

# Australian Orthopaedic Association National Joint Replacement Registry

2024 SUPPLEMENTARY REPORT

## Demographics and Outcome of Elbow and Wrist Arthroplasty



AOA  
AUSTRALIAN  
ORTHOPAEDIC  
ASSOCIATION

Australian  
Orthopaedic  
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National  
Joint  
Replacement  
Registry

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**Australian Orthopaedic Association National Joint Replacement Registry**

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

2024 Supplementary Report

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National Joint Replacement Registry

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

**2024 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 2024 Demographics and Outcome of Elbow and Wrist Arthroplasty Supplementary Report is based on the analysis of 7,719 elbow and 1,074 wrist procedures recorded by the Registry with a procedure date up to and including 31 December 2023.

The elbow arthroplasty procedures include 4,558 primary partial, 1,909 primary total and 1,252 revisions (Table EG1).

The wrist arthroplasty procedures include 372 primary partial, 546 primary total and 156 revisions (Table WG1).

The Elbow and Wrist Arthroplasty Report is one of 14 supplementary reports to complete the AOANJRR Annual Report for 2024.

The 2024 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 2024 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 2024 Hip, Knee and Shoulder Arthroplasty Annual Report:

<https://aoanjrr.sahmri.com/annual-reports-2024>

# Elbow Replacement

## CATEGORIES OF ELBOW REPLACEMENT

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

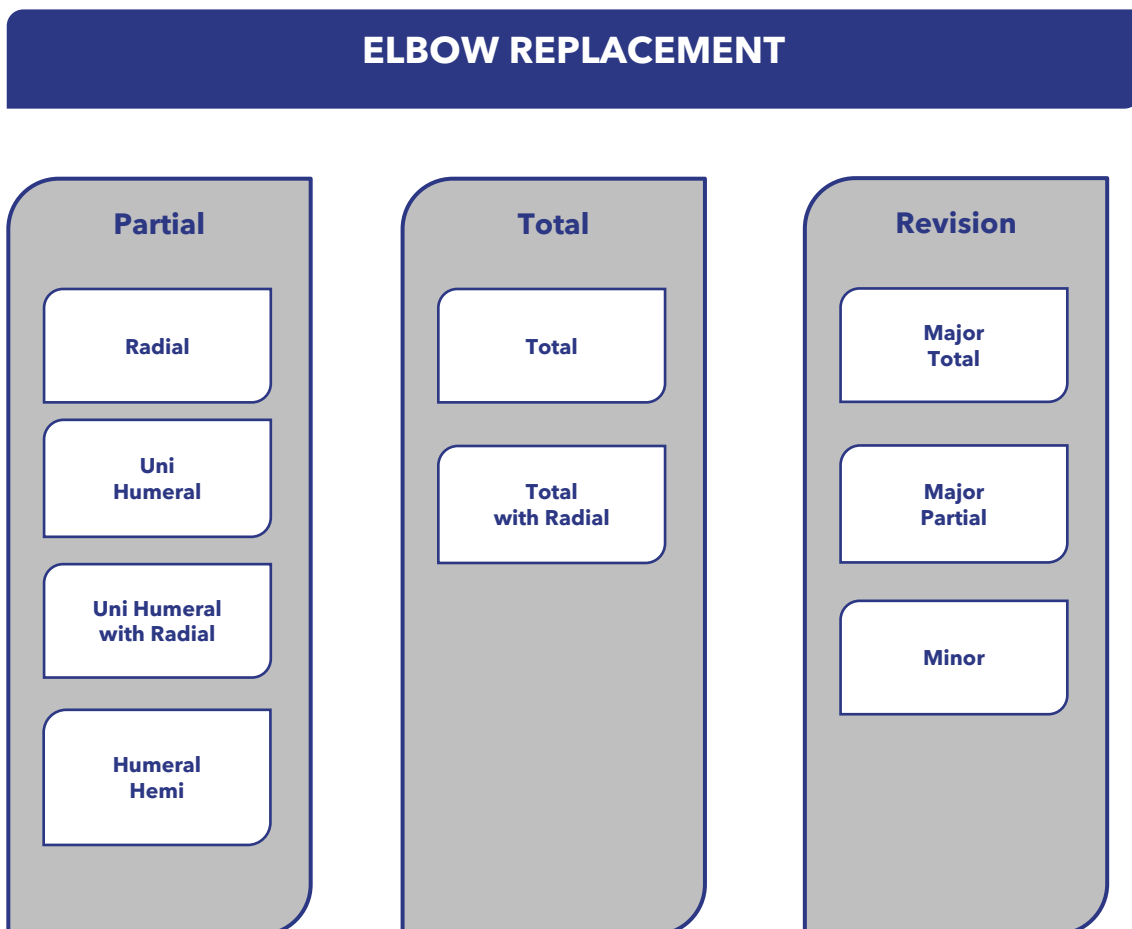
A primary replacement is the initial replacement procedure undertaken on a joint and involves replacing either part (partial) or all (total) of the articular surface.

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.





## DEMOGRAPHICS

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

Elbow Replacement	Female		Male		TOTAL	
	N	%	N	%	N	%
Radial	2407	58.5	1710	41.5	4117	90.3
Uni Humeral	7	70.0	3	30.0	10	0.2
Uni Humeral & Radial	10	40.0	15	60.0	25	0.5
Humeral	345	85.0	61	15.0	406	8.9
<b>Primary Partial</b>	<b>2769</b>	<b>60.8</b>	<b>1789</b>	<b>39.2</b>	<b>4558</b>	<b>100.0</b>
Total Elbow	1381	74.5	472	25.5	1853	97.1
Total Elbow & Radial	35	62.5	21	37.5	56	2.9
<b>Primary Total</b>	<b>1416</b>	<b>74.2</b>	<b>493</b>	<b>25.8</b>	<b>1909</b>	<b>100.0</b>
<b>Revision</b>	<b>734</b>	<b>58.6</b>	<b>518</b>	<b>41.4</b>	<b>1252</b>	<b>100.0</b>
<b>TOTAL</b>	<b>4919</b>	<b>63.7</b>	<b>2800</b>	<b>36.3</b>	<b>7719</b>	<b>100.0</b>

