

# Australian Orthopaedic Association National Joint Replacement Registry

2023 SUPPLEMENTARY REPORT

## Demographics and Outcome of Elbow and Wrist Arthroplasty



**AOA**  
AUSTRALIAN  
ORTHOPAEDIC  
ASSOCIATION

Australian  
Orthopaedic  
Association  
National  
Joint  
Replacement  
Registry

**Australian Orthopaedic Association National Joint Replacement Registry**

**Demographics and Outcomes of Elbow and Wrist  
Arthroplasty**

2023 Supplementary Report

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National Joint Replacement Registry

**Demographics and Outcomes of  
Elbow and Wrist Arthroplasty  
2023 Supplementary Report**

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The Registry greatly appreciates the participation of all joint replacement patients throughout Australia. Their contribution allows ongoing improvements in arthroplasty outcomes to be achieved.

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# Introduction

The 2023 Demographics and Outcome of Elbow and Wrist Arthroplasty Supplementary Report is based on the analysis of 7,140 elbow and 978 wrist procedures recorded by the Registry with a procedure date up to and including 31 December 2022.

The elbow arthroplasty procedures include 4,190 primary partial, 1,785 primary total and 1,165 revisions (Table EG1).

The wrist arthroplasty procedures include 349 primary partial, 493 primary total and 136 revisions (Table WG1).

The Elbow and Wrist Arthroplasty Report is one of 16 supplementary reports to complete the AOANJRR Annual Report for 2023.

The 2023 Annual Report, Supplementary Reports, and investigations of prostheses with higher than anticipated rates of revision are available on the AOANJRR website.

Information on the background, purpose, aims, benefits and governance of the Registry can be found in the Introduction of the 2023 Hip, Knee and Shoulder Arthroplasty Annual Report.

The Registry data quality processes including data collection, validation and outcomes assessment, are provided in detail in the data quality section of the 2023 Hip, Knee and Shoulder Arthroplasty Annual Report:

<https://aoanjrr.sahmri.com/annual-reports-2023>

# Elbow Replacement

## CATEGORIES OF ELBOW REPLACEMENT

The Registry groups elbow replacement into three broad categories: primary partial, primary total, and revision elbow replacement.

A primary replacement is the initial replacement procedure undertaken on a joint and involves replacing either part (partial) or all (total) of the articular surface.

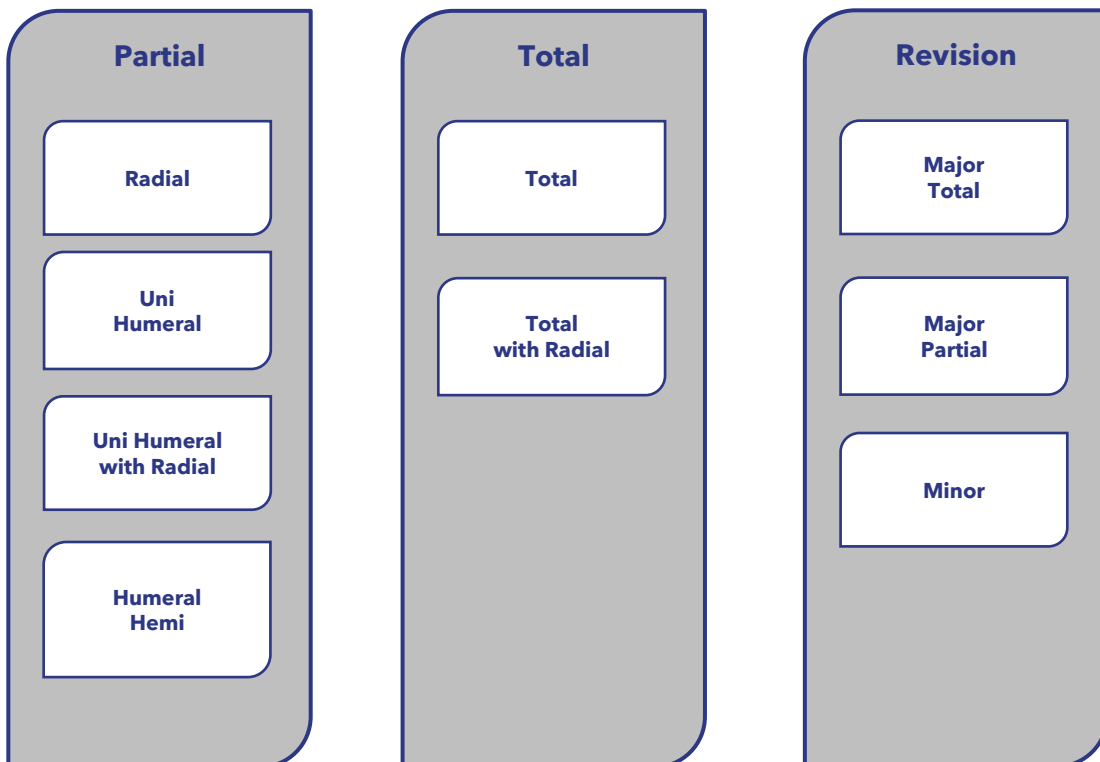
Primary partial and primary total elbow replacement are further subcategorised into classes depending on the type of prostheses used. Partial elbow classes are radial, uni humeral, uni humeral with radial, and humeral hemiarthroplasty elbow replacement. Total elbow classes are total and total with radial

elbow replacement. Definitions for each of these are detailed in the relevant chapters.

Revision procedures are re-operations of previous elbow replacements where one or more of the prosthetic components are replaced, removed, or another component is added. Revisions include re-operations of primary partial, primary total or previous revision procedures.

Elbow revisions are subcategorised into three classes: minor, major partial, and major total revisions. These are defined in the section on revisions.

## ELBOW REPLACEMENT





## DEMOGRAPHICS

**Table EG1 Number of Elbow Replacements by Gender**

Elbow Replacement	Female		Male		TOTAL	
	N	%	N	%	N	%
Radial	2215	58.2	1592	41.8	3807	90.9
Uni Humeral	7	70.0	3	30.0	10	0.2
Uni Humeral & Radial	10	40.0	15	60.0	25	0.6
Humeral	294	84.5	54	15.5	348	8.3
<b>Primary Partial</b>	<b>2526</b>	<b>60.3</b>	<b>1664</b>	<b>39.7</b>	<b>4190</b>	<b>100.0</b>
Total Elbow	1290	74.6	439	25.4	1729	96.9
Total Elbow & Radial	35	62.5	21	37.5	56	3.1
<b>Primary Total</b>	<b>1325</b>	<b>74.2</b>	<b>460</b>	<b>25.8</b>	<b>1785</b>	<b>100.0</b>
Revision	684	58.7	481	41.3	1165	100.0
<b>TOTAL</b>	<b>4535</b>	<b>63.5</b>	<b>2605</b>	<b>36.5</b>	<b>7140</b>	<b>100.0</b>

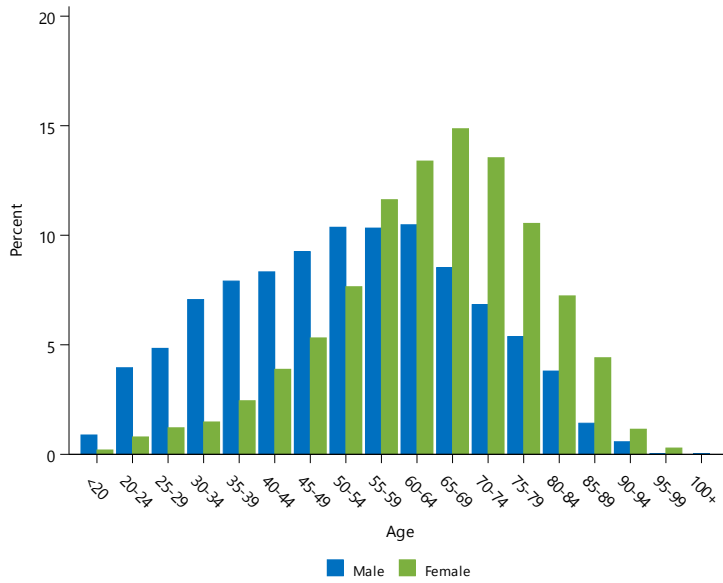
**Table EG2 Number of Elbow Replacements by Age**

