

Australian Orthopaedic Association National Joint Replacement Registry

2022 Demographics and Outcomes
of Elbow and Wrist Arthroplasty
Supplementary Report



AOA
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ASSOCIATION

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Elbow and Wrist Arthroplasty
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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Contents

INTRODUCTION	6
ELBOW REPLACEMENT	7
Categories of Elbow Replacement	7
Demographics	8
Primary Partial Elbow Replacement	10
Demographics.....	10
Primary Radial Elbow Replacement	11
Primary Uni Humeral Elbow Replacement	12
Primary Uni Humeral with Radial Elbow Replacement	13
Primary Humeral Hemiarthroplasty	14
Primary Total Elbow Replacement	15
Demographics.....	15
Primary Total Elbow without Radial Replacement	16
Primary Total Elbow with Radial Replacement	18
Revision Elbow Replacement	19
Demographics.....	19
WRIST REPLACEMENT	20
Categories of Wrist Replacement	20
Demographics.....	21
Primary Partial Wrist Replacement	23
Demographics.....	23
Primary Lunate Wrist Replacement.....	24
Primary Partial Ulna Wrist Replacement	24
Primary DRUJ with Ulna Only Replacement.....	25
Primary DRUJ with Ulna and Radial Replacement	26
Primary Scaphoid Interspacer Replacement	26
Primary Total Wrist Replacement	27
Demographics.....	27
Revision Wrist Replacement	28
Demographics.....	28
LIST OF TABLES	29
LIST OF FIGURES	30

Introduction

The 2022 Demographics and Outcome of Elbow and Wrist Arthroplasty Supplementary Report is based on the analysis of 6,565 elbow and 884 wrist procedures recorded by the Registry with a procedure date up to and including 31 December 2021.

The elbow arthroplasty procedures include 3,816 primary partial, 1,683 primary total and 1,066 revisions (Table EG1).

The wrist arthroplasty procedures include 329 primary partial, 439 primary total and 116 revisions (Table WG1).

The Elbow and Wrist Arthroplasty Report is one of 15 supplementary reports to complete the AOANJRR Annual Report for 2022.

The 2022 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 2022 Hip, Knee & 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 2022 Hip, Knee & Shoulder Arthroplasty Annual Report: <https://aoanjrr.sahmri.com/annual-reports-2022>

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.

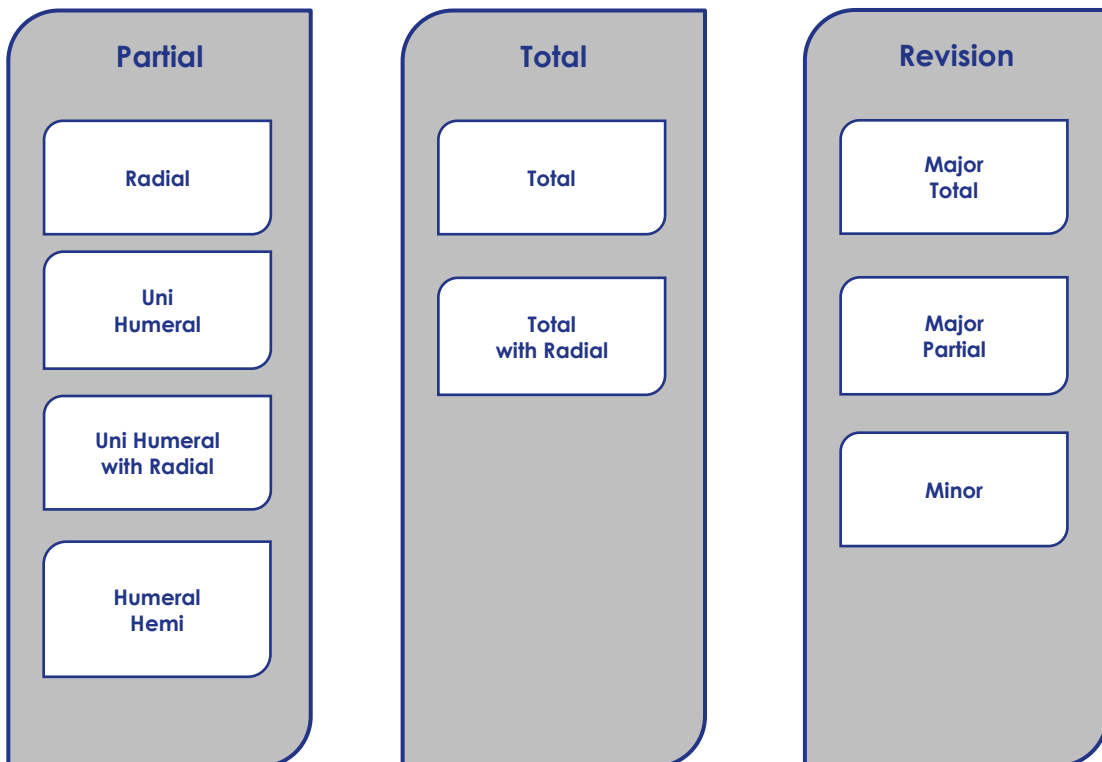
Primary partial and primary total elbow replacement are further subcategorised into classes depending on the type of prostheses used. Partial elbow classes are radial, uni humeral, uni humeral with radial, and humeral hemiarthroplasty elbow replacement. Total elbow classes are total and total with radial

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	2012	58.0	1454	42.0	3466	90.8
Uni Humeral	7	70.0	3	30.0	10	0.3
Uni Humeral & Radial	10	40.0	15	60.0	25	0.7
Humeral	269	85.4	46	14.6	315	8.3
Primary Partial	2298	60.2	1518	39.8	3816	100.0
Total Elbow	1207	74.1	421	25.9	1628	96.7
Total Elbow & Radial	34	61.8	21	38.2	55	3.3
Primary Total	1241	73.7	442	26.3	1683	100.0
Revision	630	59.1	436	40.9	1066	100.0
TOTAL	4169	63.5	2396	36.5	6565	100.0

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	1717	49.5	882	25.4	610	17.6	226	6.5	31	0.9	3466	90.8
Uni Humeral	9	90.0	1	10.0	.	.	.	.	.	.	10	0.3
Uni Humeral & Radial	10	40.0	9	36.0	5	20.0	1	4.0	.	.	25	0.7
Humeral	40	12.7	81	25.7	96	30.5	68	21.6	30	9.5	315	8.3
Primary Partial	1776	46.5	973	25.5	711	18.6	295	7.7	61	1.6	3816	100.0
Total Elbow	170	10.4	284	17.4	494	30.3	493	30.3	187	11.5	1628	96.7
Total Elbow & Radial	6	10.9	14	25.5	20	36.4	14	25.5	1	1.8	55	3.3
Primary Total	176	10.5	298	17.7	514	30.5	507	30.1	188	11.2	1683	100.0
Revision	279	26.2	259	24.3	311	29.2	170	15.9	47	4.4	1066	100.0
TOTAL	2231	34.0	1530	23.3	1536	23.4	972	14.8	296	4.5	6565	100.0