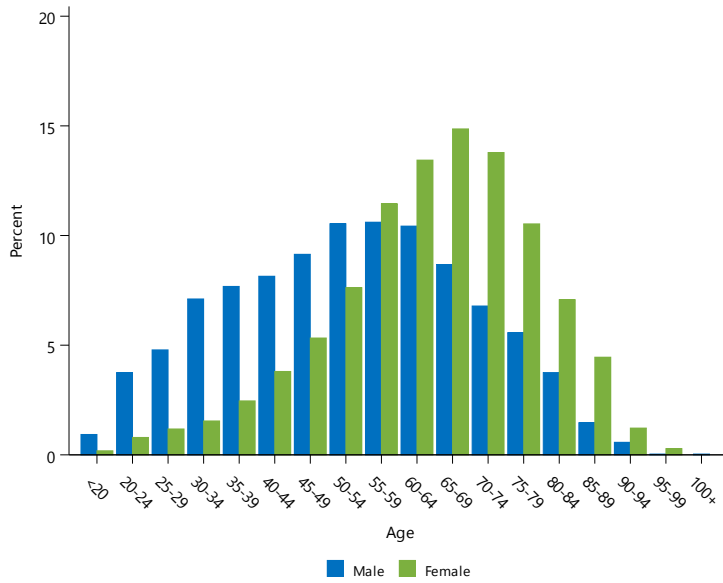
**Table EG2 Number of Elbow Replacements by Age**

Elbow Replacement	<55		55-64		65-74		75-84		≥85		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Radial	2001	48.6	1050	25.5	750	18.2	273	6.6	43	1.0	4117	90.3
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	0.5
Humeral	46	11.3	102	25.1	125	30.8	93	22.9	40	9.9	406	8.9
<b>Primary Partial</b>	<b>2066</b>	<b>45.3</b>	<b>1162</b>	<b>25.5</b>	<b>880</b>	<b>19.3</b>	<b>367</b>	<b>8.1</b>	<b>83</b>	<b>1.8</b>	<b>4558</b>	<b>100.0</b>
Total Elbow	181	9.8	320	17.3	583	31.5	556	30.0	213	11.5	1853	97.1
Total Elbow & Radial	6	10.7	14	25.0	20	35.7	15	26.8	1	1.8	56	2.9
<b>Primary Total</b>	<b>187</b>	<b>9.8</b>	<b>334</b>	<b>17.5</b>	<b>603</b>	<b>31.6</b>	<b>571</b>	<b>29.9</b>	<b>214</b>	<b>11.2</b>	<b>1909</b>	<b>100.0</b>
<b>Revision</b>	<b>332</b>	<b>26.5</b>	<b>317</b>	<b>25.3</b>	<b>359</b>	<b>28.7</b>	<b>189</b>	<b>15.1</b>	<b>55</b>	<b>4.4</b>	<b>1252</b>	<b>100.0</b>
<b>TOTAL</b>	<b>2585</b>	<b>33.5</b>	<b>1813</b>	<b>23.5</b>	<b>1842</b>	<b>23.9</b>	<b>1127</b>	<b>14.6</b>	<b>352</b>	<b>4.6</b>	<b>7719</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	16	11.7	4	2.9	8	5.8	28	20.4
Both - Total Elbow	.	.	13	9.5	86	62.8	99	72.3
Humeral Hemiarthroplasty & Total Elbow	.	.	1	0.7	1	0.7	2	1.5
Radial & Humeral Hemiarthroplasty	.	.	1	0.7	1	0.7	2	1.5
Radial & Total Elbow	.	.	.	.	3	2.2	3	2.2
Radial & Uni Humeral & Radial	.	.	.	.	1	0.7	1	0.7
Total Elbow & Total Elbow & Radial	.	.	.	.	1	0.7	1	0.7
Uni Humeral & Radial & Total Elbow	.	.	.	.	1	0.7	1	0.7
<b>TOTAL</b>	<b>16</b>	<b>11.7</b>	<b>19</b>	<b>13.9</b>	<b>102</b>	<b>74.5</b>	<b>137</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	2800	36.3%	12	102	54	53.0	16.9
Female	4919	63.7%	16	99	65	63.9	14.3
<b>TOTAL</b>	<b>7719</b>	<b>100.0%</b>	<b>12</b>	<b>102</b>	<b>62</b>	<b>59.9</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	213	4116	3.0 (2.5, 3.5)	4.8 (4.1, 5.5)	5.4 (4.7, 6.2)	5.8 (5.1, 6.7)	5.9 (5.2, 6.8)	5.9 (5.2, 6.8)
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)	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)	53.8 (35.3, 74.5)	
Humeral	25	406	3.4 (2.0, 5.8)	5.1 (3.2, 8.0)	6.1 (3.9, 9.3)	8.9 (5.8, 13.5)	10.2 (6.5, 15.7)	
Total Elbow	236	1853	3.4 (2.6, 4.3)	9.0 (7.7, 10.5)	12.1 (10.5, 13.9)	16.4 (14.3, 18.6)	19.7 (17.2, 22.5)	21.6 (18.6, 25.0)
Total Elbow & Radial	14	56	5.5 (1.8, 16.0)	19.0 (10.7, 32.4)	23.2 (13.9, 37.3)	26.1 (15.9, 40.9)	30.7 (18.7, 47.8)	30.7 (18.7, 47.8)
<b>TOTAL</b>	<b>502</b>	<b>6466</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.

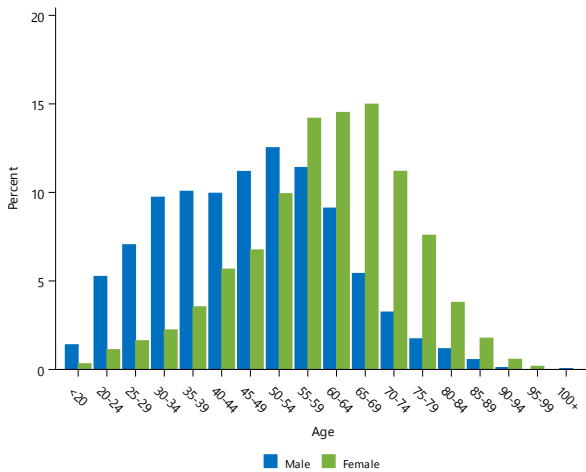
**Uni humeral with radial** involves replacement of the capitellum and radial head.