Elbow Replacement	<55		55-64		65-74		75-84		≥85		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Radial	1866	49.0	968	25.4	685	18.0	249	6.5	39	1.0	3807	90.9
Uni Humeral	9	90.0	1	10.0	.	.	.	.	.	.	10	0.2
Uni Humeral & Radial	10	40.0	9	36.0	5	20.0	1	4.0	.	.	25	0.6
Humeral	44	12.6	90	25.9	104	29.9	77	22.1	33	9.5	348	8.3
<b>Primary Partial</b>	<b>1929</b>	<b>46.0</b>	<b>1068</b>	<b>25.5</b>	<b>794</b>	<b>18.9</b>	<b>327</b>	<b>7.8</b>	<b>72</b>	<b>1.7</b>	<b>4190</b>	<b>100.0</b>
Total Elbow	172	9.9	302	17.5	539	31.2	521	30.1	195	11.3	1729	96.9
Total Elbow & Radial	6	10.7	14	25.0	20	35.7	15	26.8	1	1.8	56	3.1
<b>Primary Total</b>	<b>178</b>	<b>10.0</b>	<b>316</b>	<b>17.7</b>	<b>559</b>	<b>31.3</b>	<b>536</b>	<b>30.0</b>	<b>196</b>	<b>11.0</b>	<b>1785</b>	<b>100.0</b>
Revision	305	26.2	292	25.1	335	28.8	182	15.6	51	4.4	1165	100.0
<b>TOTAL</b>	<b>2412</b>	<b>33.8</b>	<b>1676</b>	<b>23.5</b>	<b>1688</b>	<b>23.6</b>	<b>1045</b>	<b>14.6</b>	<b>319</b>	<b>4.5</b>	<b>7140</b>	<b>100.0</b>

**Table EG3 Time between Procedures for Bilateral Primary Elbow Replacement**

Bilateral Procedures	Same Day		1day-6months		≥6months		TOTAL	
	N	Total%	N	Total%	N	Total%	N	Total%
Both - Radial	15	11.7	4	3.1	8	6.3	27	21.1
Both - Total Elbow	.	.	13	10.2	80	62.5	93	72.7
Humeral Hemiarthroplasty & Total Elbow	.	.	1	0.8	1	0.8	2	1.6
Radial & Humeral Hemiarthroplasty	.	.	1	0.8	.	.	1	0.8
Radial & Total Elbow	.	.	.	.	2	1.6	2	1.6
Radial & Uni Humeral & Radial	.	.	.	.	1	0.8	1	0.8
Total Elbow & Total Elbow & Radial	.	.	.	.	1	0.8	1	0.8
Uni Humeral & Radial & Total Elbow	.	.	.	.	1	0.8	1	0.8
<b>TOTAL</b>	<b>15</b>	<b>11.7</b>	<b>19</b>	<b>14.8</b>	<b>94</b>	<b>73.4</b>	<b>128</b>	<b>100.0</b>

**Figure EG1 Elbow Replacement by Age and Gender**



**Table EG4 Age and Gender of All Elbow Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	2605	36.5%	12	102	53	52.8	16.9
Female	4535	63.5%	16	99	65	63.9	14.3
<b>TOTAL</b>	<b>7140</b>	<b>100.0%</b>	<b>12</b>	<b>102</b>	<b>62</b>	<b>59.8</b>	<b>16.2</b>

**Table EG5 Cumulative Percent Revision of Primary Elbow Replacement by Elbow Class**

Elbow Class	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	8 Yrs	11 Yrs	14 Yrs
Radial	190	3806	3.0 (2.5, 3.7)	4.8 (4.1, 5.5)	5.3 (4.6, 6.1)	5.6 (4.9, 6.5)	5.7 (5.0, 6.6)	5.7 (5.0, 6.6)
Uni Humeral	1	10	0.0 (0.0, 0.0)	10.0 (1.5, 52.7)	10.0 (1.5, 52.7)	10.0 (1.5, 52.7)	10.0 (1.5, 52.7)	
Uni Humeral & Radial	13	25	24.0 (11.6, 45.8)	48.0 (30.8, 68.8)	48.0 (30.8, 68.8)	48.0 (30.8, 68.8)	54.5 (35.6, 75.6)	
Humeral	25	348	3.9 (2.3, 6.7)	5.8 (3.7, 9.1)	6.9 (4.5, 10.6)	10.2 (6.7, 15.5)		
Total Elbow	223	1729	3.4 (2.7, 4.4)	9.2 (7.8, 10.8)	12.4 (10.8, 14.3)	17.1 (14.9, 19.5)	20.5 (17.8, 23.5)	22.9 (19.4, 26.9)
Total Elbow & Radial	14	56	5.5 (1.8, 16.1)	19.2 (10.8, 32.8)	23.7 (14.1, 38.1)	26.7 (16.3, 42.0)	31.3 (19.1, 48.6)	
<b>TOTAL</b>	<b>466</b>	<b>5974</b>						

## PRIMARY PARTIAL ELBOW REPLACEMENT

### DEMOGRAPHICS

The Registry subcategorises primary partial elbow replacement into four classes. These are defined as:

**Radial** involves resection of the radial head and replacement with a stemmed radial prosthesis.

**Uni humeral** involves replacement of the capitellum.

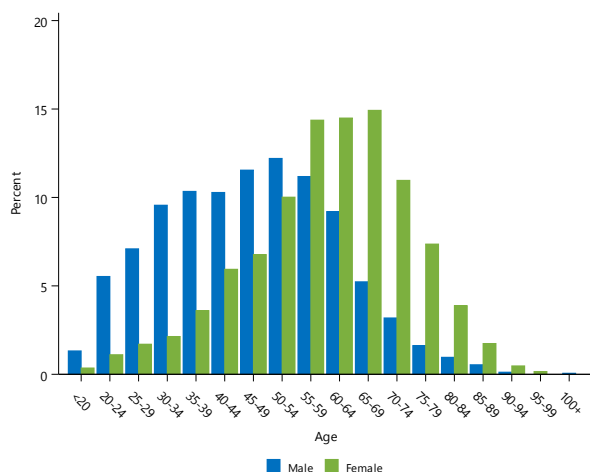
**Uni humeral with radial** involves replacement of the capitellum and radial head.

**Humeral hemiarthroplasty** involves resection of the distal humerus and replacement with a stemmed humeral prosthesis.

**Table EP1 Age and Gender of Primary Partial Elbow Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	2526	60.3%	16	99	61	59.7	14.1
Male	1663	39.7%	14	102	47	46.9	14.9
<b>TOTAL</b>	<b>4189</b>	<b>100.0%</b>	<b>14</b>	<b>102</b>	<b>56</b>	<b>54.6</b>	<b>15.7</b>

**Figure EP1 Primary Partial Elbow Replacement by Age and Gender**



**Table EP2 Primary Partial Elbow Replacement by Primary Diagnosis**

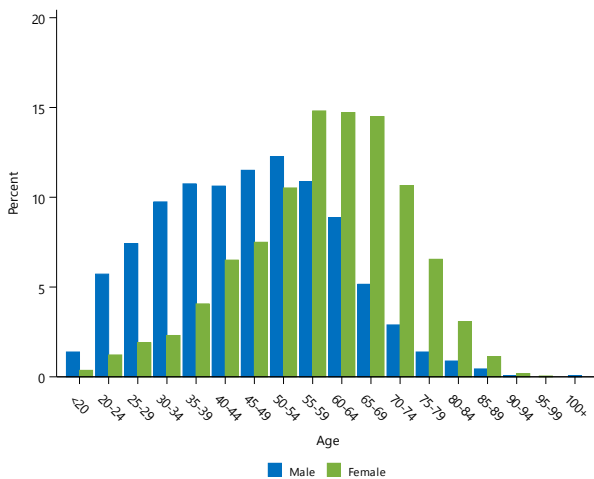
Primary Diagnosis	Number	Percent
Fracture/Dislocation	3809	90.9
Osteoarthritis	305	7.3
Instability	39	0.9
Rheumatoid Arthritis	14	0.3
Osteonecrosis	13	0.3
Tumour	4	0.1
Other Inflammatory Arthritis	3	0.1
Other	2	0.0
<b>TOTAL</b>	<b>4189</b>	<b>100.0</b>

## PRIMARY RADIAL ELBOW REPLACEMENT

**Table EP3 Age and Gender of Primary Radial Elbow Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	2215	58.2%	16	97	60	58.5	13.8
Male	1591	41.8%	14	102	46	46.3	14.7
<b>TOTAL</b>	<b>3806</b>	<b>100.0%</b>	<b>14</b>	<b>102</b>	<b>55</b>	<b>53.4</b>	<b>15.4</b>