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	12.2	4	3.3	6	4.9	25	20.3
Both - Total Elbow	.	.	13	10.6	77	62.6	90	73.2
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
TOTAL	15	12.2	19	15.4	89	72.4	123	100.0

Figure EG1 Elbow Replacement by Age and Gender

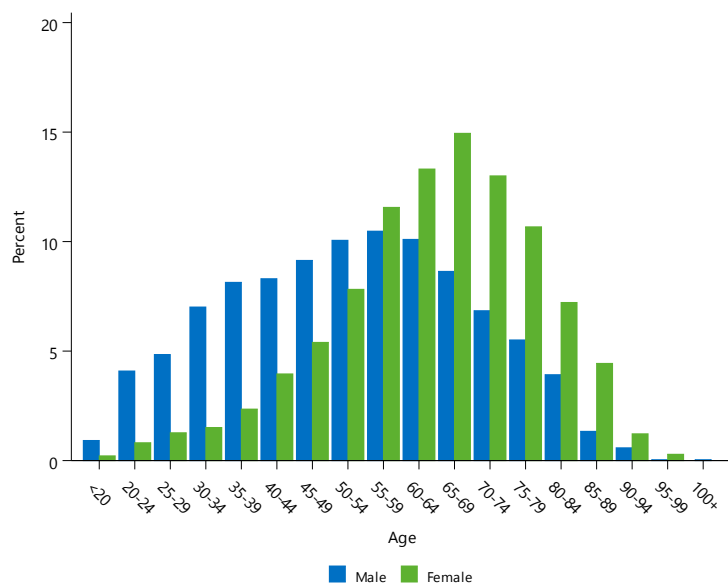


Table EG4 Age and Gender of All Elbow Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Male	2396	36.5%	12	102	53	52.8	17.0
Female	4169	63.5%	16	99	65	63.8	14.4
TOTAL	6565	100.0%	12	102	61	59.8	16.3

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	164	3466	2.9 (2.4, 3.5)	4.6 (4.0, 5.4)	5.1 (4.4, 6.0)	5.4 (4.6, 6.3)	5.6 (4.8, 6.5)	
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	24	315	4.4 (2.6, 7.4)	6.0 (3.8, 9.6)	7.3 (4.6, 11.3)	11.1 (7.2, 17.0)		
Total Elbow	203	1628	3.5 (2.7, 4.5)	9.1 (7.7, 10.8)	12.5 (10.7, 14.5)	17.4 (15.1, 20.0)	21.2 (18.2, 24.6)	
Total Elbow & Radial	13	55	5.6 (1.8, 16.3)	19.8 (11.1, 33.7)	22.3 (12.9, 36.8)	25.8 (15.2, 41.7)	30.4 (18.1, 48.3)	
TOTAL	418	5499						

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	2298	60.2%	16	99	61	59.6	14.1
Male	1518	39.8%	14	102	46	46.6	14.8
TOTAL	3816	100.0%	14	102	56	54.4	15.7

Figure EP1 Primary Partial Elbow Replacement by Age and Gender

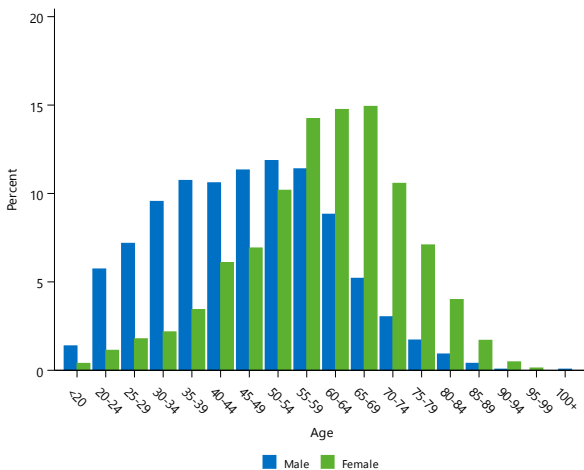


Table EP2 Primary Partial Elbow Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Fracture/Dislocation	3473	91.0
Osteoarthritis	275	7.2
Instability	36	0.9
Rheumatoid Arthritis	14	0.4
Osteonecrosis	10	0.3
Tumour	4	0.1
Other Inflammatory Arthritis	3	0.1
Other	1	0.0
TOTAL	3816	100.0

PRIMARY RADIAL ELBOW REPLACEMENT

Table EP3 Age and Gender of Primary Radial Elbow Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	2012	58.0%	16	92	60	58.4	13.8
Male	1454	42.0%	14	102	46	46.0	14.6
TOTAL	3466	100.0%	14	102	55	53.2	15.4

Figure EP2 Primary Radial Elbow Replacement by Age and Gender

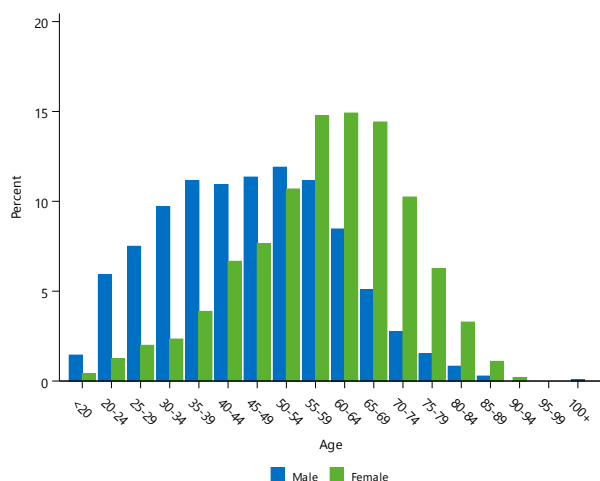


Table EP4 Primary Radial Elbow Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Fracture/Dislocation	3174	91.6
Osteoarthritis	233	6.7
Instability	36	1.0
Rheumatoid Arthritis	11	0.3
Osteonecrosis	7	0.2
Other Inflammatory Arthritis	3	0.1
Tumour	1	0.0
Other	1	0.0
TOTAL	3466	100.0

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

2008		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
57	Evolve	122	Radial Stem (Ascension)	155	Radial Stem (Ascension)	171	Radial Stem (Ascension)	137	Radial Stem (Ascension)
30	Radial Stem (Ascension)	95	Anatomic	75	Anatomic	67	Anatomic	58	Evolve
20	Anatomic	59	Evolve	61	Evolve	57	Evolve	39	Anatomic
15	MOPYC	35	MOPYC	40	MOPYC	27	MOPYC	37	MOPYC
8	RHS	7	RHS	7	ExploR	4	ExploR	4	ALIGN
6	ExploR	5	ExploR	2	RHS	1	RHS	2	ExploR
4	Swanson							2	RHS
4	rHead								
1	Generic Radial Stem								
1	Solar								
Most Used									
146	(10) 100.0%	323	(6) 100.0%	340	(6) 100.0%	327	(6) 100.0%	279	(7) 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
TOTAL	10	100.0%	27	56	49	45.8	10.2