**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	2769	60.8%	16	99	61	59.9	14.1
Male	1788	39.2%	14	102	47	47.1	15.0
<b>TOTAL</b>	<b>4557</b>	<b>100.0%</b>	<b>14</b>	<b>102</b>	<b>57</b>	<b>54.9</b>	<b>15.8</b>

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



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

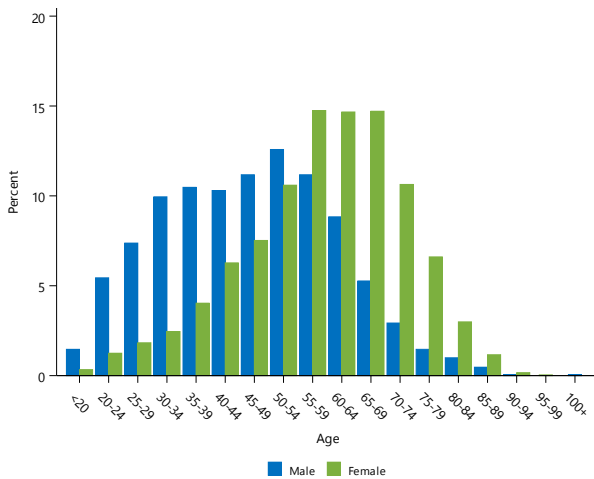
Primary Diagnosis	Number	Percent
Fracture/Dislocation	4160	91.3
Osteoarthritis	319	7.0
Instability	40	0.9
Rheumatoid Arthritis	14	0.3
Osteonecrosis	13	0.3
Tumour	6	0.1
Other Inflammatory Arthritis	3	0.1
Other	2	0.0
<b>TOTAL</b>	<b>4557</b>	<b>100.0</b>

## PRIMARY RADIAL ELBOW REPLACEMENT

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

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	2407	58.5%	16	97	60	58.5	13.8
Male	1709	41.5%	14	102	47	46.5	14.8
<b>TOTAL</b>	<b>4116</b>	<b>100.0%</b>	<b>14</b>	<b>102</b>	<b>55</b>	<b>53.5</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	3773	91.7
Osteoarthritis	274	6.7
Instability	40	1.0
Rheumatoid Arthritis	11	0.3
Osteonecrosis	10	0.2
Other Inflammatory Arthritis	3	0.1
Tumour	3	0.1
Other	2	0.0
<b>TOTAL</b>	<b>4116</b>	<b>100.0</b>

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

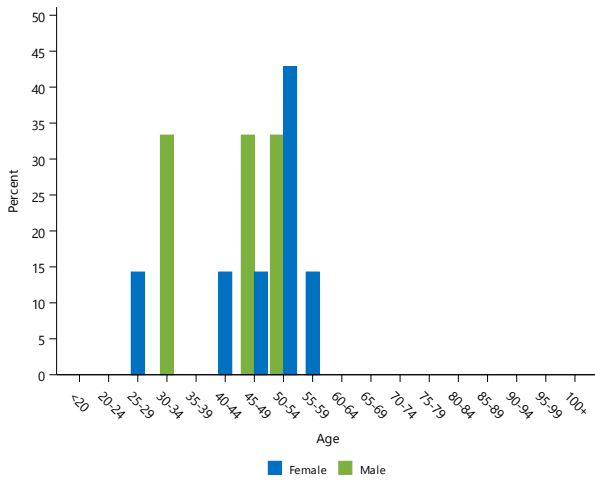
2008		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
57	Evolve	189	Radial Stem (Ascension)	162	Radial Stem (Ascension)	137	Radial Stem (Ascension)	65	Radial Stem (Ascension)
30	Radial Stem (Ascension)	73	Anatomic	65	Evolve	58	Evolve	64	Anatomic
20	Anatomic	62	Evolve	55	Anatomic	47	Anatomic	49	ALIGN
15	MOPYC	31	MOPYC	42	MOPYC	30	MOPYC	48	Evolve
8	RHS	5	ExploR	6	ALIGN	13	ALIGN	39	MOPYC
6	ExploR	1	RHS	2	ExploR	3	Radial Head Replacement System	6	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%	361 (6)	100.0%	334 (7)	100.0%	288 (6)	100.0%	271 (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**

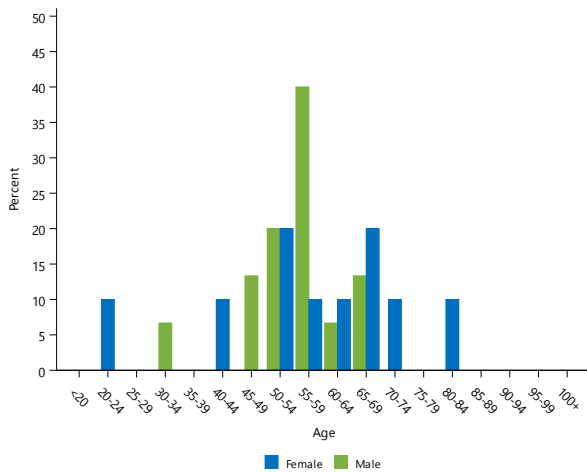
Primary Diagnosis	Number	Percent
Osteoarthritis	5	50.0
Fracture/Dislocation	4	40.0
Osteonecrosis	1	10.0
<b>TOTAL</b>	<b>10</b>	<b>100.0</b>

## 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**

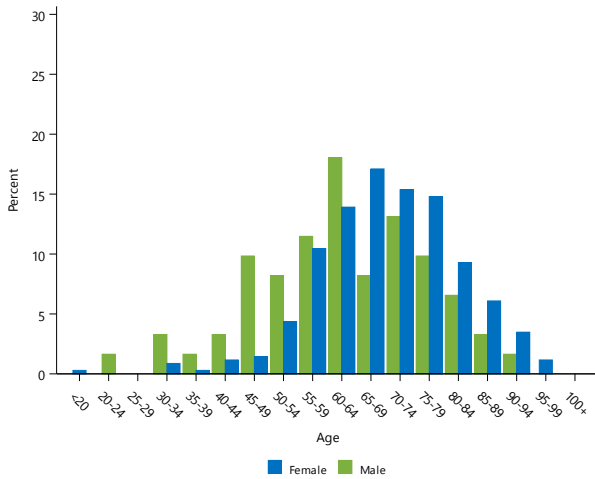
Primary Diagnosis	Number	Percent
Osteoarthritis	21	84.0
Osteonecrosis	2	8.0
Fracture/Dislocation	2	8.0
<b>TOTAL</b>	<b>25</b>	<b>100.0</b>

## PRIMARY HUMERAL HEMIARTHROPLASTY

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

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	345	85.0%	18	99	70	69.6	12.0
Male	61	15.0%	22	91	63	62.2	14.6
<b>TOTAL</b>	<b>406</b>	<b>100.0%</b>	<b>18</b>	<b>99</b>	<b>69</b>	<b>68.5</b>	<b>12.7</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	381	93.8
Osteoarthritis	19	4.7
Rheumatoid Arthritis	3	0.7
Tumour	3	0.7
<b>TOTAL</b>	<b>406</b>	<b>100.0</b>

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

2008		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
13	Latitude	26	Latitude	38	Latitude	32	Latitude	58	Latitude
1	Sorbie-Questor								
<b>10 Most Used</b>									
14	(2) 100.0%	26	(1) 100.0%	38	(1) 100.0%	32	(1) 100.0%	58	(1) 100.0%