**Figure EP2 Primary Radial Elbow Replacement by Age and Gender**



**Table EP4 Primary Radial Elbow Replacement by Primary Diagnosis**

Primary Diagnosis	Number	Percent
Fracture/Dislocation	3479	91.4
Osteoarthritis	261	6.9
Instability	39	1.0
Rheumatoid Arthritis	11	0.3
Osteonecrosis	10	0.3
Other Inflammatory Arthritis	3	0.1
Tumour	1	0.0
Other	2	0.1
<b>TOTAL</b>	<b>3806</b>	<b>100.0</b>

**Table EP5 Most Used Radial Head/Stem Prostheses in Primary Radial Elbow Replacement**

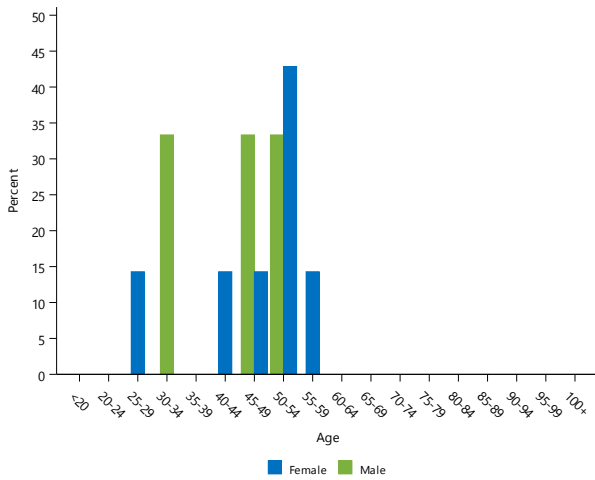
2008		2019		2020		2021		2022	
N	Model	N	Model	N	Model	N	Model	N	Model
57	Evolve	155	Radial Stem (Ascension)	189	Radial Stem (Ascension)	153	Radial Stem (Ascension)	127	Radial Stem (Ascension)
30	Radial Stem (Ascension)	75	Anatomic	73	Anatomic	62	Evolve	55	Evolve
20	Anatomic	61	Evolve	60	Evolve	52	Anatomic	45	Anatomic
15	MOPYC	42	MOPYC	31	MOPYC	39	MOPYC	26	MOPYC
8	RHS	7	ExploR	5	ExploR	6	ALIGN	13	ALIGN
6	ExploR	2	RHS	1	RHS	2	ExploR	3	Radial Head Replacement System
4	Swanson					2	RHS		
4	rHead								
1	Generic Radial Stem								
1	Solar								
<b>10 Most Used</b>									
146 (10)	100.0%	342 (6)	100.0%	359 (6)	100.0%	316 (7)	100.0%	269 (6)	100.0%

## PRIMARY UNI HUMERAL ELBOW REPLACEMENT

**Table EP6 Age and Gender of Primary Uni Humeral Elbow Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	7	70.0%	27	56	51	47.0	10.4
Male	3	30.0%	30	52	47	43.0	11.5
<b>TOTAL</b>	<b>10</b>	<b>100.0%</b>	<b>27</b>	<b>56</b>	<b>49</b>	<b>45.8</b>	<b>10.2</b>

**Figure EP3 Primary Humeral Elbow Replacement by Age and Gender**



**Table EP7 Primary Uni Humeral Elbow Replacement by Primary Diagnosis**

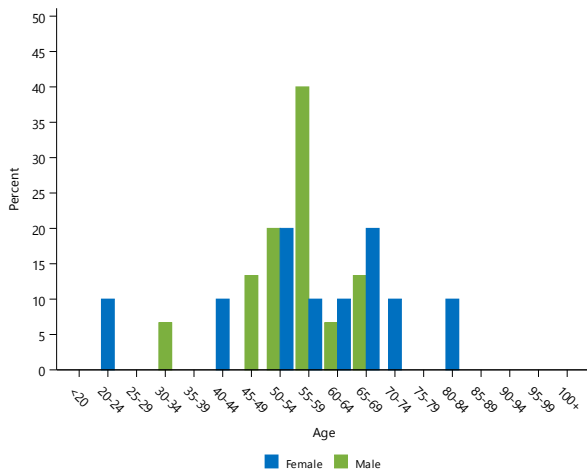
Primary Diagnosis	Number	Percent
Osteoarthritis	5	50.0
Fracture/Dislocation	4	40.0
Osteonecrosis	1	10.0
<b>TOTAL</b>	<b>10</b>	<b>100.0</b>

## PRIMARY UNI HUMERAL WITH RADIAL ELBOW REPLACEMENT

**Table EP8 Age and Gender of Primary Uni Humeral with Radial Elbow Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	10	40.0%	22	83	59	57.4	17.0
Male	15	60.0%	31	69	57	55.0	9.3
<b>TOTAL</b>	<b>25</b>	<b>100.0%</b>	<b>22</b>	<b>83</b>	<b>58</b>	<b>56.0</b>	<b>12.6</b>

**Figure EP4 Primary Uni Humeral with Radial Elbow Replacement by Age and Gender**



**Table EP9 Primary Uni Humeral with Radial Elbow Replacement by Primary Diagnosis**

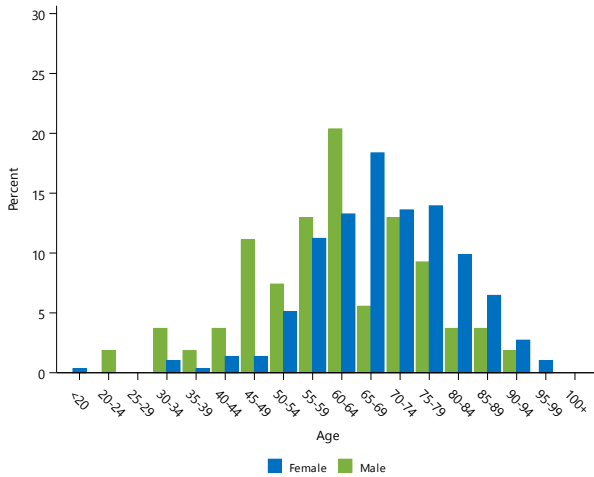
Primary Diagnosis	Number	Percent
Osteoarthritis	21	84.0
Osteonecrosis	2	8.0
Fracture/Dislocation	2	8.0
<b>TOTAL</b>	<b>25</b>	<b>100.0</b>

## PRIMARY HUMERAL HEMIARTHROPLASTY

**Table EP10 Age and Gender of Primary Humeral Hemiarthroplasty Elbow Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	294	84.5%	18	99	69	69.1	12.2
Male	54	15.5%	22	91	61	61.1	14.7
<b>TOTAL</b>	<b>348</b>	<b>100.0%</b>	<b>18</b>	<b>99</b>	<b>68</b>	<b>67.9</b>	<b>13.0</b>

**Figure EP5 Primary Humeral Hemiarthroplasty Elbow Replacement by Age and Gender**



**Table EP11 Primary Humeral Hemiarthroplasty Elbow Replacement by Primary Diagnosis**

Primary Diagnosis	Number	Percent
Fracture/Dislocation	324	93.1
Osteoarthritis	18	5.2
Rheumatoid Arthritis	3	0.9
Tumour	3	0.9
<b>TOTAL</b>	<b>348</b>	<b>100.0</b>

**Table EP12 Most Used Humeral Prostheses in Primary Humeral Hemiarthroplasty Elbow Replacement**

2008		2019		2020		2021		2022	
N	Model	N	Model	N	Model	N	Model	N	Model
13	Latitude	24	Latitude	26	Latitude	38	Latitude	32	Latitude
1	Sorbie-Questor								
<b>10 Most Used</b>									
14	(2) 100.0%	24	(1) 100.0%	26	(1) 100.0%	38	(1) 100.0%	32	(1) 100.0%

## PRIMARY TOTAL ELBOW REPLACEMENT

### DEMOGRAPHICS

The Registry subcategorises primary total elbow replacement into two classes. These are defined as:

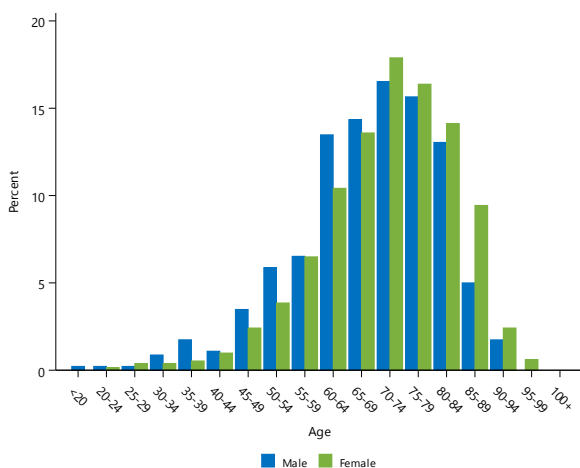
**Total elbow without radial** involves resection of the olecranon and distal humerus and replacement with a stemmed ulna and stemmed humeral prosthesis.