Figure EP3 Primary Humeral Elbow Replacement by Age and Gender

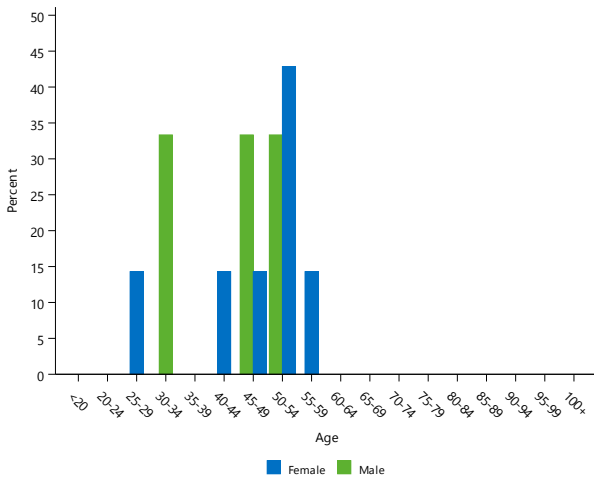


Table EP7 Primary Uni Humeral Elbow Replacement by Primary Diagnosis

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



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
TOTAL	25	100.0%	22	83	58	56.0	12.6

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

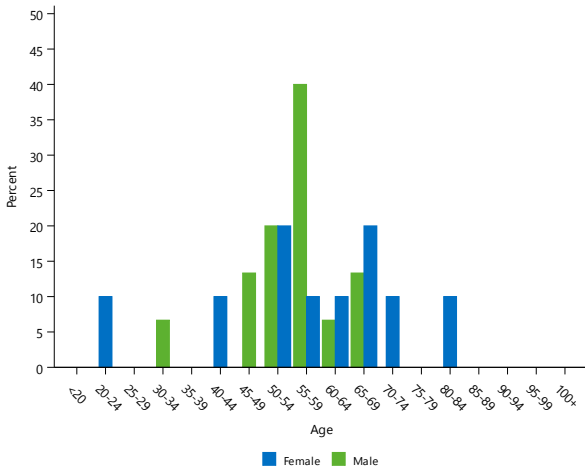


Table EP9 Primary Uni Humeral with Radial Elbow Replacement by Primary Diagnosis

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

PRIMARY HUMERAL HEMIARTHROPLASTY

Table EP10 Age and Gender of Primary Humeral Hemiarthroplasty Elbow Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	269	85.4%	18	99	68	68.9	12.3
Male	46	14.6%	22	91	63	61.4	15.2
TOTAL	315	100.0%	18	99	68	67.8	13.0

Figure EP5 Primary Humeral Hemiarthroplasty Elbow Replacement by Age and Gender

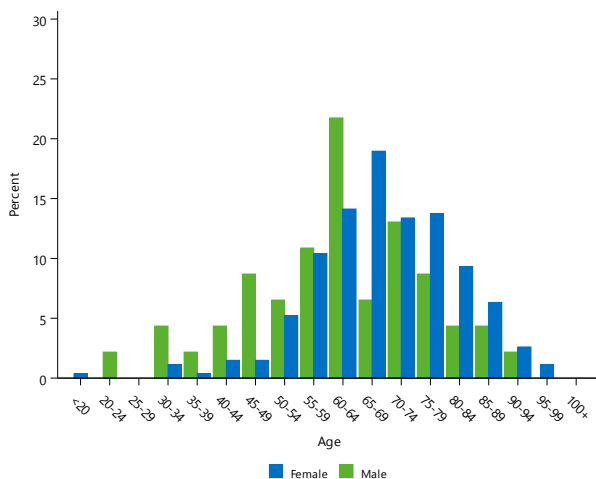


Table EP11 Primary Humeral Hemiarthroplasty Elbow Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Fracture/Dislocation	293	93.0
Osteoarthritis	16	5.1
Rheumatoid Arthritis	3	1.0
Tumour	3	1.0
TOTAL	315	100.0

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

2008		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
13	Latitude	33	Latitude	24	Latitude	26	Latitude	37	Latitude
1	Sorbie-Questor								
Most Used									
14	(2) 100.0%	33	(1) 100.0%	24	(1) 100.0%	26	(1) 100.0%	37	(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	1241	73.7%	21	96	72	71.2	12.1
Male	442	26.3%	12	94	70	68.4	12.8
TOTAL	1683	100.0%	12	96	72	70.4	12.3

Figure ET1 Primary Total Elbow Replacement by Age and Gender

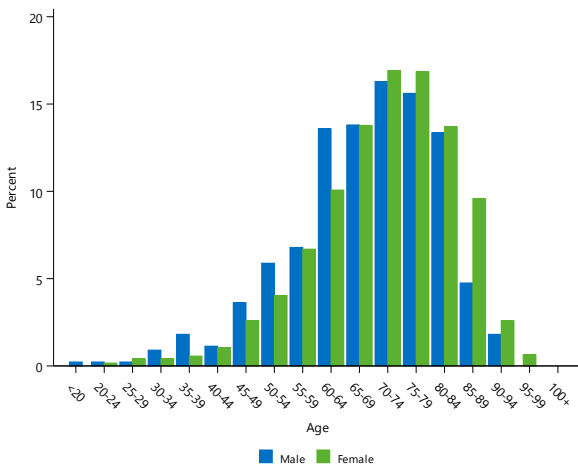


Figure ET2 Primary Total Elbow Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Fracture/Dislocation	624	37.1
Osteoarthritis	565	33.6
Rheumatoid Arthritis	414	24.6
Other Inflammatory Arthritis	40	2.4
Tumour	24	1.4
Instability	9	0.5
Osteonecrosis	3	0.2
Other	4	0.2
TOTAL	1683	100.0

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	1207	74.1%	21	96	73	71.3	12.1
Male	421	25.9%	12	94	70	68.4	12.9
TOTAL	1628	100.0%	12	96	72	70.5	12.4