## PRIMARY TOTAL ELBOW REPLACEMENT

### DEMOGRAPHICS

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

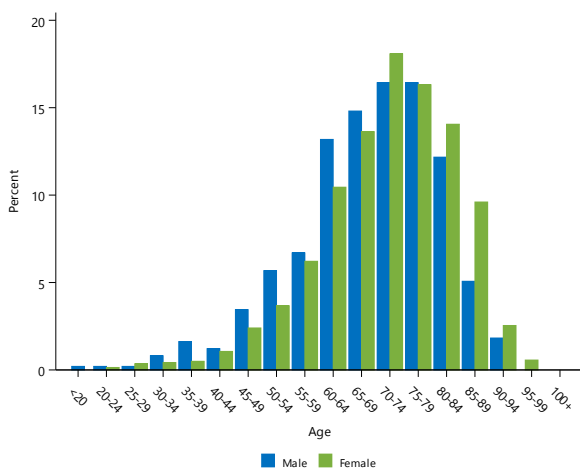
**Total elbow without radial** involves resection of the olecranon and distal humerus and replacement with a stemmed ulna and stemmed humeral prosthesis.

**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	1416	74.2%	21	96	73	71.4	11.9
Male	493	25.8%	12	94	70	68.5	12.5
<b>TOTAL</b>	<b>1909</b>	<b>100.0%</b>	<b>12</b>	<b>96</b>	<b>72</b>	<b>70.6</b>	<b>12.1</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	719	37.7
Osteoarthritis	650	34.0
Rheumatoid Arthritis	446	23.4
Other Inflammatory Arthritis	45	2.4
Tumour	31	1.6
Instability	11	0.6
Osteonecrosis	3	0.2
Other	4	0.2
<b>TOTAL</b>	<b>1909</b>	<b>100.0</b>

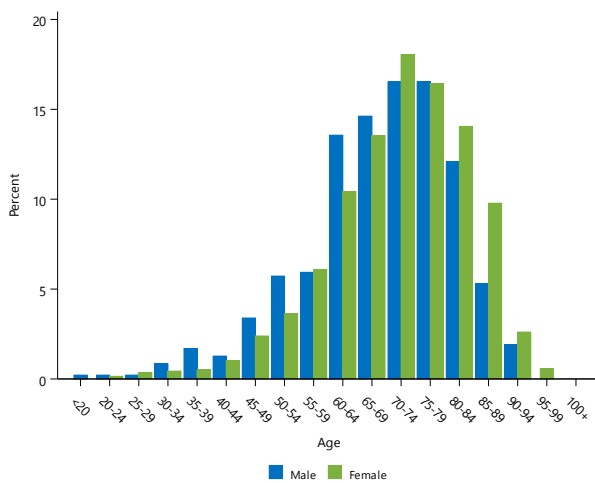


## PRIMARY TOTAL ELBOW WITHOUT RADIAL REPLACEMENT

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

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	1381	74.5%	21	96	73	71.5	11.9
Male	472	25.5%	12	94	70	68.6	12.6
<b>TOTAL</b>	<b>1853</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	708	38.2
Osteoarthritis	620	33.5
Rheumatoid Arthritis	433	23.4
Other Inflammatory Arthritis	44	2.4
Tumour	31	1.7
Instability	10	0.5
Osteonecrosis	3	0.2
Other	4	0.2
<b>TOTAL</b>	<b>1853</b>	<b>100.0</b>

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

2008		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
47	Coonrad/Morrey	59	Latitude	64	Latitude	50	Latitude	59	Latitude
21	Latitude	46	Nexel	44	Nexel	38	Nexel	39	Nexel
10	Discovery	21	Coonrad/Morrey	20	Coonrad/Morrey	9	Coonrad/Morrey	23	Coonrad/Morrey
1	Souter Strathclyde	2	Comprehensive	2	Comprehensive	5	Mutars	2	Mutars
		2	Discovery	2	Mutars				
<b>10 Most Used</b>									
79	(4) 100.0%	130	(5) 100.0%	132	(5) 100.0%	102	(4) 100.0%	123	(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	29	325	2.0 (0.9, 4.4)	6.1 (3.9, 9.7)	8.9 (6.0, 13.2)	11.9 (8.1, 17.2)		
Discovery	3	26	4.0 (0.6, 25.2)	8.4 (2.2, 29.6)	13.2 (4.4, 35.7)	13.2 (4.4, 35.7)		
Latitude	14	244	2.5 (1.1, 5.5)	5.8 (3.3, 10.0)	5.8 (3.3, 10.0)			
Nexel	9	108	1.9 (0.5, 7.3)	7.0 (3.2, 15.1)				
Other (4)	1	5	20.0 (3.1, 79.6)	20.0 (3.1, 79.6)	20.0 (3.1, 79.6)			
<b>TOTAL</b>	<b>56</b>	<b>708</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	199	4.0 (2.0, 7.9)	15.5 (11.0, 21.5)	21.0 (15.7, 27.7)	26.9 (20.8, 34.4)	28.0 (21.6, 35.7)	
Discovery	15	61	3.3 (0.8, 12.5)	11.7 (5.8, 23.1)	15.3 (8.3, 27.4)	22.1 (13.0, 35.9)	33.4 (20.6, 51.2)	
Latitude	30	213	5.5 (3.1, 9.7)	7.9 (4.8, 12.8)	13.3 (8.7, 20.0)	18.0 (11.8, 26.9)		
Nexel	21	140	5.4 (2.6, 10.9)	15.6 (10.1, 23.8)				
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>116</b>	<b>620</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	187	2.7 (1.1, 6.4)	7.8 (4.7, 12.8)	11.4 (7.5, 17.1)	16.3 (11.4, 23.0)	16.3 (11.4, 23.0)	
Discovery	5	32	6.3 (1.6, 22.7)	6.3 (1.6, 22.7)	6.3 (1.6, 22.7)	10.2 (3.4, 28.5)	14.6 (5.7, 35.0)	
Latitude	10	133	0.8 (0.1, 5.5)	4.4 (1.8, 10.3)	5.6 (2.5, 12.3)			
Nexel	7	78	1.4 (0.2, 9.8)	9.2 (4.2, 19.4)	9.2 (4.2, 19.4)	12.4 (5.8, 25.4)		
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>50</b>	<b>433</b>						