**Total elbow with radial** involves resection of the olecranon and distal humerus and replacement with a stemmed ulna and stemmed humeral prosthesis combined with replacement of the radial head with a radial prosthesis.

**Table ET1 Age and Gender of Primary Total Elbow Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	1325	74.2%	21	96	72	71.3	11.9
Male	460	25.8%	12	94	70	68.5	12.6
<b>TOTAL</b>	<b>1785</b>	<b>100.0%</b>	<b>12</b>	<b>96</b>	<b>72</b>	<b>70.6</b>	<b>12.2</b>

**Figure ET1 Primary Total Elbow Replacement by Age and Gender**



**Figure ET2 Primary Total Elbow Replacement by Primary Diagnosis**

Primary Diagnosis	Number	Percent
Fracture/Dislocation	673	37.7
Osteoarthritis	601	33.7
Rheumatoid Arthritis	424	23.8
Other Inflammatory Arthritis	43	2.4
Tumour	28	1.6
Instability	9	0.5
Osteonecrosis	3	0.2
Other	4	0.2
<b>TOTAL</b>	<b>1785</b>	<b>100.0</b>

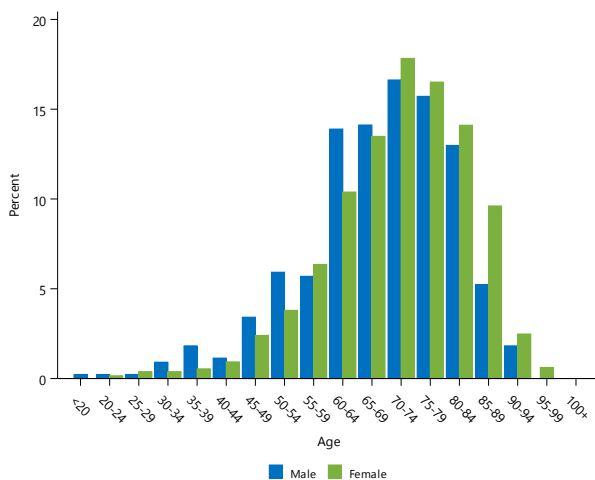


## PRIMARY TOTAL ELBOW WITHOUT RADIAL REPLACEMENT

**Table ET2 Age and Gender of Primary Total Elbow without Radial Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	1290	74.6%	21	96	73	71.4	11.9
Male	439	25.4%	12	94	70	68.6	12.7
<b>TOTAL</b>	<b>1729</b>	<b>100.0%</b>	<b>12</b>	<b>96</b>	<b>72</b>	<b>70.7</b>	<b>12.2</b>

**Figure ET3 Primary Total Elbow without Radial Replacement by Age and Gender**



**Table ET3 Primary Total Elbow without Radial Replacement by Primary Diagnosis**

Primary Diagnosis	Number	Percent
Fracture/Dislocation	662	38.3
Osteoarthritis	571	33.0
Rheumatoid Arthritis	411	23.8
Other Inflammatory Arthritis	42	2.4
Tumour	28	1.6
Instability	8	0.5
Osteonecrosis	3	0.2
Other	4	0.2
<b>TOTAL</b>	<b>1729</b>	<b>100.0</b>

**Table ET4 Most Used Humeral Prostheses in Primary Total Elbow without Radial Replacement**

2008		2019		2020		2021		2022	
N	Model	N	Model	N	Model	N	Model	N	Model
47	Coonrad/Morrey	60	Latitude	59	Latitude	64	Latitude	50	Latitude
21	Latitude	49	Nexel	46	Nexel	44	Nexel	38	Nexel
10	Discovery	23	Coonrad/Morrey	21	Coonrad/Morrey	20	Coonrad/Morrey	9	Coonrad/Morrey
1	Souter Strathclyde	4	Mutars	2	Comprehensive	2	Comprehensive	4	Mutars
		1	Comprehensive	2	Discovery	2	Mutars		
		1	Custom Made (Comprehensive)						
		1	Discovery						
<b>10 Most Used</b>									
79	(4) 100.0%	139	(7) 100.0%	130	(5) 100.0%	132	(5) 100.0%	101	(4) 100.0%

**Table ET5 Cumulative Percent Revision of Primary Total Elbow without Radial Replacement by Humeral Prostheses (Primary Diagnosis Fracture/Dislocation)**

Humeral Stem	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	8 Yrs	11 Yrs	14 Yrs
Coonrad/Morrey	26	310	2.1 (0.9, 4.5)	5.6 (3.4, 9.1)	8.5 (5.6, 12.9)	11.0 (7.3, 16.3)		
Discovery	2	26	4.0 (0.6, 25.2)	8.4 (2.2, 29.6)	8.4 (2.2, 29.6)	8.4 (2.2, 29.6)		
Latitude	14	224	2.7 (1.2, 6.0)	6.5 (3.7, 11.3)	6.5 (3.7, 11.3)			
Nexel	7	97	2.1 (0.5, 8.2)	6.9 (2.9, 16.1)	10.1 (4.3, 22.7)			
Other (4)	1	5	20.0 (3.1, 79.6)	20.0 (3.1, 79.6)				
<b>TOTAL</b>	<b>50</b>	<b>662</b>						

Note: Only prostheses with over 10 procedures have been listed

**Table ET6 Cumulative Percent Revision of Primary Total Elbow without Radial Replacement by Humeral Prostheses (Primary Diagnosis Osteoarthritis)**

Humeral Stem	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	8 Yrs	11 Yrs	14 Yrs
Coonrad/Morrey	47	193	4.2 (2.1, 8.1)	15.8 (11.2, 21.9)	21.4 (16.0, 28.3)	27.6 (21.3, 35.2)		
Discovery	15	61	3.3 (0.8, 12.5)	11.7 (5.8, 23.1)	15.4 (8.3, 27.5)	22.6 (13.3, 36.9)	34.0 (21.0, 51.9)	
Latitude	29	188	5.6 (3.1, 10.2)	8.3 (5.0, 13.7)	14.7 (9.5, 22.3)			
Nexel	17	122	4.3 (1.8, 10.1)	14.4 (8.7, 23.4)				
Other (5)	3	7	28.6 (8.0, 74.2)	46.4 (17.5, 86.8)	46.4 (17.5, 86.8)	46.4 (17.5, 86.8)	46.4 (17.5, 86.8)	
<b>TOTAL</b>	<b>111</b>	<b>571</b>						

Note: Only prostheses with over 10 procedures have been listed

**Table ET7 Cumulative Percent Revision of Primary Total Elbow without Radial Replacement by Humeral Prostheses (Primary Diagnosis Rheumatoid Arthritis)**

Humeral Stem	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	8 Yrs	11 Yrs	14 Yrs
Coonrad/Morrey	28	185	2.7 (1.1, 6.4)	7.8 (4.7, 12.8)	11.5 (7.6, 17.3)	16.7 (11.7, 23.6)	16.7 (11.7, 23.6)	
Discovery	4	32	6.3 (1.6, 22.7)	6.3 (1.6, 22.7)	6.3 (1.6, 22.7)	10.3 (3.4, 29.0)	15.0 (5.8, 35.9)	
Latitude	10	122	0.8 (0.1, 5.8)	4.9 (2.0, 11.4)	6.2 (2.8, 13.6)			
Nexel	7	69	1.5 (0.2, 10.4)	9.9 (4.6, 20.8)	9.9 (4.6, 20.8)			
Other (1)	0	3	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	
<b>TOTAL</b>	<b>49</b>	<b>411</b>						