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

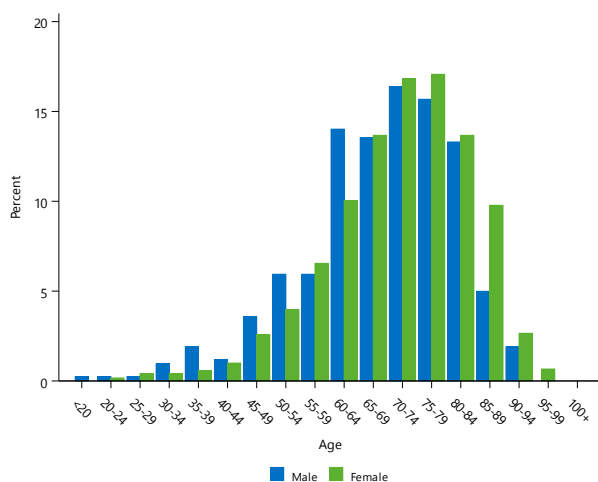


Table ET3 Primary Total Elbow without Radial Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Fracture/Dislocation	613	37.7
Osteoarthritis	536	32.9
Rheumatoid Arthritis	401	24.6
Other Inflammatory Arthritis	39	2.4
Tumour	24	1.5
Instability	8	0.5
Osteonecrosis	3	0.2
Other	4	0.2
TOTAL	1628	100.0

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

2008		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
47	Coonrad/Morrey	54	Latitude	60	Latitude	59	Latitude	65	Latitude
21	Latitude	34	Coonrad/Morrey	49	Nexel	46	Nexel	44	Nexel
10	Discovery	19	Nexel	23	Coonrad/Morrey	21	Coonrad/Morrey	19	Coonrad/Morrey
1	Souter Strathclyde	11	Discovery	4	Mutars	2	Comprehensive	2	Comprehensive
		2	Mutars	1	Comprehensive	2	Discovery	2	Mutars
		1	Custom Made (Biomet)	1	Custom Made (Comprehensive)				
				1	Discovery				
Most Used									
79	(4) 100.0%	121	(6) 100.0%	139	(7) 100.0%	130	(5) 100.0%	132	(5) 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	24	302	2.1 (1.0, 4.7)	5.4 (3.2, 8.9)	8.6 (5.6, 13.2)	10.6 (6.9, 16.1)		
Discovery	2	26	4.0 (0.6, 25.2)	8.6 (2.2, 30.3)	8.6 (2.2, 30.3)	8.6 (2.2, 30.3)		
Latitude	12	200	2.6 (1.1, 6.1)	6.3 (3.4, 11.4)	6.3 (3.4, 11.4)			
Nexel	6	80	2.6 (0.7, 10.1)	6.5 (2.4, 16.8)	11.2 (4.2, 28.1)			
Other (4)	1	5	20.0 (3.1, 79.6)	20.0 (3.1, 79.6)				
TOTAL	45	613						

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	44	192	4.2 (2.1, 8.2)	16.1 (11.5, 22.3)	21.3 (15.9, 28.3)	27.1 (20.8, 34.9)		
Discovery	15	61	3.3 (0.8, 12.5)	11.8 (5.8, 23.2)	15.7 (8.4, 28.0)	23.8 (14.0, 38.9)	36.1 (22.2, 55.1)	
Latitude	27	171	6.2 (3.4, 11.2)	8.4 (4.9, 14.0)	14.8 (9.3, 23.2)			
Nexel	13	105	3.0 (1.0, 9.1)	13.6 (7.4, 24.2)				
Other (5)	3	7	31.4 (8.8, 78.7)	48.6 (18.7, 88.2)	48.6 (18.7, 88.2)	48.6 (18.7, 88.2)		
TOTAL	102	536						

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	27	184	2.7 (1.1, 6.5)	7.4 (4.3, 12.3)	11.2 (7.3, 17.0)	16.9 (11.7, 24.0)		
Discovery	4	32	6.3 (1.6, 22.7)	6.3 (1.6, 22.7)	6.3 (1.6, 22.7)	10.5 (3.5, 29.6)	15.5 (5.9, 37.0)	
Latitude	8	117	0.9 (0.1, 6.1)	5.4 (2.3, 12.7)	5.4 (2.3, 12.7)			
Nexel	5	65	1.7 (0.2, 11.6)	8.2 (3.1, 20.8)	8.2 (3.1, 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)	
TOTAL	44	401						

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	34	61.8%	42	86	68	67.5	10.9
Male	21	38.2%	45	83	67	67.5	10.7
TOTAL	55	100.0%	42	86	68	67.5	10.7

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

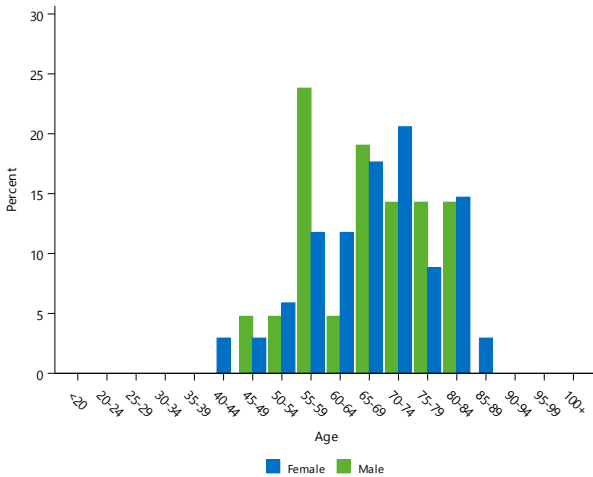


Table ET9 Primary Total Elbow with Radial Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	29	52.7
Rheumatoid Arthritis	13	23.6
Fracture/Dislocation	11	20.0
Other Inflammatory Arthritis	1	1.8
Instability	1	1.8
TOTAL	55	100.0

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

2008		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
10	Latitude	5	Latitude	3	Latitude	2	Latitude	1	Latitude
				1	Nexel				
Most Used									
10	(1) 100.0%	5	(1) 100.0%	4	(2) 100.0%	2	(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	436	40.9%	20	97	61	58.7	15.5
Female	630	59.1%	21	95	66	64.7	13.5
TOTAL	1066	100.0%	20	97	64	62.3	14.7

Table ER2 Reason for Revision of All Revision Elbow Replacement

Reason for Revision	Number	Percent
Loosening	366	34.3
Infection	245	23.0
Fracture	131	12.3
Instability	62	5.8
Pain	26	2.4
Prosthesis Dislocation	25	2.3
Wear Bushing	19	1.8
Incorrect Sizing	18	1.7
Lysis	15	1.4
Implant Breakage Ulna	12	1.1
Arthrofibrosis	10	0.9
Progression Of Disease	9	0.8
Malposition	8	0.8
Implant Breakage Humeral	7	0.7
Metal Related Pathology	7	0.7
Wear Ulna	5	0.5
Heterotopic Bone	4	0.4
Synovitis	2	0.2
Wear Humeral	1	0.1
Other	94	8.8
TOTAL	1066	100.0

Table ER3 Type of Revision of All Revision Elbow Replacement

Type of Revision	Number	Percent
Humeral/Ulnar	270	25.3
Radial Component	208	19.5
Humeral Component	150	14.1
Elbow Pin Only	110	10.3
Ulna Component	98	9.2
Removal of Prostheses	84	7.9
Cement Spacer	54	5.1
Radial Head Only	17	1.6
Ulna Cap Only	14	1.3
Radial Neck Only	14	1.3
Reoperation	14	1.3
Minor Components	11	1.0
Uni Humeral/Radius	7	0.7
Cement Only	7	0.7
Reinsertion of Components	4	0.4
Radial/Ulnar	3	0.3
Humeral/Radius	1	0.1
TOTAL	1066	100.0

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.

