited to 21.7 Years)

| Type of Revision | CORAIL/Trident (Shell) | | Other Total Conventional Hip | |
|---------------------------|------------------------|--------------|------------------------------|--------------|
| | Number | Percent | Number | Percent |
| Femoral Component | 8 | 26.7 | 6339 | 33.0 |
| Acetabular Component | 3 | 10.0 | 3604 | 18.8 |
| THR (Femoral/Acetabular) | 6 | 20.0 | 2249 | 11.7 |
| Cement Spacer | 4 | 13.3 | 616 | 3.2 |
| Removal of Prostheses | | | 99 | 0.5 |
| Reinsertion of Components | | | 28 | 0.1 |
| Total Femoral | | | 9 | 0.0 |
| Bipolar Head and Femoral | | | 7 | 0.0 |
| Saddle | | | 1 | 0.0 |
| N Major | 21 | 70.0 | 12952 | 67.4 |
| Head/Insert | 7 | 23.3 | 4836 | 25.2 |
| Head Only | 2 | 6.7 | 924 | 4.8 |
| Minor Components | | | 311 | 1.6 |
| Insert Only | | | 187 | 1.0 |
| Bipolar Only | | | 2 | 0.0 |
| Cement Only | | | 1 | 0.0 |
| Head/Neck | | | 1 | 0.0 |
| N Minor | 9 | 30.0 | 6262 | 32.6 |
| TOTAL | 30 | 100.0 | 19214 | 100.0 |

Note: This table is restricted to revisions within 21.7 years for all groups to allow a time-matched comparison of revisions.

Note: Prostheses no longer used in 2023 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

TABLE 6**Revision Rates of CORAIL/Trident (Shell) Primary Total Conventional Hip Replacement by Fixation**

This analysis is provided as some prostheses have more than one fixation option. Additionally there are prostheses where an alternative to the recommended approach to fixation was used e.g. a cementless prosthesis that has been cemented or vice-versa.

Table 6: Revised Number of CORAIL/Trident (Shell) Primary Total Conventional Hip Replacement by Fixation

| Fixation | N Revised | N Total |
|--------------|-----------|------------|
| Cementless | 30 | 680 |
| TOTAL | 30 | 680 |

TABLE 7**Revision Rates of CORAIL/Trident (Shell) Primary Total Conventional Hip Replacement by Bearing Surface**

This analysis is provided as some prostheses are combined with a variety of bearing surfaces. All bearing surfaces used with this combination are listed.

Table 7: Revised Number of CORAIL/Trident (Shell) Primary Total Conventional Hip Replacement by Bearing Surface

| Bearing Surface | N Revised | N Total |
|-----------------|-----------|------------|
| Ceramic/Ceramic | 1 | 4 |
| Ceramic/XLPE | 13 | 241 |
| Metal/Non XLPE | 0 | 1 |
| Metal/XLPE | 16 | 434 |
| TOTAL | 30 | 680 |

TABLE 8**Revision Rates of CORAIL/Trident (Shell) Primary Total Conventional Hip Replacement by Approach**

This analysis is provided as some prostheses are used with a variety of surgical approaches. All surgical approaches used with this combination are listed.

Table 8: Revised Number of CORAIL/Trident (Shell) Primary Total Conventional Hip Replacement by Approach

| Approach | N Revised | N Total |
|--------------|-----------|------------|
| Anterior | 1 | 51 |
| Lateral | 1 | 32 |
| Posterior | 13 | 432 |
| TOTAL | 15 | 515 |

Note: Excludes 165 procedures with no approach recorded

TABLE 9

Revision Rates of Primary Total Conventional Hip Replacement by State

This enables a state by state variation to be identified for the CORAIL/Trident (Shell) total conventional hip combination and provides the comparative data for each of the states for all other total conventional hip prostheses.

The purpose of this analysis is to determine if the higher than anticipated rate of revision has widespread distribution between states. If there is widespread distribution then the reason for the higher than anticipated rate of revision is unlikely to be surgeon specific. If the prosthesis has been used in only a small number of states it is not possible to distinguish if the higher than anticipated rate of revision is related to the prosthesis, surgeon, technique or patient.