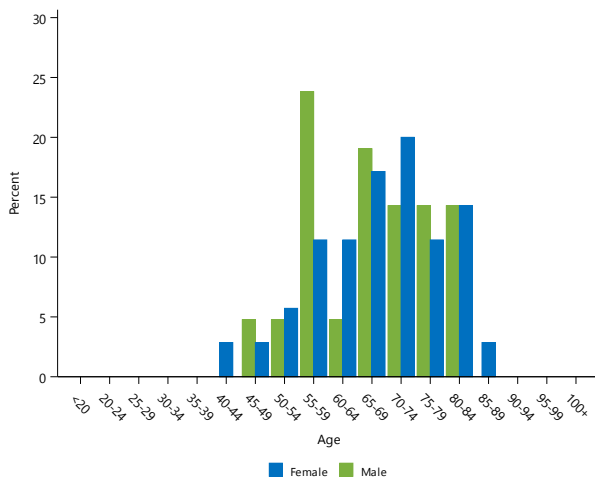
Note: Only prostheses with over 10 procedures have been listed

## PRIMARY TOTAL ELBOW WITH RADIAL REPLACEMENT

**Table ET8 Age and Gender of Primary Total Elbow with Radial Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	35	62.5%	42	86	68	67.7	10.8
Male	21	37.5%	45	83	67	67.5	10.7
<b>TOTAL</b>	<b>56</b>	<b>100.0%</b>	<b>42</b>	<b>86</b>	<b>68</b>	<b>67.6</b>	<b>10.7</b>

**Figure ET4 Primary Total Elbow with Radial Replacement by Age and Gender**



**Table ET9 Primary Total Elbow with Radial Replacement by Primary Diagnosis**

Primary Diagnosis	Number	Percent
Osteoarthritis	30	53.6
Rheumatoid Arthritis	13	23.2
Fracture/Dislocation	11	19.6
Other Inflammatory Arthritis	1	1.8
Instability	1	1.8
<b>TOTAL</b>	<b>56</b>	<b>100.0</b>

**Table ET10 Most Used Radial Head/Humeral Prostheses in Primary Total Elbow with Radial Replacement**

2008		2019		2020		2021		2022	
N	Model	N	Model	N	Model	N	Model	N	Model
10	Latitude	3	Latitude	2	Latitude	1	Latitude	1	Latitude
		1	Nexel						
<b>10 Most Used</b>									
10	(1) 100.0%	4	(2) 100.0%	2	(1) 100.0%	1	(1) 100.0%	1	(1) 100.0%

## REVISION ELBOW REPLACEMENT

### DEMOGRAPHICS

The Registry subcategorises elbow revisions into three classes. These are defined as:

**Major total revision** involves the insertion, removal and/or replacement of a major component on both the proximal and distal side of the joint.

**Major partial revision** involves the insertion, removal and/or replacement of a major component on either the proximal or distal side of the joint.

**Minor revision** involves the insertion, removal and/or replacement of any other prosthesis or implant in elbow replacement.

Major components are prostheses that are fixed to bone. These are the humeral prosthesis and the ulna prosthesis in elbow replacement. The exception to this is the radial prosthesis, which is fixed to bone and is not considered a major prosthesis.

Different types of major partial and minor revisions are identified based on the specific prostheses or implants used in the revision.

**Table ER1 Age and Gender of All Revision Elbow Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	481	41.3%	20	97	60	58.4	15.4
Female	684	58.7%	21	95	66	64.8	13.4
<b>TOTAL</b>	<b>1165</b>	<b>100.0%</b>	<b>20</b>	<b>97</b>	<b>64</b>	<b>62.2</b>	<b>14.6</b>

**Table ER2 Reason for Revision of All Revision Elbow Replacement**

Reason for Revision	Number	Percent
Loosening	402	34.5
Infection	269	23.1
Fracture	139	11.9
Instability	67	5.8
Pain	29	2.5
Prosthesis Dislocation	28	2.4
Incorrect Sizing	23	2.0
Wear Bushing	22	1.9
Lysis	17	1.5
Implant Breakage Ulna	13	1.1
Arthrofibrosis	11	0.9
Malposition	9	0.8
Progression Of Disease	9	0.8
Metal Related Pathology	8	0.7
Implant Breakage Humeral	7	0.6
Wear Ulna	5	0.4
Heterotopic Bone	4	0.3
Synovitis	2	0.2
Wear Humeral	1	0.1
Other	100	8.6
<b>TOTAL</b>	<b>1165</b>	<b>100.0</b>

**Table ER3 Type of Revision of All Revision Elbow Replacement**

Type of Revision	Number	Percent
Humeral/Ulnar	295	25.3
Radial Component	236	20.3
Humeral Component	159	13.6
Elbow Pin Only	119	10.2
Ulna Component	107	9.2
Removal of Prostheses	89	7.6
Cement Spacer	60	5.2
Radial Head Only	18	1.5
Ulna Cap Only	17	1.5
Radial Neck Only	15	1.3
Reoperation	15	1.3
Minor Components	11	0.9
Cement Only	9	0.8
Uni Humeral/Radius	7	0.6
Reinsertion of Components	4	0.3
Radial/Ulnar	3	0.3
Humeral/Radius	1	0.1
<b>TOTAL</b>	<b>1165</b>	<b>100.0</b>

# Wrist Replacement

## CATEGORIES OF WRIST REPLACEMENT

The Registry groups wrist replacement into three broad categories: primary partial, primary total and revision wrist replacement.

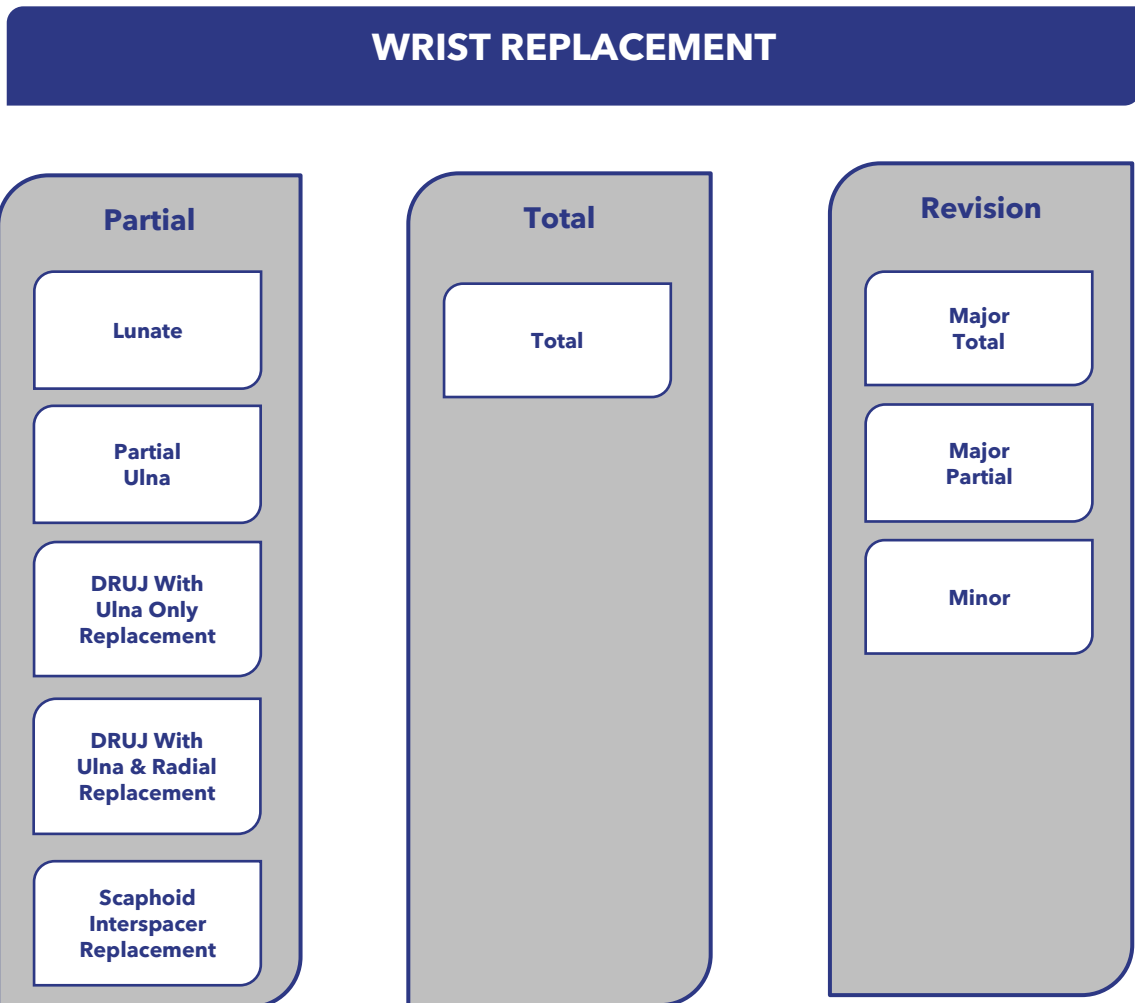
A primary replacement is the initial replacement procedure undertaken on a joint and involves replacing either part (partial) or all (total) of the articular surface.