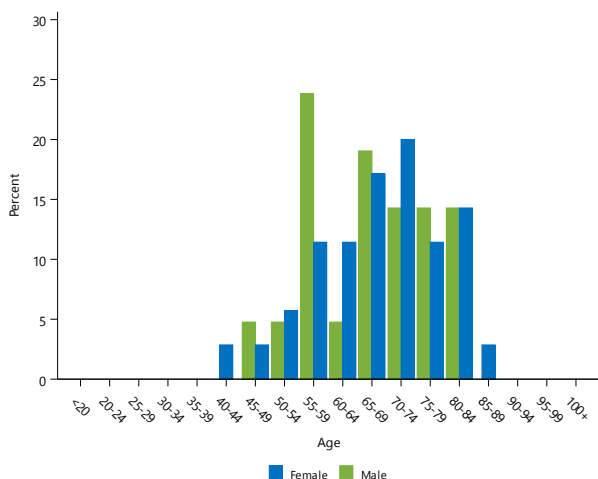
Note: Only prostheses with over 10 procedures have been listed

## 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		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
10	Latitude	2	Latitude	1	Latitude	1	Latitude		
<b>10 Most Used</b>									
10	(1) 100.0%	2	(1) 100.0%	1	(1) 100.0%	1	(1) 100.0%	0	(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	518	41.4%	20	97	60	58.5	15.2
Female	734	58.6%	21	95	66	64.6	13.4
<b>TOTAL</b>	<b>1252</b>	<b>100.0%</b>	<b>20</b>	<b>97</b>	<b>64</b>	<b>62.1</b>	<b>14.5</b>

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

Reason for Revision	Number	Percent
Loosening	434	34.7
Infection	285	22.8
Fracture	152	12.1
Instability	72	5.8
Pain	31	2.5
Prosthesis Dislocation	29	2.3
Incorrect Sizing	26	2.1
Wear Bushing	23	1.8
Lysis	20	1.6
Implant Breakage Ulna	14	1.1
Arthrofibrosis	13	1.0
Malposition	10	0.8
Progression Of Disease	9	0.7
Metal Related Pathology	9	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	106	8.5
<b>TOTAL</b>	<b>1252</b>	<b>100.0</b>

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

Type of Revision	Number	Percent
Humeral/Ulnar	318	25.4
Radial Component	264	21.1
Humeral Component	164	13.1
Elbow Pin Only	122	9.7
Ulna Component	115	9.2
Removal of Prostheses	97	7.7
Cement Spacer	65	5.2
Ulna Cap Only	19	1.5
Radial Head Only	19	1.5
Radial Neck Only	17	1.4
Reoperation	15	1.2
Minor Components	13	1.0
Cement Only	9	0.7
Uni Humeral/Radius	7	0.6
Reinsertion of Components	4	0.3
Radial/Ulnar	3	0.2
Humeral/Radius	1	0.1
<b>TOTAL</b>	<b>1252</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.

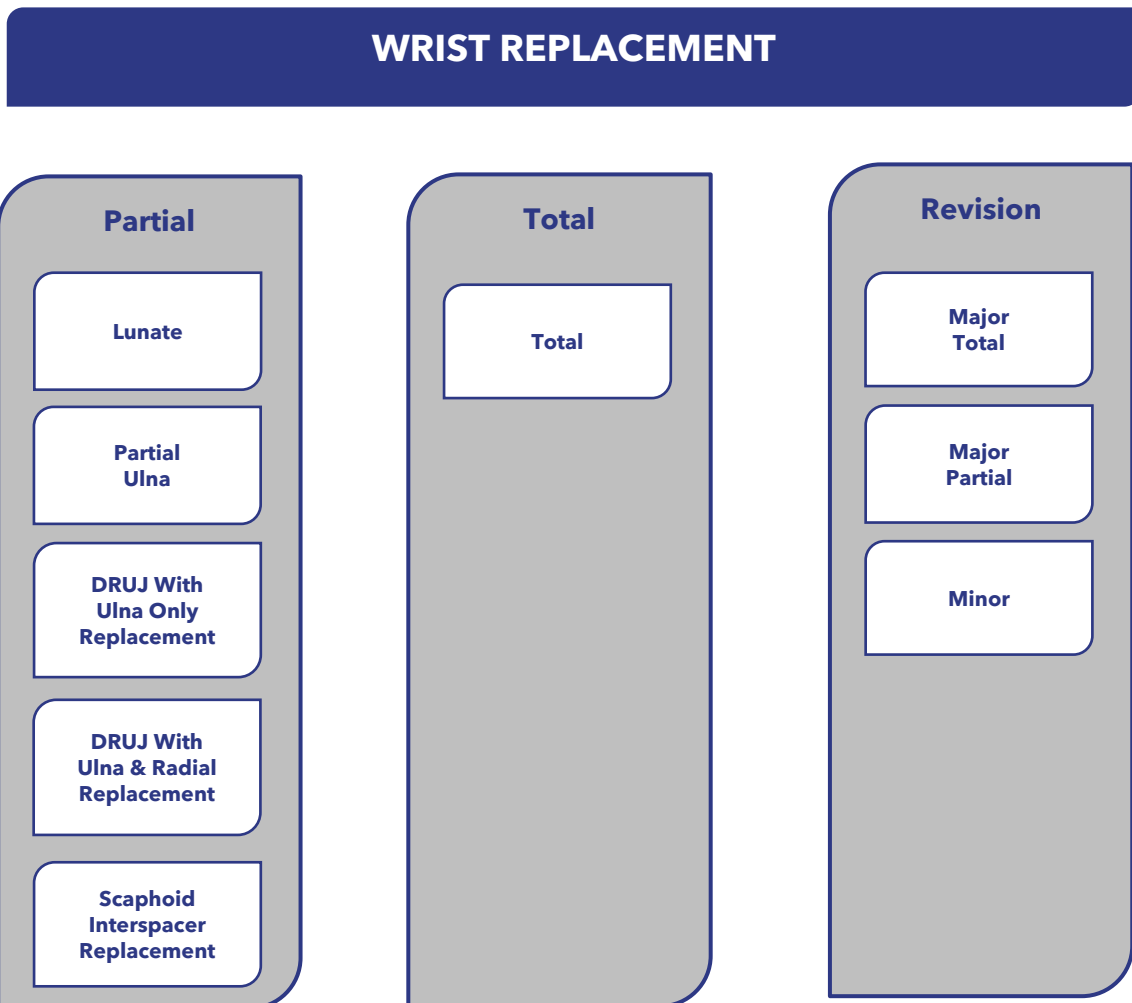
A primary replacement is the initial replacement procedure undertaken on a joint and involves replacing either part (partial) or all (total) of the articular surface.