Table 9: Revised Number of Primary Total Conventional Hip Replacement by State

| Component | State | N Revised | N Total |
|------------------------------|--------|--------------|---------------|
| CORAIL/Trident (Shell) | NSW | 7 | 109 |
| | VIC | 9 | 177 |
| | QLD | 8 | 187 |
| | WA | 5 | 122 |
| | SA | 1 | 83 |
| | TAS | 0 | 2 |
| Other Total Conventional Hip | NSW | 5201 | 157600 |
| | VIC | 4850 | 140505 |
| | QLD | 3783 | 94395 |
| | WA | 2541 | 63144 |
| | SA | 1824 | 49315 |
| | TAS | 452 | 18196 |
| | ACT/NT | 569 | 14710 |
| TOTAL | | 19250 | 538545 |

Note: Prostheses no longer used in 2023 are excluded from the comparator. Procedures using metal/metal prostheses with head size larger than 32mm are excluded from the comparator.

TABLE 10**Number of Revisions of CORAIL/Trident (Shell) Primary Total Conventional Hip Replacement by Year of Implant**

This analysis details the number of prostheses reported each year to the Registry for the CORAIL/Trident (Shell) total conventional hip combination. It also provides the subsequent number of revisions of the primaries reported in that year.

Primary procedures performed in later years have had less follow up time therefore the number revised is expected to be less than the number revised in earlier years. For example, a primary procedure performed in 2023 has a maximum of one year to be revised, whereas a primary procedure performed in 2021 has a maximum of three years to be revised.

Table 10: Number of Revisions of CORAIL/Trident (Shell) Primary Total Conventional Hip Replacement by Year of Implant

| Year of Implant | Number Revised | Total Number |
|-----------------|----------------|--------------|
| 2001 | 0 | 1 |
| 2002 | 1 | 2 |
| 2004 | 0 | 2 |
| 2005 | 0 | 2 |
| 2006 | 0 | 4 |
| 2007 | 2 | 22 |
| 2008 | 1 | 10 |
| 2009 | 1 | 13 |
| 2010 | 2 | 16 |
| 2011 | 3 | 25 |
| 2012 | 2 | 26 |
| 2013 | 2 | 24 |
| 2014 | 1 | 14 |
| 2015 | 0 | 13 |
| 2016 | 0 | 11 |
| 2017 | 2 | 32 |
| 2018 | 1 | 37 |
| 2019 | 0 | 47 |
| 2020 | 1 | 65 |
| 2021 | 7 | 128 |
| 2022 | 0 | 99 |
| 2023 | 4 | 87 |
| TOTAL | 30 | 680 |

TABLE 11

Revision Rates of CORAIL/Trident (Shell) Primary Total Conventional Hip Replacement by Catalogue Number Range

Many prostheses have a number of catalogue ranges. The catalogue range is specific to particular design features; more than one catalogue range usually indicates a minor difference in design in a particular CORAIL/Trident (Shell) prosthesis.

This analysis has been undertaken to determine if the revision rate varies according to the catalogue number range.