Primary partial wrist replacement is further subcategorised into five classes depending on the type of prosthesis used. Partial wrist classes are lunate, partial ulna, distal radial ulna joint (DRUJ) with ulna only replacement, DRUJ with ulna and radial replacement, and scaphoid interspacer

replacement. Definitions for each of these are detailed in the relevant sections.

Revision procedures are re-operations of previous wrist replacements where one or more of the prosthetic components are replaced, removed, or another component is added. Revisions include re-operations of primary partial, primary total or previous revision procedures.

Wrist revisions are subcategorised into three classes: minor, major partial, and major total revisions. These are defined in the chapter on revisions.



## DEMOGRAPHICS

**Table WG1 Number of Wrist Replacements by Gender**

Wrist Replacement	Female		Male		TOTAL	
	N	%	N	%	N	%
Lunate	6	37.5	10	62.5	16	4.6
Partial Ulnar	20	52.6	18	47.4	38	10.9
Partial DRUJ - Ulnar Only	77	52.4	70	47.6	147	42.1
DRUJ - Ulnar & Radial	41	47.7	45	52.3	86	24.6
Scaphoid Interspacer	21	33.9	41	66.1	62	17.8
<b>Primary Partial</b>	<b>165</b>	<b>47.3</b>	<b>184</b>	<b>52.7</b>	<b>349</b>	<b>100.0</b>
<b>Primary Total</b>	<b>229</b>	<b>46.5</b>	<b>264</b>	<b>53.5</b>	<b>493</b>	<b>100.0</b>
<b>Revision</b>	<b>83</b>	<b>61.0</b>	<b>53</b>	<b>39.0</b>	<b>136</b>	<b>100.0</b>
<b>TOTAL</b>	<b>477</b>	<b>48.8</b>	<b>501</b>	<b>51.2</b>	<b>978</b>	<b>100.0</b>

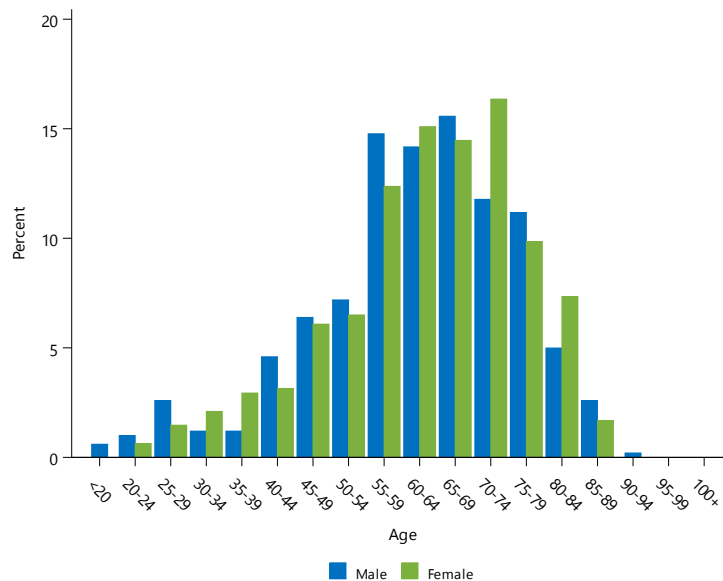
**Table WG2 Number of Wrist Replacements by Age**

Wrist Replacement	<55		55-64		65-74		75-84		≥85		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Lunate	11	68.8	5	31.3	.	.	.	.	.	.	16	4.6
Partial Ulnar	5	13.2	14	36.8	7	18.4	10	26.3	2	5.3	38	10.9
Partial DRUJ - Ulnar Only	37	25.2	35	23.8	49	33.3	23	15.6	3	2.0	147	42.1
DRUJ - Ulnar & Radial	27	31.4	31	36.0	17	19.8	9	10.5	2	2.3	86	24.6
Scaphoid Interspacer	29	46.8	12	19.4	14	22.6	6	9.7	1	1.6	62	17.8
<b>Primary Partial</b>	<b>109</b>	<b>31.2</b>	<b>97</b>	<b>27.8</b>	<b>87</b>	<b>24.9</b>	<b>48</b>	<b>13.8</b>	<b>8</b>	<b>2.3</b>	<b>349</b>	<b>100.0</b>
<b>Primary Total</b>	<b>93</b>	<b>18.9</b>	<b>138</b>	<b>28.0</b>	<b>158</b>	<b>32.0</b>	<b>93</b>	<b>18.9</b>	<b>11</b>	<b>2.2</b>	<b>493</b>	<b>100.0</b>
<b>Revision</b>	<b>31</b>	<b>22.8</b>	<b>41</b>	<b>30.1</b>	<b>39</b>	<b>28.7</b>	<b>22</b>	<b>16.2</b>	<b>3</b>	<b>2.2</b>	<b>136</b>	<b>100.0</b>
<b>TOTAL</b>	<b>233</b>	<b>23.8</b>	<b>276</b>	<b>28.2</b>	<b>284</b>	<b>29.0</b>	<b>163</b>	<b>16.7</b>	<b>22</b>	<b>2.2</b>	<b>978</b>	<b>100.0</b>

**Figure WG1 Age and Gender of Primary Wrist Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	477	48.8%	21	88	64	62.8	13.5
Male	501	51.2%	18	90	63	61.8	14.0
<b>TOTAL</b>	<b>978</b>	<b>100.0%</b>	<b>18</b>	<b>90</b>	<b>64</b>	<b>62.3</b>	<b>13.8</b>

**Figure WG2 Primary Wrist Replacement by Age and Gender**



**Table WG3 Cumulative Percent Revision of Primary Wrist Replacement by Class**

Wrist Class	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	8 Yrs	11 Yrs	14 Yrs
Lunate	3	16	12.5 (3.3, 41.4)	20.5 (7.0, 51.4)	20.5 (7.0, 51.4)	20.5 (7.0, 51.4)		
Partial Ulnar	1	38	2.8 (0.4, 18.1)	2.8 (0.4, 18.1)	2.8 (0.4, 18.1)	2.8 (0.4, 18.1)	2.8 (0.4, 18.1)	
Partial DRUJ - Ulnar Only	13	147	3.5 (1.5, 8.1)	7.9 (4.4, 13.8)	8.7 (5.0, 14.9)	8.7 (5.0, 14.9)		
DRUJ - Ulnar & Radial	5	86	2.5 (0.6, 9.6)	6.0 (2.2, 15.5)	8.3 (3.4, 19.3)	8.3 (3.4, 19.3)		
Scaphoid Interspacer	2	62	3.2 (0.8, 12.3)	3.2 (0.8, 12.3)	3.2 (0.8, 12.3)	3.2 (0.8, 12.3)	3.2 (0.8, 12.3)	
Total Wrist	49	493	3.3 (2.0, 5.4)	8.9 (6.5, 12.2)	11.8 (8.7, 15.9)	15.1 (11.0, 20.5)	17.6 (12.6, 24.4)	
<b>TOTAL</b>	<b>73</b>	<b>842</b>						

## PRIMARY PARTIAL WRIST REPLACEMENT

### DEMOGRAPHICS

The Registry subcategorises primary partial wrist replacement into five classes. These are defined as:

**Lunate** involves replacement of the lunate bone with a lunate prosthesis.

**Partial ulna** involves the replacement of part of the distal ulna surface with a stemmed ulna prosthesis.

**Distal radial ulna joint (DRUJ) with ulna only replacement** involves resection of the ulna head and replacement with a stemmed ulna prosthesis.

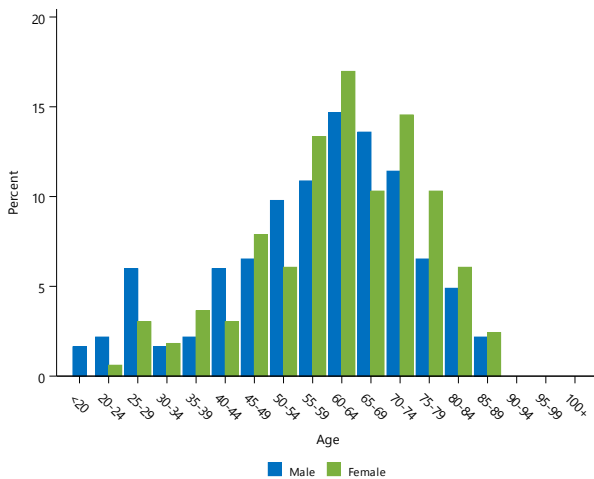
**Distal radial ulna joint (DRUJ) with ulna and radial replacement** involves resection of the ulna head and replacement with a stemmed ulna prosthesis and a distal radial notch and plate.