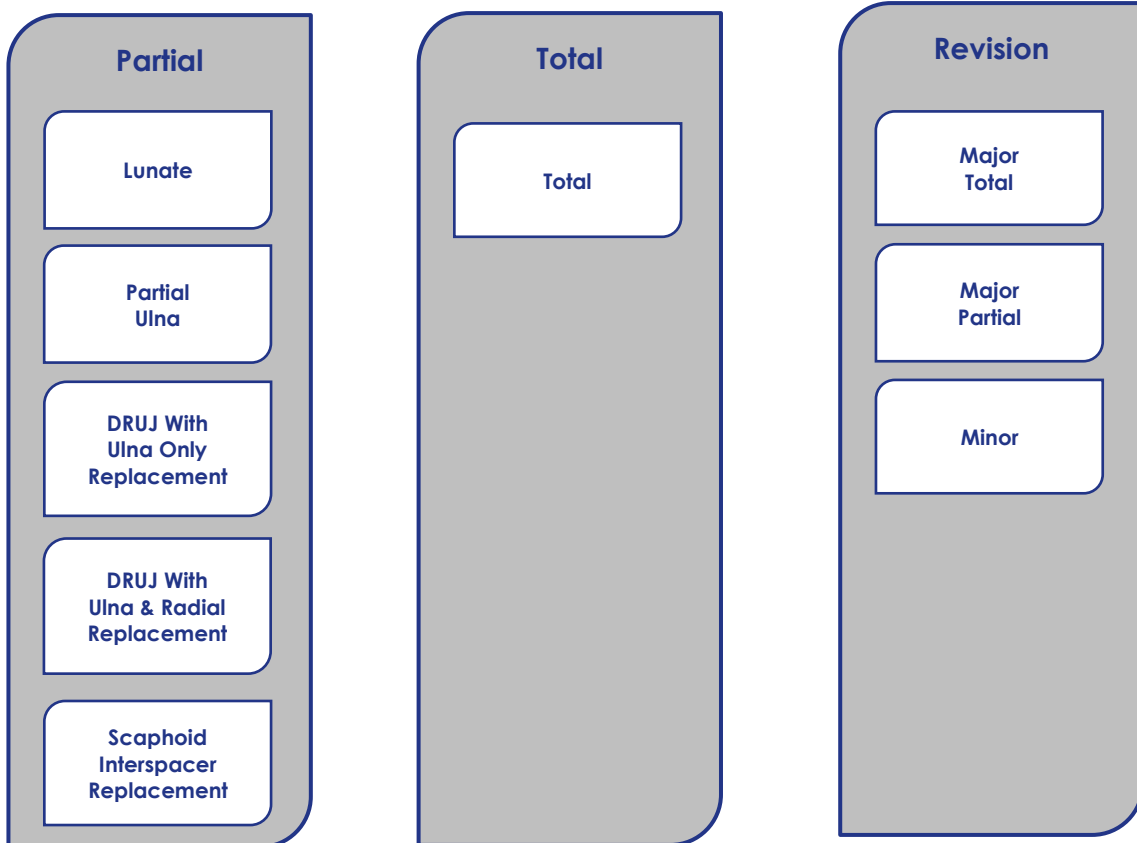
Primary partial wrist replacement is further subcategorised into five classes depending on the type of prosthesis used. Partial wrist classes are lunate, partial ulna, distal radial ulna joint (DRUJ) with ulna only replacement, DRUJ with ulna and radial replacement, and scaphoid

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.

WRIST REPLACEMENT





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	4.9
Partial Ulnar	18	52.9	16	47.1	34	10.3
Partial DRUJ - Ulnar Only	74	52.5	67	47.5	141	42.9
DRUJ - Ulnar & Radial	36	47.4	40	52.6	76	23.1
Scaphoid Interspacer	21	33.9	41	66.1	62	18.8
Primary Partial	155	47.1	174	52.9	329	100.0
Primary Total	212	48.3	227	51.7	439	100.0
Revision	72	62.1	44	37.9	116	100.0
TOTAL	439	49.7	445	50.3	884	100.0

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	4.9
Partial Ulnar	4	11.8	13	38.2	6	17.6	9	26.5	2	5.9	34	10.3
Partial DRUJ - Ulnar Only	36	25.5	34	24.1	45	31.9	23	16.3	3	2.1	141	42.9
DRUJ - Ulnar & Radial	26	34.2	25	32.9	16	21.1	8	10.5	1	1.3	76	23.1
Scaphoid Interspacer	29	46.8	12	19.4	14	22.6	6	9.7	1	1.6	62	18.8
Primary Partial	106	32.2	89	27.1	81	24.6	46	14.0	7	2.1	329	100.0
Primary Total	84	19.1	127	28.9	138	31.4	82	18.7	8	1.8	439	100.0
Revision	29	25.0	34	29.3	32	27.6	20	17.2	1	0.9	116	100.0
TOTAL	219	24.8	250	28.3	251	28.4	148	16.7	16	1.8	884	100.0

Table WG3 Age and Gender of Primary Wrist Replacement

Gender	Number	Percent	Minimum	Maximum	Median	Mean	Std Dev
Female	439	49.7%	21	88	64	62.7	13.5
Male	445	50.3%	18	90	62	61.1	14.2
TOTAL	884	100.0%	18	90	64	61.9	13.9

Figure WG1 Primary Wrist Replacement by Age and Gender

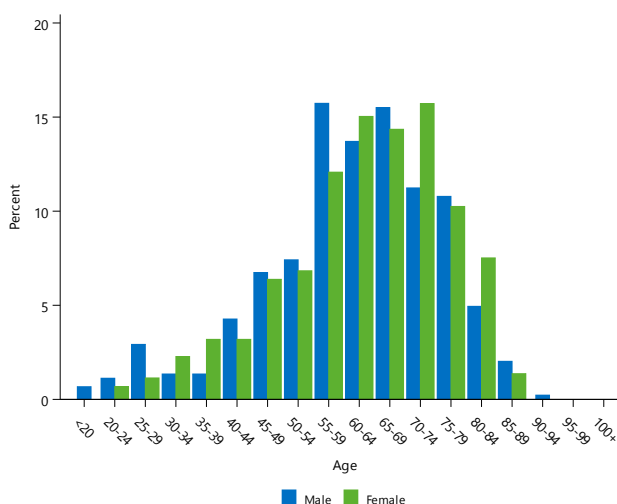


Table WG4 Cumulative Percent Revision of Primary Wrist Replacement by Class

Wrist Class	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	8 Yrs	11 Yrs	14 Yrs
Lunate	3	16	12.5 (3.3, 41.4)	22.2 (7.4, 55.8)	22.2 (7.4, 55.8)			
Partial Ulnar	1	34	2.9 (0.4, 19.1)	2.9 (0.4, 19.1)	2.9 (0.4, 19.1)	2.9 (0.4, 19.1)		
Partial DRUJ - Ulnar Only	12	141	3.7 (1.5, 8.6)	7.7 (4.2, 13.8)	8.6 (4.8, 15.0)	8.6 (4.8, 15.0)		
DRUJ - Ulnar & Radial	4	76	3.0 (0.8, 11.6)	7.4 (2.8, 19.0)	7.4 (2.8, 19.0)	7.4 (2.8, 19.0)		
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)		
Total Wrist	39	439	2.6 (1.4, 4.8)	8.4 (5.8, 12.1)	11.3 (8.0, 16.0)	15.3 (10.7, 21.7)		
TOTAL	61	768						