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	7	41.2	10	58.8	17	4.6
Partial Ulnar	21	51.2	20	48.8	41	11.0
Partial DRUJ - Ulnar Only	86	52.8	77	47.2	163	43.8
DRUJ - Ulnar & Radial	42	47.7	46	52.3	88	23.7
Scaphoid Interspace	21	33.3	42	66.7	63	16.9
<b>Primary Partial</b>	<b>177</b>	<b>47.6</b>	<b>195</b>	<b>52.4</b>	<b>372</b>	<b>100.0</b>
<b>Primary Total</b>	<b>245</b>	<b>44.9</b>	<b>301</b>	<b>55.1</b>	<b>546</b>	<b>100.0</b>
<b>Revision</b>	<b>94</b>	<b>60.3</b>	<b>62</b>	<b>39.7</b>	<b>156</b>	<b>100.0</b>
<b>TOTAL</b>	<b>516</b>	<b>48.0</b>	<b>558</b>	<b>52.0</b>	<b>1074</b>	<b>100.0</b>

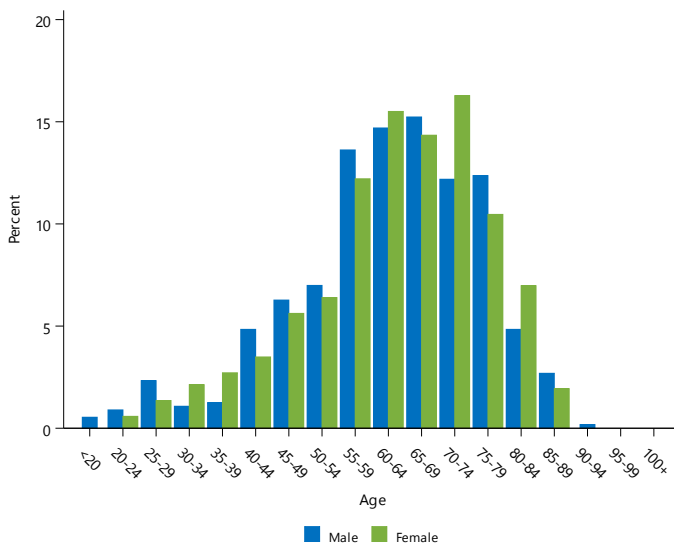
**Table WG2 Number of Wrist Replacements by Age**

Wrist Replacement	<55		55-64		65-74		75-84		≥85		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Lunate	12	70.6	5	29.4	.	.	.	.	.	.	17	4.6
Partial Ulnar	5	12.2	15	36.6	8	19.5	11	26.8	2	4.9	41	11.0
Partial DRUJ - Ulnar Only	40	24.5	39	23.9	53	32.5	26	16.0	5	3.1	163	43.8
DRUJ - Ulnar & Radial	27	30.7	32	36.4	17	19.3	10	11.4	2	2.3	88	23.7
Scaphoid Interspace	29	46.0	13	20.6	14	22.2	6	9.5	1	1.6	63	16.9
<b>Primary Partial</b>	<b>113</b>	<b>30.4</b>	<b>104</b>	<b>28.0</b>	<b>92</b>	<b>24.7</b>	<b>53</b>	<b>14.2</b>	<b>10</b>	<b>2.7</b>	<b>372</b>	<b>100.0</b>
<b>Primary Total</b>	<b>101</b>	<b>18.5</b>	<b>151</b>	<b>27.7</b>	<b>174</b>	<b>31.9</b>	<b>108</b>	<b>19.8</b>	<b>12</b>	<b>2.2</b>	<b>546</b>	<b>100.0</b>
<b>Revision</b>	<b>36</b>	<b>23.1</b>	<b>46</b>	<b>29.5</b>	<b>45</b>	<b>28.8</b>	<b>25</b>	<b>16.0</b>	<b>4</b>	<b>2.6</b>	<b>156</b>	<b>100.0</b>
<b>TOTAL</b>	<b>250</b>	<b>23.3</b>	<b>301</b>	<b>28.0</b>	<b>311</b>	<b>29.0</b>	<b>186</b>	<b>17.3</b>	<b>26</b>	<b>2.4</b>	<b>1074</b>	<b>100.0</b>

**Table WG3 Age and Gender of All Wrist Replacement**

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	558	52.0%	18	90	64	62.2	13.9
Female	516	48.0%	21	88	65	63.1	13.4
<b>TOTAL</b>	<b>1074</b>	<b>100.0%</b>	<b>18</b>	<b>90</b>	<b>64</b>	<b>62.6</b>	<b>13.7</b>

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



**Table WG4 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	17	12.5 (3.3, 41.4)	19.2 (6.6, 48.6)	19.2 (6.6, 48.6)	19.2 (6.6, 48.6)		
Partial Ulnar	1	41	2.6 (0.4, 16.8)	2.6 (0.4, 16.8)	2.6 (0.4, 16.8)	2.6 (0.4, 16.8)	2.6 (0.4, 16.8)	
Partial DRUJ - Ulnar Only	13	163	3.2 (1.4, 7.6)	7.4 (4.2, 13.1)	8.2 (4.7, 14.0)	8.2 (4.7, 14.0)	9.8 (5.6, 16.7)	
DRUJ - Ulnar & Radial	5	88	2.3 (0.6, 8.9)	5.2 (2.0, 13.5)	7.1 (3.0, 16.5)	7.1 (3.0, 16.5)	7.1 (3.0, 16.5)	
Scaphoid Interspacer	2	63	3.2 (0.8, 12.1)	3.2 (0.8, 12.1)	3.2 (0.8, 12.1)	3.2 (0.8, 12.1)	3.2 (0.8, 12.1)	
Total Wrist	60	546	3.7 (2.4, 5.8)	9.7 (7.3, 12.7)	12.2 (9.3, 15.8)	14.8 (11.2, 19.5)	17.1 (12.7, 22.8)	
<b>TOTAL</b>	<b>84</b>	<b>918</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.

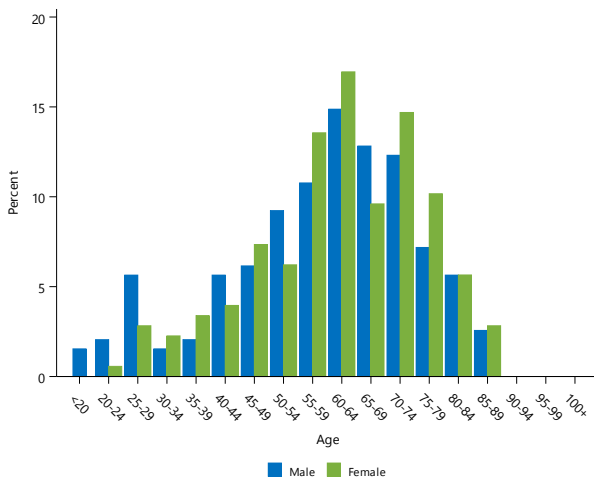
**Distal radial ulna joint (DRUJ) with ulna and radial replacement** involves resection of the ulna head and replacement with a stemmed ulna prosthesis and a distal radial notch and plate.