**Scaphoid interspacer** is used to replace the proximal pole in the scaphoid.

**Table WP1 Age and Gender of Primary Partial Wrist Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	165	47.3%	21	88	63	61.5	14.4
Male	184	52.7%	18	88	61	58.0	16.2
<b>TOTAL</b>	<b>349</b>	<b>100.0%</b>	<b>18</b>	<b>88</b>	<b>62</b>	<b>59.7</b>	<b>15.5</b>

**Figure WP1 Primary Partial Wrist Replacement by Age and Gender**



**Table WP2 Primary Partial Wrist Replacement by Primary Diagnosis**

Primary Diagnosis	Number	Percent
Osteoarthritis	246	70.5
Fracture/Dislocation	31	8.9
Rheumatoid Arthritis	29	8.3
Instability	15	4.3
Osteonecrosis	13	3.7
Other Inflammatory Arthritis	8	2.3
Tumour	1	0.3
Other	6	1.7
<b>TOTAL</b>	<b>349</b>	<b>100.0</b>

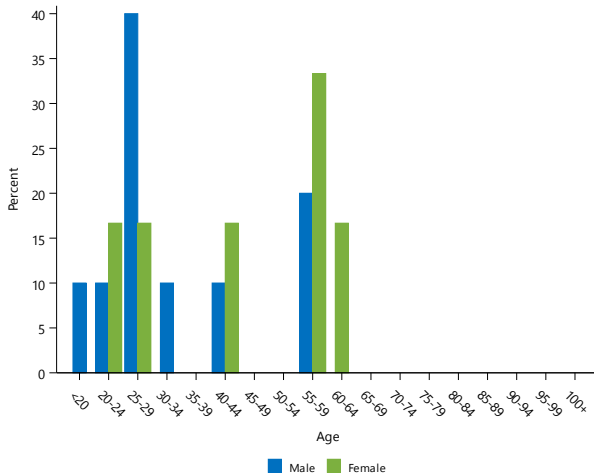


## PRIMARY LUNATE WRIST REPLACEMENT

**Table WP3 Age and Gender of Primary Lunate Wrist Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	6	37.5%	21	61	50	44.3	17.4
Male	10	62.5%	19	59	28	34.4	14.2
<b>TOTAL</b>	<b>16</b>	<b>100.0%</b>	<b>19</b>	<b>61</b>	<b>31</b>	<b>38.1</b>	<b>15.7</b>

**Figure WP2 Primary Lunate Wrist Replacement by Age and Gender**



**Table WP4 Primary Lunate Wrist Replacement by Primary Diagnosis**

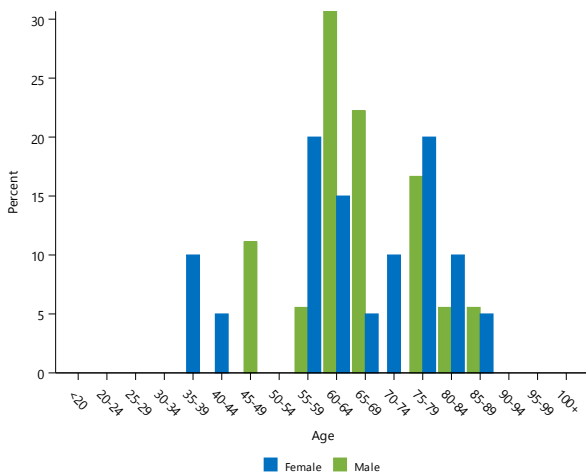
Primary Diagnosis	Number	Percent
Osteonecrosis	11	68.8
Osteoarthritis	4	25.0
Fracture/Dislocation	1	6.3
<b>TOTAL</b>	<b>16</b>	<b>100.0</b>

## PRIMARY PARTIAL ULNA WRIST REPLACEMENT

**Table WP5 Age and Gender of Primary Partial Ulna Wrist Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	20	52.6%	35	85	64	64.9	15.2
Male	18	47.4%	48	86	65	66.7	10.3
<b>TOTAL</b>	<b>38</b>	<b>100.0%</b>	<b>35</b>	<b>86</b>	<b>65</b>	<b>65.7</b>	<b>12.9</b>

**Figure WP3 Primary Partial Ulna Wrist Replacement by Age and Gender**



**Table WP6 Primary Partial Ulna Wrist Replacement by Primary Diagnosis**

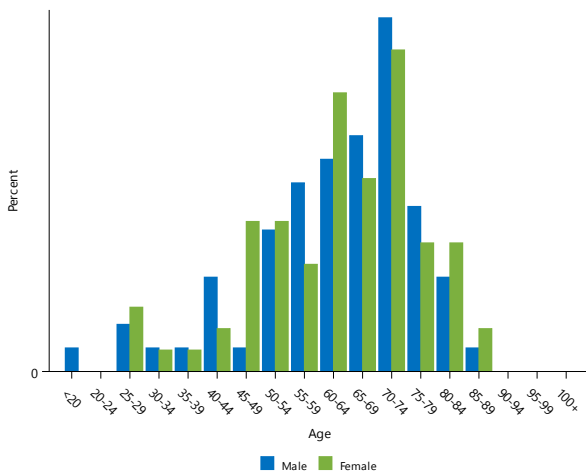
Primary Diagnosis	Number	Percent
Osteoarthritis	28	73.7
Fracture/Dislocation	4	10.5
Rheumatoid Arthritis	3	7.9
Other Inflammatory Arthritis	2	5.3
Instability	1	2.6
<b>TOTAL</b>	<b>38</b>	<b>100.0</b>

## PRIMARY DRUJ WITH ULNA ONLY REPLACEMENT

**Table WP7 Age and Gender of Primary DRUJ with Ulna Only Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	77	52.4%	26	87	64	62.6	14.0
Male	70	47.6%	19	88	65	62.6	14.4
<b>TOTAL</b>	<b>147</b>	<b>100.0%</b>	<b>19</b>	<b>88</b>	<b>65</b>	<b>62.6</b>	<b>14.2</b>

**Figure WP4 Primary DRUJ with Ulna Only Replacement by Age and Gender**



**Table WP8 Primary DRUJ with Ulna Only Replacement by Primary Diagnosis**

Primary Diagnosis	Number	Percent
Osteoarthritis	106	72.1
Rheumatoid Arthritis	18	12.2
Fracture/Dislocation	11	7.5
Instability	4	2.7
Other Inflammatory Arthritis	3	2.0
Tumour	1	0.7
Osteonecrosis	1	0.7
Other	3	2.0
<b>TOTAL</b>	<b>147</b>	<b>100.0</b>

**Table WP9 Most Used Ulna Prostheses in Primary DRUJ with Ulna Only Replacement**

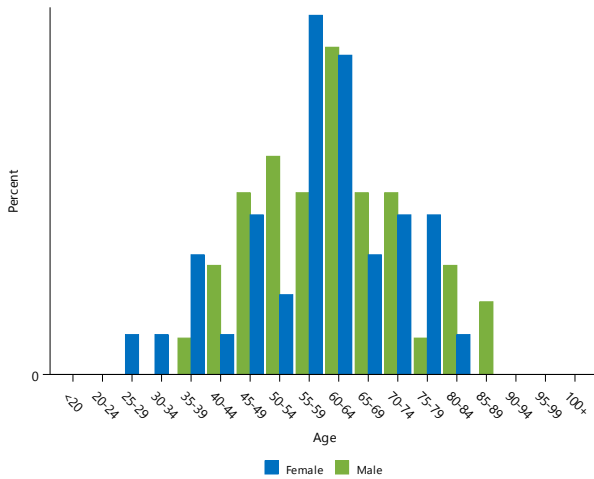
2008		2019		2020		2021		2022	
N	Model	N	Model	N	Model	N	Model	N	Model
5	uHead	6	DRUJ (Ascension)	6	Herbert UHP	5	DRUJ (Ascension)	4	Herbert UHP
2	Eclipse	4	Herbert UHP	3	DRUJ (Ascension)	2	Herbert UHP	1	DRUJ (Ascension)
2	Herbert UHP					1	Eclipse		
1	E-Centrix								
<b>10 Most Used</b>									
10	(4) 100.0%	10	(2) 100.0%	9	(2) 100.0%	8	(3) 100.0%	5	(2) 100.0%