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	155	47.1%	21	88	63	61.5	14.5
Male	174	52.9%	18	88	61	57.7	16.3
TOTAL	329	100.0%	18	88	62	59.4	15.6

Figure WP1 Primary Partial Wrist Replacement by Age and Gender

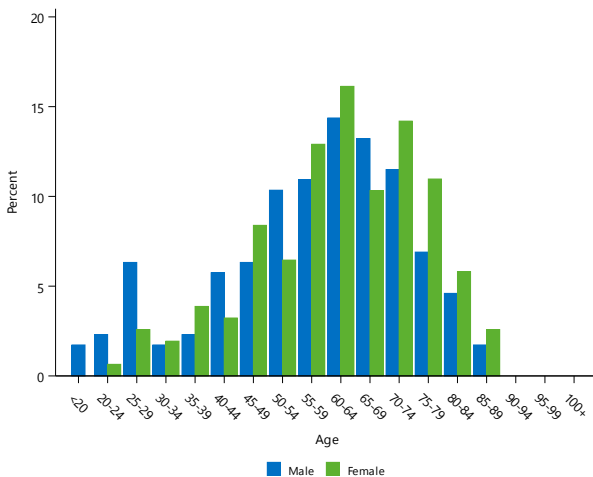


Table WP2 Primary Partial Wrist Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	227	69.0
Fracture/Dislocation	30	9.1
Rheumatoid Arthritis	29	8.8
Instability	15	4.6
Osteonecrosis	13	4.0
Other Inflammatory Arthritis	8	2.4
Tumour	1	0.3
Other	6	1.8
TOTAL	329	100.0

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
TOTAL	16	100.0%	19	61	31	38.1	15.7

Figure WP2 Primary Lunate Wrist Replacement by Age and Gender

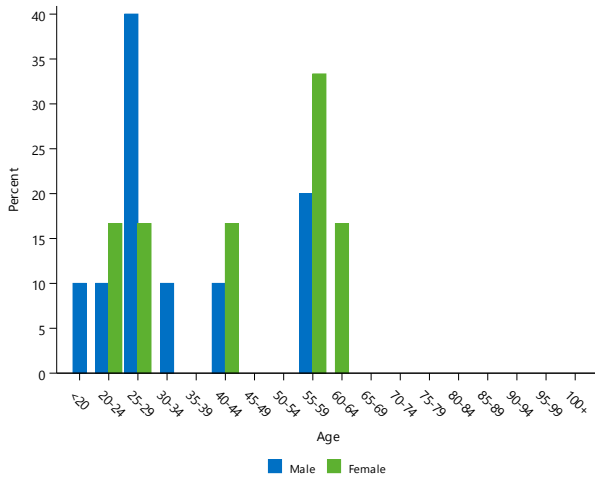


Table WP4 Primary Lunate Wrist Replacement by Primary Diagnosis

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

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	18	52.9%	35	85	63	63.9	15.4
Male	16	47.1%	49	86	66	68.1	9.7
TOTAL	34	100.0%	35	86	65	65.9	13.0

Figure WP3 Primary Partial Ulna Wrist Replacement by Age and Gender

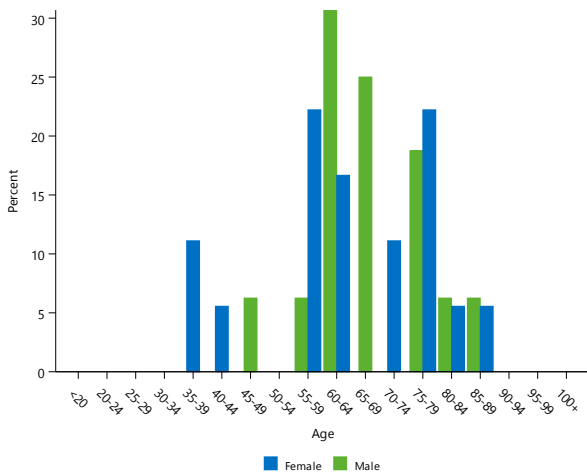


Table WP6 Primary Partial Ulna Wrist Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	24	70.6
Fracture/Dislocation	4	11.8
Rheumatoid Arthritis	3	8.8
Other Inflammatory Arthritis	2	5.9
Instability	1	2.9
TOTAL	34	100.0

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	74	52.5%	26	87	64	62.4	14.2
Male	67	47.5%	19	88	65	62.7	14.5
TOTAL	141	100.0%	19	88	65	62.5	14.3

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

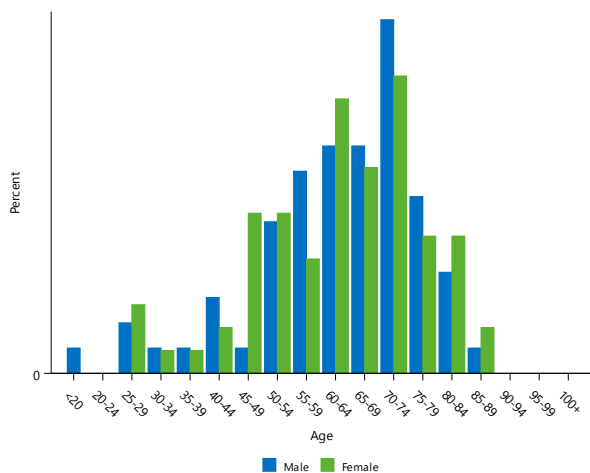


Table WP8 Primary DRUJ with Ulna Only Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	101	71.6
Rheumatoid Arthritis	18	12.8
Fracture/Dislocation	10	7.1
Instability	4	2.8
Other Inflammatory Arthritis	3	2.1
Tumour	1	0.7
Osteonecrosis	1	0.7
Other	3	2.1
TOTAL	141	100.0