**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	177	47.6%	21	88	63	61.4	14.5
Male	195	52.4%	18	88	62	58.9	16.3
<b>TOTAL</b>	<b>372</b>	<b>100.0%</b>	<b>18</b>	<b>88</b>	<b>62</b>	<b>60.1</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	264	71.0
Rheumatoid Arthritis	32	8.6
Fracture/Dislocation	31	8.3
Instability	15	4.0
Osteonecrosis	14	3.8
Other Inflammatory Arthritis	8	2.2
Tumour	1	0.3
Other	7	1.9
<b>TOTAL</b>	<b>372</b>	<b>100.0</b>

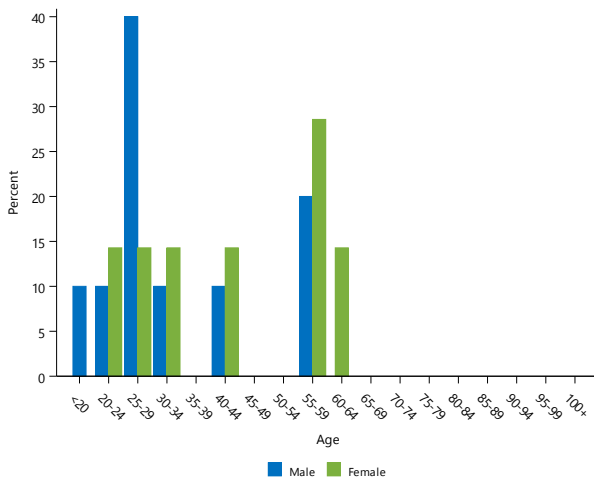


## PRIMARY LUNATE WRIST REPLACEMENT

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

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	7	41.2%	21	61	43	42.6	16.5
Male	10	58.8%	19	59	28	34.4	14.2
<b>TOTAL</b>	<b>17</b>	<b>100.0%</b>	<b>19</b>	<b>61</b>	<b>32</b>	<b>37.8</b>	<b>15.2</b>

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



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

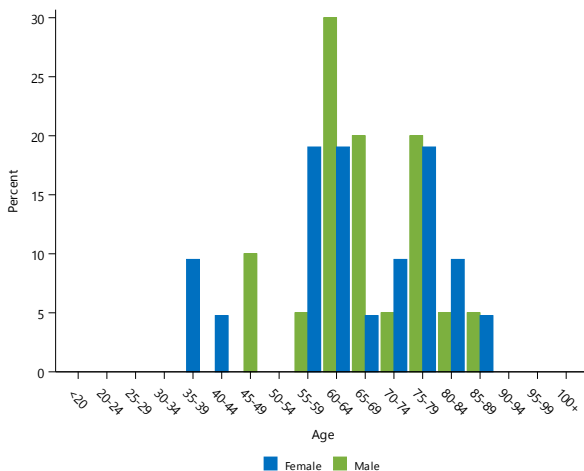
Primary Diagnosis	Number	Percent
Osteonecrosis	12	70.6
Osteoarthritis	4	23.5
Fracture/Dislocation	1	5.9
<b>TOTAL</b>	<b>17</b>	<b>100.0</b>

## 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	21	51.2%	35	85	63	64.7	14.8
Male	20	48.8%	48	86	66	67.5	10.1
<b>TOTAL</b>	<b>41</b>	<b>100.0%</b>	<b>35</b>	<b>86</b>	<b>65</b>	<b>66.1</b>	<b>12.7</b>

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



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

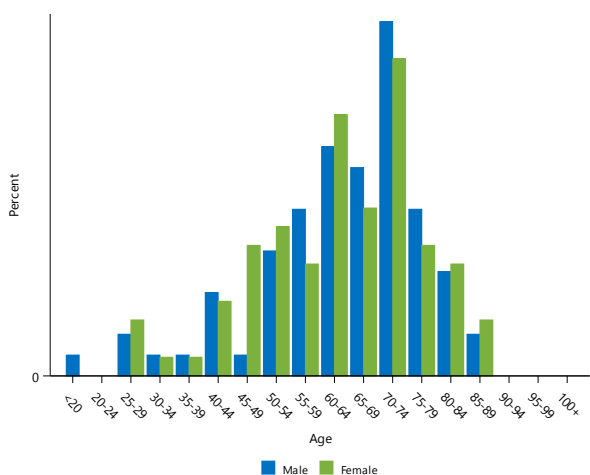
Primary Diagnosis	Number	Percent
Osteoarthritis	30	73.2
Rheumatoid Arthritis	4	9.8
Fracture/Dislocation	4	9.8
Other Inflammatory Arthritis	2	4.9
Instability	1	2.4
<b>TOTAL</b>	<b>41</b>	<b>100.0</b>

## 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	86	52.8%	26	87	64	62.6	14.1
Male	77	47.2%	19	88	66	63.6	14.3
<b>TOTAL</b>	<b>163</b>	<b>100.0%</b>	<b>19</b>	<b>88</b>	<b>65</b>	<b>63.1</b>	<b>14.1</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	119	73.0
Rheumatoid Arthritis	20	12.3
Fracture/Dislocation	11	6.7
Instability	4	2.5
Other Inflammatory Arthritis	3	1.8
Tumour	1	0.6
Osteonecrosis	1	0.6
Other	4	2.5
<b>TOTAL</b>	<b>163</b>	<b>100.0</b>

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

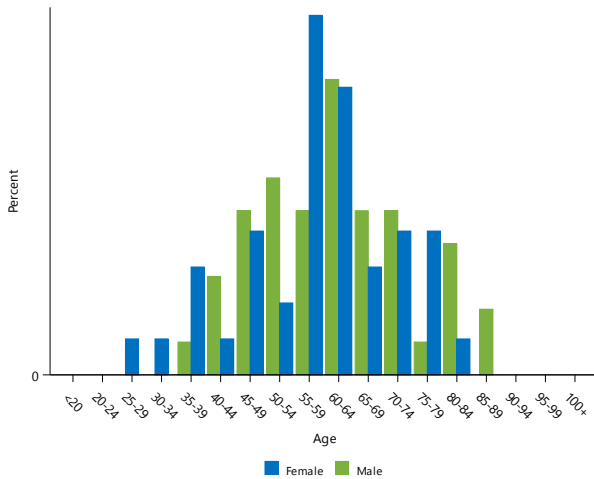
2008		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
5	uHead	6	Herbert UHP	5	DRUJ (Ascension)	4	Herbert UHP	15	Herbert UHP
2	Eclipse	3	DRUJ (Ascension)	2	Herbert UHP	2	DRUJ (Ascension)		
2	Herbert UHP			1	Eclipse				
1	E-Centrix								
<b>10 Most Used</b>									
10	(4) 100.0%	9	(2) 100.0%	8	(3) 100.0%	6	(2) 100.0%	15	(1) 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	42	47.7%	27	81	59	58.5	13.0
Male	46	52.3%	39	87	61	61.7	12.4
<b>TOTAL</b>	<b>88</b>	<b>100.0%</b>	<b>27</b>	<b>87</b>	<b>61</b>	<b>60.2</b>	<b>12.7</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**