## PRIMARY DRUJ WITH ULNA AND RADIAL REPLACEMENT

**Table WP10 Age and Gender of Primary DRUJ with Ulna and Radial Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	41	47.7%	27	81	59	58.5	13.2
Male	45	52.3%	39	87	61	61.2	12.1
<b>TOTAL</b>	<b>86</b>	<b>100.0%</b>	<b>27</b>	<b>87</b>	<b>61</b>	<b>59.9</b>	<b>12.6</b>

**Figure WP5 Primary DRUJ with Ulna and Radial Replacement by Age and Gender**



**Table WP11 Primary DRUJ with Ulna and Radial Replacement by Primary Diagnosis**

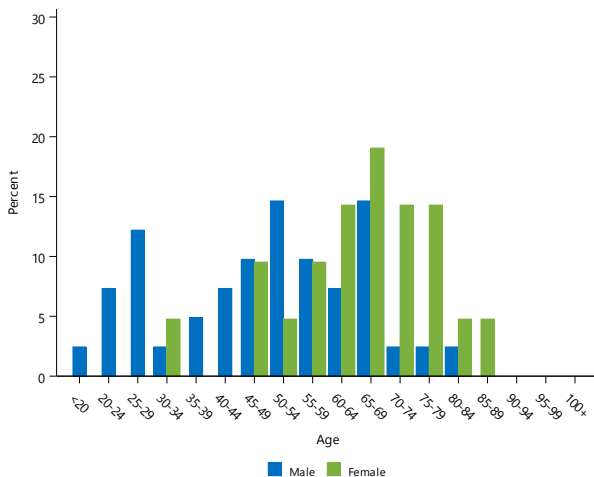
Primary Diagnosis	Number	Percent
Osteoarthritis	67	77.9
Instability	9	10.5
Rheumatoid Arthritis	4	4.7
Fracture/Dislocation	3	3.5
Other	3	3.5
<b>TOTAL</b>	<b>86</b>	<b>100.0</b>

## PRIMARY SCAPHOID INTERSPACER REPLACEMENT

**Table WP12 Age and Gender of Primary Scaphoid Interspacers Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	21	33.9%	31	88	66	64.7	13.5
Male	41	66.1%	18	80	50	48.7	16.9
<b>TOTAL</b>	<b>62</b>	<b>100.0%</b>	<b>18</b>	<b>88</b>	<b>58</b>	<b>54.1</b>	<b>17.5</b>

**Figure WP6 Primary Scaphoid Interspacers Replacement by Age and Gender**



**Table WP13 Primary Scaphoid Interspacers Replacement by Primary Diagnosis**

Primary Diagnosis	Number	Percent
Osteoarthritis	41	66.1
Fracture/Dislocation	12	19.4
Rheumatoid Arthritis	4	6.5
Other Inflammatory Arthritis	3	4.8
Instability	1	1.6
Osteonecrosis	1	1.6
<b>TOTAL</b>	<b>62</b>	<b>100.0</b>

# PRIMARY TOTAL WRIST REPLACEMENT

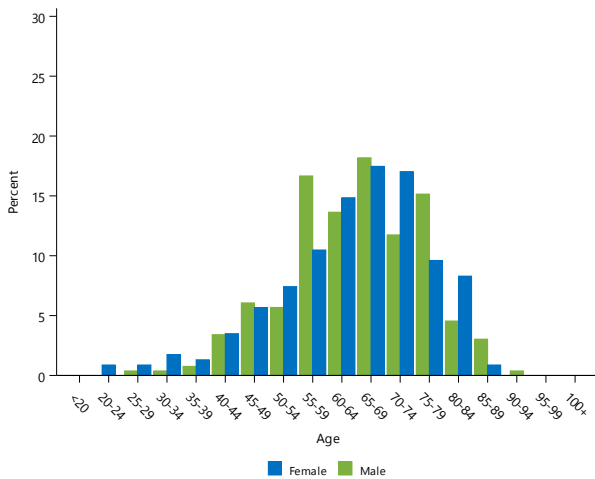
## DEMOGRAPHICS

Primary total wrist replacement includes resection of the distal radius and replacement with a radial prosthesis combined with replacement of carpal bones with a carpal prosthesis and carpal spacer.

**Table WT1 Age and Gender of Primary Total Wrist Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	229	46.5%	22	87	65	63.7	12.7
Male	264	53.5%	29	90	66	64.6	11.4
<b>TOTAL</b>	<b>493</b>	<b>100.0%</b>	<b>22</b>	<b>90</b>	<b>66</b>	<b>64.2</b>	<b>12.0</b>

**Figure WT1 Primary Total Wrist Replacement by Age and Gender**



**Table WT2 Primary Total Wrist Replacement by Primary Diagnosis**

Primary Diagnosis	Number	Percent
Osteoarthritis	362	73.4
Rheumatoid Arthritis	72	14.6
Fracture/Dislocation	15	3.0
Osteonecrosis	15	3.0
Instability	13	2.6
Other Inflammatory Arthritis	11	2.2
Other	5	1.0
<b>TOTAL</b>	<b>493</b>	<b>100.0</b>

**Table WT3 Most Used Carpal/Radial Prostheses in Primary Total Wrist Replacement**

2008		2019		2020		2021		2022						
N	Model	N	Model	N	Model	N	Model	N	Model					
10	Re-Motion	60	Motec	60	Motec	82	Motec	46	Motec					
3	Universal 2	4	Freedom	7	Universal 2	1	Freedom	1	Re-Motion					
		4	Universal 2	2	Freedom	1	Universal 2							
		3	Re-Motion											
<b>10 Most Used</b>														
13	(2)	100.0	71	(4)	100.0	69	(3)	100.0	84	(3)	100.0	47	(2)	100.0

## REVISION WRIST REPLACEMENT

### DEMOGRAPHICS

The Registry subcategorises wrist revisions into three classes. These are defined as:

**Major total revision** involves the insertion, removal and/or replacement of a major component on both the proximal and distal side of the joint.

**Major partial revision** involves the insertion, removal and/or replacement of a major component on either the proximal or the distal side of the joint.

**Minor revision** involves the insertion removal and/or replacement of any other prosthesis or implant in wrist replacement.

Major components are prostheses that are fixed to bone. These are the radial prosthesis and the carpal prosthesis in wrist replacement. The ulna and individual carpal prostheses are not considered major prostheses.

Different types of major partial and minor revisions are identified based on the specific prostheses or implants used in the revision.

**Table WR1 Age and Gender of All Revision Wrist Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	53	39.0%	22	88	63	60.8	14.6
Female	83	61.0%	32	87	66	63.3	13.6
<b>TOTAL</b>	<b>136</b>	<b>100.0%</b>	<b>22</b>	<b>88</b>	<b>64</b>	<b>62.3</b>	<b>14.0</b>

**Table WR2 Reason for Revision of All Revision Wrist Replacement**

Reason for Revision	Number	Percent
Loosening	41	30.1
Pain	20	14.7
Instability	18	13.2
Infection	12	8.8
Lysis	8	5.9
Metal Related Pathology	4	2.9
Progression Of Disease	3	2.2
Implant Breakage Carpal	3	2.2
Prosthesis Dislocation	2	1.5
Incorrect Sizing	2	1.5
Arthrofibrosis	2	1.5
Contracture	1	0.7
Malposition	1	0.7
Implant Breakage Wrist Plate	1	0.7
Implant Breakage Ulna	1	0.7
Flexion Deformity	1	0.7
Other	16	11.8
<b>TOTAL</b>	<b>136</b>	<b>100.0</b>

**Table WR3 Type of Revision of All Revision Wrist Replacement**

Type of Revision	Number	Percent
Removal of Prostheses	24	17.6
Ulna Component	15	11.0
Carpal Component	14	10.3
Sigmoid Notch	14	10.3
Carpal/Radius	11	8.1
Minor Components	11	8.1
Carpal Head/Radial Cup	11	8.1
Reoperation Fusion	9	6.6
Ulna Head Only	8	5.9
Radius Component	6	4.4
Carpal Insert	5	3.7
Cement Spacer	3	2.2
Sigmoid Notch/Ulna	2	1.5
Carpal Head	2	1.5
Radial Cup	1	0.7
<b>TOTAL</b>	<b>136</b>	<b>100.0</b>

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