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

2008		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
5	uHead	4	DRUJ (Ascension)	6	DRUJ (Ascension)	6	Herbert UHP	4	DRUJ (Ascension)
2	Eclipse	2	Eclipse	4	Herbert UHP	3	DRUJ (Ascension)	2	Herbert UHP
2	Herbert UHP	2	Herbert UHP					1	Eclipse
1	E-Centrix								
Most Used									
10	(4) 100.0%	8	(3) 100.0%	10	(2) 100.0%	9	(2) 100.0%	7	(3) 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	36	47.4%	31	81	60	59.3	13.0
Male	40	52.6%	39	87	61	60.1	11.6
TOTAL	76	100.0%	31	87	61	59.7	12.2

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

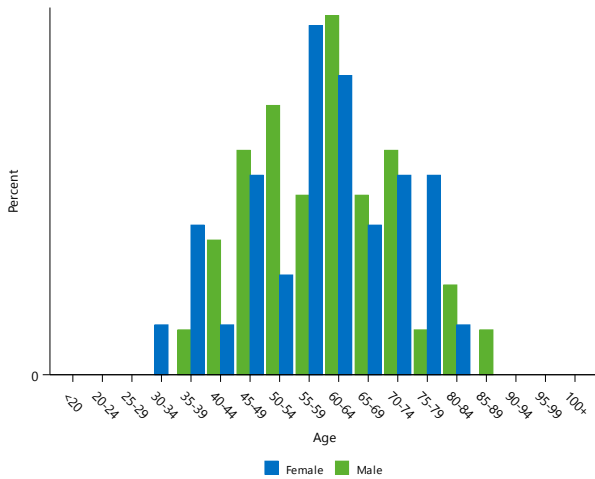


Table WP11 Primary DRUJ with Ulna and Radial Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	57	75.0
Instability	9	11.8
Rheumatoid Arthritis	4	5.3
Fracture/Dislocation	3	3.9
Other	3	3.9
TOTAL	76	100.0

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	33.9%	31	88	66	64.7	13.5
Male	41	66.1%	18	80	50	48.7	16.9
TOTAL	62	100.0%	18	88	58	54.1	17.5

Figure WP6 Primary Scaphoid Interspace Replacement by Age and Gender

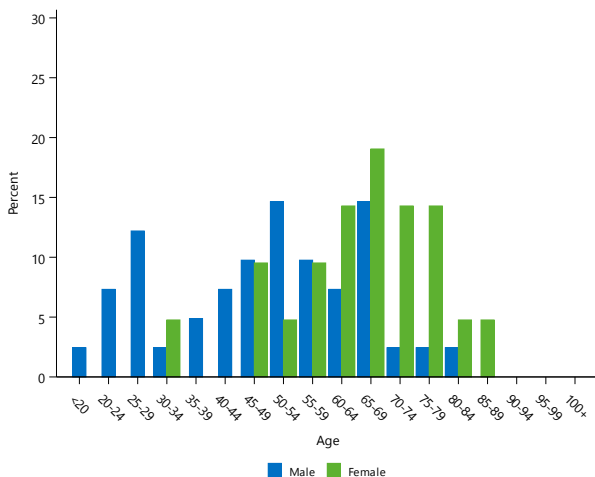


Table WP13 Primary Scaphoid Interspace Replacement by Primary Diagnosis

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
TOTAL	62	100.0

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	212	48.3%	22	87	65	63.6	12.6
Male	227	51.7%	29	90	65	64.2	11.4
TOTAL	439	100.0%	22	90	65	63.9	12.0

Figure WT1 Primary Total Wrist Replacement by Age and Gender

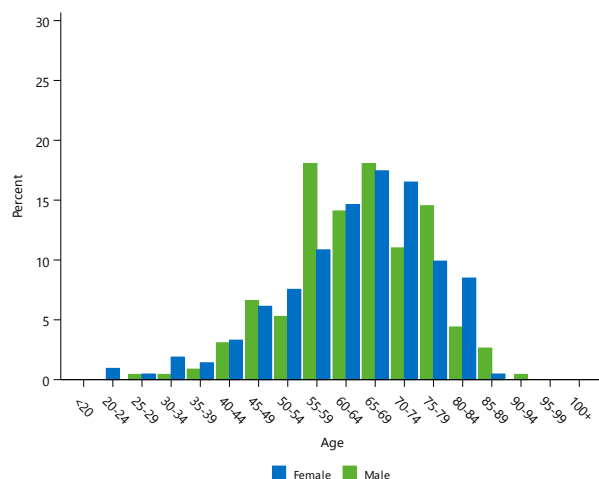


Table WT2 Primary Total Wrist Replacement by Primary Diagnosis

Primary Diagnosis	Number	Percent
Osteoarthritis	319	72.7
Rheumatoid Arthritis	70	15.9
Fracture/Dislocation	14	3.2
Osteonecrosis	11	2.5
Instability	11	2.5
Other Inflammatory Arthritis	9	2.1
Other	5	1.1
TOTAL	439	100.0

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

2008		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
10	Re-Motion	45	Motec	60	Motec	59	Motec	76	Motec
3	Universal 2	2	Universal 2	4	Freedom	7	Universal 2	1	Freedom
		1	Freedom	4	Universal 2	2	Freedom	1	Universal 2
		1	Re-Motion	3	Re-Motion				
Most Used									
13	(2) 100.0	49	(4) 100.0	71	(4) 100.0	68	(3) 100.0	78	(3) 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	44	37.9%	22	84	59	59.4	14.8
Female	72	62.1%	32	87	65	62.7	14.0
TOTAL	116	100.0%	22	87	64	61.4	14.3

Table WR2 Reason for Revision of All Revision Wrist Replacement

Reason for Revision	Number	Percent
Loosening	34	29.3
Pain	17	14.7
Instability	16	13.8
Infection	9	7.8
Lysis	8	6.9
Metal Related Pathology	4	3.4
Progression Of Disease	3	2.6
Prosthesis Dislocation	2	1.7
Implant Breakage Carpal	2	1.7
Incorrect Sizing	2	1.7
Contracture	1	0.9
Malposition	1	0.9
Implant Breakage Wrist Plate	1	0.9
Implant Breakage Ulna	1	0.9
Arthrofibrosis	1	0.9
Flexion Deformity	1	0.9
Other	13	11.2
TOTAL	116	100.0

Table WR3 Type of Revision of All Revision Wrist Replacement

Type of Revision	Number	Percent
Removal of Prostheses	21	18.1
Ulna Component	13	11.2
Sigmoid Notch	11	9.5
Carpal/Radius	10	8.6
Carpal Component	10	8.6
Minor Components	10	8.6
Reoperation Fusion	9	7.8
Ulna Head Only	8	6.9
Carpal Head/Radial Cup	8	6.9
Carpal Insert	5	4.3
Cement Spacer	3	2.6
Radius Component	3	2.6
Sigmoid Notch/Ulna	2	1.7
Carpal Head	2	1.7
Radial Cup	1	0.9
TOTAL	116	100.0