| Model | Catalogue Range | Catalogue Description | Cement | Material | Coating |
|---------------------|-------------------|---|--------|----------|-----------|
| Femoral Stem | | | | | |
| CORAIL | 3L92498-3L92521 | STANDARD CEMENTLESS FEMORAL STEM W/COLLAR | NO | METAL | HA COATED |
| CORAIL | 3L92507-3L92520 | STANDARD CEMENTLESS FEMORAL STEM W/OUT COLLAR | NO | METAL | HA COATED |
| CORAIL | 3L93709-3L93720 | CEMENTLESS LATERALISED FEMORAL STEM W/COLLAR | NO | METAL | HA COATED |
| CORAIL | L20106-L20106 | CEMENTLESS DYSPLASIA FEMORAL STEM W/OUT COLLAR | NO | METAL | HA COATED |
| CORAIL | L20309-L20320 | CEMENTLESS HIGH OFFSET FEMORAL STEM W/OUT COLLAR | NO | METAL | HA COATED |
| CORAIL | L92509-L92520 | CEMENTLESS FEMORAL STEM W/OUT COLLAR HAC | NO | METAL | HA COATED |
| CORAIL | L971109-L971120 | CEMENTLESS FEMORAL STEM HIGH OFFSET COLLAR | NO | METAL | |
| CORAIL | L971208-L971214 | CEMENTLESS FEMORAL STEM STANDARD COLLAR | NO | METAL | |
| CORAIL | L971308-L971314 | CEMENTLESS FEMORAL STEM SHORT NECK COLLAR | NO | METAL | |
| CORAIL | L981208-L981210 | CEMENTLESS FEMORAL STEM 125° STANDARD STD NO COLLAR | NO | METAL | |
| Acetabular | | | | | |
| Trident (Shell) | 5000142A-5000168I | HEMISPHERICAL SOLID SHELL | NO | METAL | |
| Trident (Shell) | 5001142A-5001174J | HEMISPHERICAL HA SOLID SHELL | NO | METAL | HA COATED |
| Trident (Shell) | 5021142A-5021174J | HEMISPHERICAL HA CLUSTER HOLE SHELL | NO | METAL | HA COATED |
| Trident (Shell) | 5081142A-5081174J | TITANIUM HEMISPHERICAL HA MULTI-HOLE CUP | NO | METAL | HA COATED |
| Trident (Shell) | 5401140A-5401174K | PSL TITANIUM HA NO HOLE CUP | NO | METAL | HA COATED |
| Trident (Shell) | 5421140A-5421172J | PSL TITANIUM HA CLUSTER HOLE CUP | NO | METAL | HA COATED |

Table 11: Revised Number of CORAIL/Trident (Shell) Primary Total Conventional Hip Replacement by Catalogue Number Range

| Femoral Stem Range | Acetabular Range | N Revised | N Total |
|--------------------|-------------------|-----------|------------|
| 3L92498-3L92521 | 5001142A-5001174J | 0 | 87 |
| | 5021142A-5021174J | 6 | 183 |
| | 5081142A-5081174J | 0 | 3 |
| | 5401140A-5401174K | 0 | 13 |
| | 5421140A-5421172J | 4 | 62 |
| 3L92507-3L92520 | 5000142A-5000168I | 1 | 1 |
| | 5001142A-5001174J | 1 | 15 |
| | 5021142A-5021174J | 3 | 25 |
| | 5401140A-5401174K | 0 | 2 |
| | 5421140A-5421172J | 2 | 11 |
| 3L93709-3L93720 | 5001142A-5001174J | 2 | 66 |
| | 5021142A-5021174J | 1 | 33 |
| | 5401140A-5401174K | 0 | 4 |
| | 5421140A-5421172J | 0 | 7 |
| L20106-L20106 | 5021142A-5021174J | 1 | 1 |
| L20309-L20320 | 5000142A-5000168I | 0 | 1 |
| | 5001142A-5001174J | 0 | 9 |
| | 5021142A-5021174J | 1 | 16 |
| | 5401140A-5401174K | 1 | 1 |
| | 5421140A-5421172J | 0 | 1 |
| L92509-L92520 | 5421140A-5421172J | 1 | 3 |
| L971109-L971120 | 5001142A-5001174J | 1 | 25 |
| | 5021142A-5021174J | 0 | 37 |
| | 5081142A-5081174J | 0 | 1 |
| | 5401140A-5401174K | 0 | 3 |
| | 5421140A-5421172J | 0 | 7 |
| L971208-L971214 | 5001142A-5001174J | 2 | 15 |
| | 5021142A-5021174J | 0 | 15 |
| | 5401140A-5401174K | 0 | 1 |
| | 5421140A-5421172J | 2 | 10 |
| L971308-L971314 | 5001142A-5001174J | 0 | 9 |
| | 5021142A-5021174J | 0 | 6 |
| | 5401140A-5401174K | 1 | 3 |
| | 5421140A-5421172J | 0 | 3 |
| L981208-L981210 | 5001142A-5001174J | 0 | 1 |
| TOTAL | | 30 | 680 |