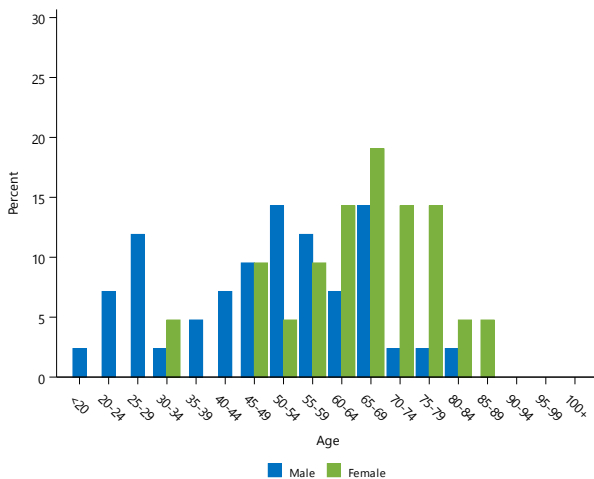
Primary Diagnosis	Number	Percent
Osteoarthritis	69	78.4
Instability	9	10.2
Rheumatoid Arthritis	4	4.5
Fracture/Dislocation	3	3.4
Other	3	3.4
<b>TOTAL</b>	<b>88</b>	<b>100.0</b>

## PRIMARY SCAPHOID INTERSPACER REPLACEMENT

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

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	21	33.3%	31	88	66	64.7	13.5
Male	42	66.7%	18	80	51	49.0	16.8
<b>TOTAL</b>	<b>63</b>	<b>100.0%</b>	<b>18</b>	<b>88</b>	<b>58</b>	<b>54.2</b>	<b>17.4</b>

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



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

Primary Diagnosis	Number	Percent
Osteoarthritis	42	66.7
Fracture/Dislocation	12	19.0
Rheumatoid Arthritis	4	6.3
Other Inflammatory Arthritis	3	4.8
Instability	1	1.6
Osteonecrosis	1	1.6
<b>TOTAL</b>	<b>63</b>	<b>100.0</b>

# PRIMARY TOTAL WRIST REPLACEMENT

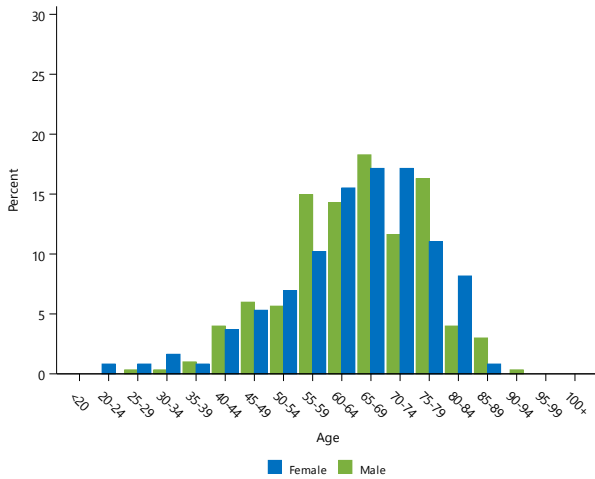
## DEMOGRAPHICS

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	245	44.9%	22	87	66	64.2	12.5
Male	301	55.1%	29	90	66	64.6	11.5
<b>TOTAL</b>	<b>546</b>	<b>100.0%</b>	<b>22</b>	<b>90</b>	<b>66</b>	<b>64.4</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	400	73.3
Rheumatoid Arthritis	78	14.3
Fracture/Dislocation	17	3.1
Osteonecrosis	17	3.1
Other Inflammatory Arthritis	13	2.4
Instability	13	2.4
Other	8	1.5
<b>TOTAL</b>	<b>546</b>	<b>100.0</b>

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

2008		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
10	Re-Motion	60	Motec	81	Motec	48	Motec	51	Motec
3	Universal 2	7	Universal 2	1	Freedom	1	Freedom		
		2	Freedom	1	Universal 2	1	Re-Motion		
<b>10 Most Used</b>									
13	(2) 100.0	69	(3) 100.0	83	(3) 100.0	50	(3) 100.0	51	(1) 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	62	39.7%	22	88	64	61.0	14.3
Female	94	60.3%	32	87	66	63.4	13.5
<b>TOTAL</b>	<b>156</b>	<b>100.0%</b>	<b>22</b>	<b>88</b>	<b>64</b>	<b>62.4</b>	<b>13.8</b>

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

Reason for Revision	Number	Percent
Loosening	48	30.8
Pain	21	13.5
Instability	19	12.2
Infection	17	10.9
Lysis	9	5.8
Metal Related Pathology	5	3.2
Progression Of Disease	3	1.9
Prosthesis Dislocation	3	1.9
Implant Breakage Carpal	3	1.9
Incorrect Sizing	2	1.3
Arthrofibrosis	2	1.3
Contracture	1	0.6
Malposition	1	0.6
Implant Breakage Wrist Plate	1	0.6
Implant Breakage Ulna	1	0.6
Flexion Deformity	1	0.6
Fracture	1	0.6
Other	18	11.5
<b>TOTAL</b>	<b>156</b>	<b>100.0</b>

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

Type of Revision	Number	Percent
Removal of Prostheses	25	16.0
Carpal Component	18	11.5
Ulna Component	16	10.3
Minor Components	16	10.3
Sigmoid Notch	14	9.0
Carpal/Radius	13	8.3
Carpal Head/Radial Cup	12	7.7
Reoperation Fusion	10	6.4
Ulna Head Only	10	6.4
Radius Component	7	4.5
Carpal Insert	6	3.8
Cement Spacer	4	2.6
Sigmoid Notch/Ulna	2	1.3
Carpal Head	2	1.3
Radial Cup	1	0.6
<b>TOTAL</b>	<b>156</b>	<b>100.0</b>

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