List of Tables

ELBOW REPLACEMENT	7
Demographics	8
Table EG1 Number of Elbow Replacements by Gender	8
Table EG2 Number of Elbow Replacements by Age	8
Table EG3 Time between Procedures for Bilateral Primary Elbow Replacement	8
Table EG4 Age and Gender of All Elbow Replacement	9
Table EG5 Cumulative Percent Revision of Primary Elbow Replacement by Elbow Class.....	9
Primary Partial Elbow Replacement	10
Table EP1 Age and Gender of Primary Partial Elbow Replacement	10
Table EP2 Primary Partial Elbow Replacement by Primary Diagnosis.....	10
Table EP3 Age and Gender of Primary Radial Elbow Replacement	11
Table EP4 Primary Radial Elbow Replacement by Primary Diagnosis	11
Table EP5 Most Used Radial Head/Stem Prostheses in Primary Radial Elbow Replacement	11
Table EP6 Age and Gender of Primary Uni Humeral Elbow Replacement.....	12
Table EP7 Primary Uni Humeral Elbow Replacement by Primary Diagnosis.....	12
Table EP8 Age and Gender of Primary Uni Humeral with Radial Elbow Replacement	13
Table EP9 Primary Uni Humeral with Radial Elbow Replacement by Primary Diagnosis	13
Table EP10 Age and Gender of Primary Humeral Hemiarthroplasty Elbow Replacement	14
Table EP11 Primary Humeral Hemiarthroplasty Elbow Replacement by Primary Diagnosis	14
Table EP12 Most Used Humeral Prostheses in Primary Humeral Hemiarthroplasty Elbow Replacement	14
Primary Total Elbow Replacement	15
Table ET1 Age and Gender of Primary Total Elbow Replacement	15
Table ET2 Age and Gender of Primary Total Elbow without Radial Replacement.....	16
Table ET3 Primary Total Elbow without Radial Replacement by Primary Diagnosis.....	16
Table ET4 Most Used Humeral Prostheses in Primary Total Elbow without Radial Replacement.....	16
Table ET5 CPR of Primary Total Elbow without Radial Replacement by Humeral Prostheses (Fracture/Dislocation)	17
Table ET6 CPR of Primary Total Elbow without Radial Replacement by Humeral Prostheses (Osteoarthritis).....	17
Table ET7 CPR of Primary Total Elbow without Radial Replacement by Humeral Prostheses (Rheumatoid Arthritis).....	17
Table ET8 Age and Gender of Primary Total Elbow with Radial Replacement	18
Table ET9 Primary Total Elbow with Radial Replacement by Primary Diagnosis	18
Table ET10 Most Used Radial Head/Humeral Prostheses in Primary Total Elbow with Radial Replacement	18
Revision Elbow Replacement	19
Table ER1 Age and Gender of All Revision Elbow Replacement	19
Table ER2 Reason for Revision of All Revision Elbow Replacement.....	19
Table ER3 Type of Revision of All Revision Elbow Replacement	19
WRIST REPLACEMENT	20
Demographics	21
Table WG1 Number of Wrist Replacements by Gender.....	21
Table WG2 Number of Wrist Replacements by Age.....	21
Table WG3 Age and Gender of Primary Wrist Replacement	21
Table WG4 Cumulative Percent Revision of Primary Wrist Replacement by Class	22
Primary Partial Wrist Replacement	23
Table WP1 Age and Gender of Primary Partial Wrist Replacement	23
Table WP2 Primary Partial Wrist Replacement by Primary Diagnosis	23
Table WP3 Age and Gender of Primary Lunate Wrist Replacement.....	24
Table WP4 Primary Lunate Wrist Replacement by Primary Diagnosis.....	24
Table WP5 Age and Gender of Primary Partial Ulna Wrist Replacement	24
Table WP6 Primary Partial Ulna Wrist Replacement by Primary Diagnosis.....	24
Table WP7 Age and Gender of Primary DRUJ with Ulna Only Replacement	25
Table WP8 Primary DRUJ with Ulna Only Replacement by Primary Diagnosis	25
Table WP9 Most Used Ulna Prostheses in Primary DRUJ with Ulna Only Replacement	25
Table WP10 Age and Gender of Primary DRUJ with Ulna and Radial Replacement.....	26
Table WP11 Primary DRUJ with Ulna and Radial Replacement by Primary Diagnosis.....	26
Table WP12 Age and Gender of Primary Scaphoid Interspacer Replacement.....	26
Table WP13 Primary Scaphoid Interspacer Replacement by Primary Diagnosis	26
Primary Total Wrist Replacement	27
Table WT1 Age and Gender of Primary Total Wrist Replacement	27
Table WT2 Primary Total Wrist Replacement by Primary Diagnosis	27
Table WT3 Most Used Carpal/Radial Prostheses in Primary Total Wrist Replacement	27
Revision Wrist Replacement	28
Table WR1 Age and Gender of All Revision Wrist Replacement	28
Table WR2 Reason for Revision of All Revision Wrist Replacement	28
Table WR3 Type of Revision of All Revision Wrist Replacement.....	28

List of Figures

ELBOW REPLACEMENT	7
Demographics	8
Figure EG1 Elbow Replacement by Age and Gender.....	9
Primary Partial Elbow Replacement	10
Figure EP1 Primary Partial Elbow Replacement by Age and Gender.....	10
Figure EP2 Primary Radial Elbow Replacement by Age and Gender.....	11
Figure EP3 Primary Humeral Elbow Replacement by Age and Gender.....	12
Figure EP4 Primary Uni Humeral with Radial Elbow Replacement by Age and Gender.....	13
Figure EP5 Primary Humeral Hemiarthroplasty Elbow Replacement by Age and Gender.....	14
Primary Total Elbow Replacement	15
Figure ET1 Primary Total Elbow Replacement by Age and Gender.....	15
Figure ET2 Primary Total Elbow Replacement by Primary Diagnosis.....	15
Figure ET3 Primary Total Elbow without Radial Replacement by Age and Gender.....	16
Figure ET4 Primary Total Elbow with Radial Replacement by Age and Gender.....	18
Revision Elbow Replacement	19
WRIST REPLACEMENT	20
Demographics	21
Figure WG1 Primary Wrist Replacement by Age and Gender.....	21
Primary Partial Wrist Replacement	23
Figure WP1 Primary Partial Wrist Replacement by Age and Gender.....	23
Figure WP2 Primary Lunate Wrist Replacement by Age and Gender.....	24
Figure WP3 Primary Partial Ulna Wrist Replacement by Age and Gender.....	24
Figure WP4 Primary DRUJ with Ulna Only Replacement by Age and Gender.....	25
Figure WP5 Primary DRUJ with Ulna and Radial Replacement by Age and Gender.....	26
Figure WP6 Primary Scaphoid Interspacer Replacement by Age and Gender.....	26
Primary Total Wrist Replacement	27
Figure WT1 Primary Total Wrist Replacement by Age and Gender.....	27