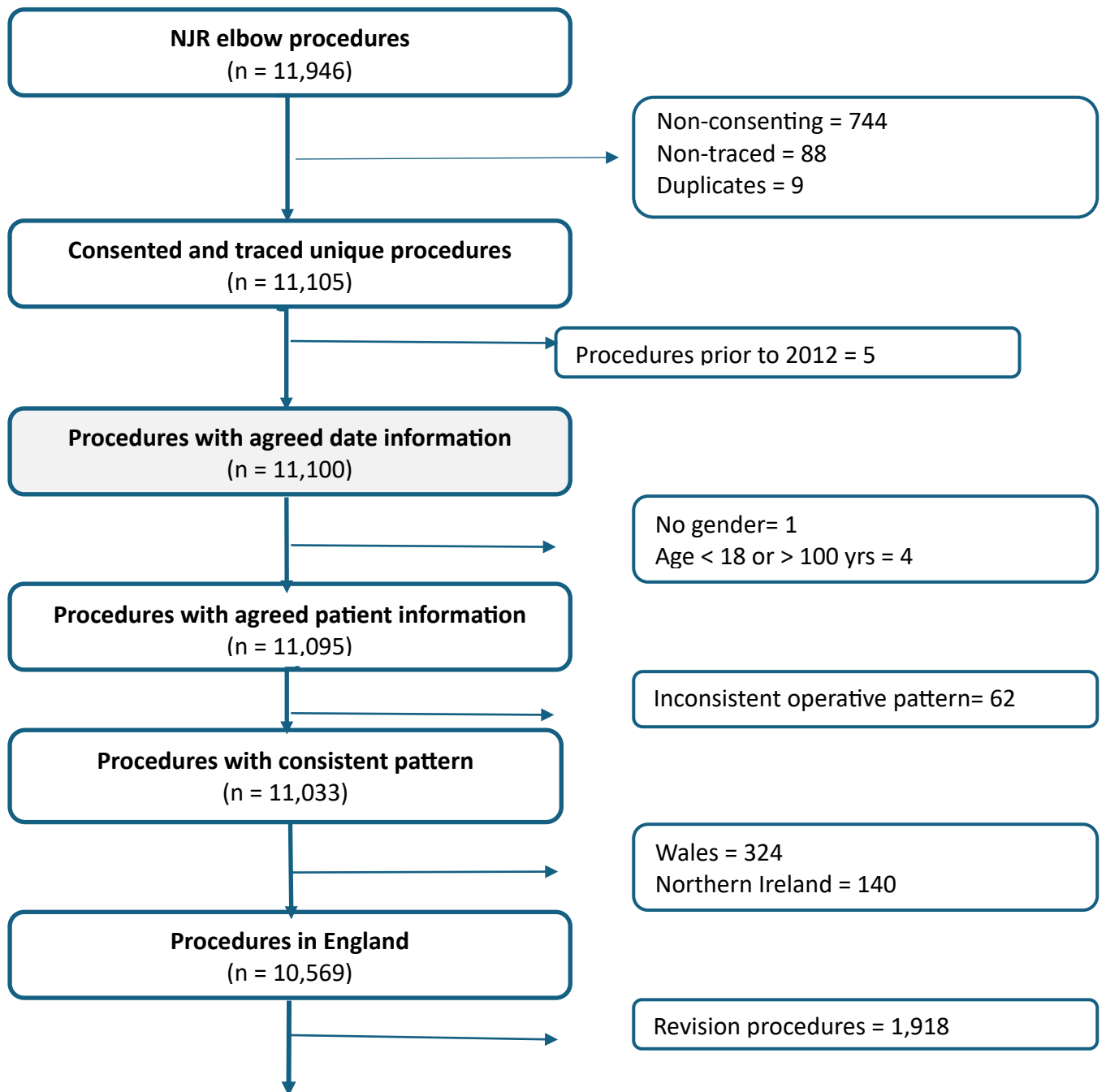


The Bone & Joint Journal

Supplementary Material

10.1302/0301-620X.106B11.BJJ-2024-0427.R1



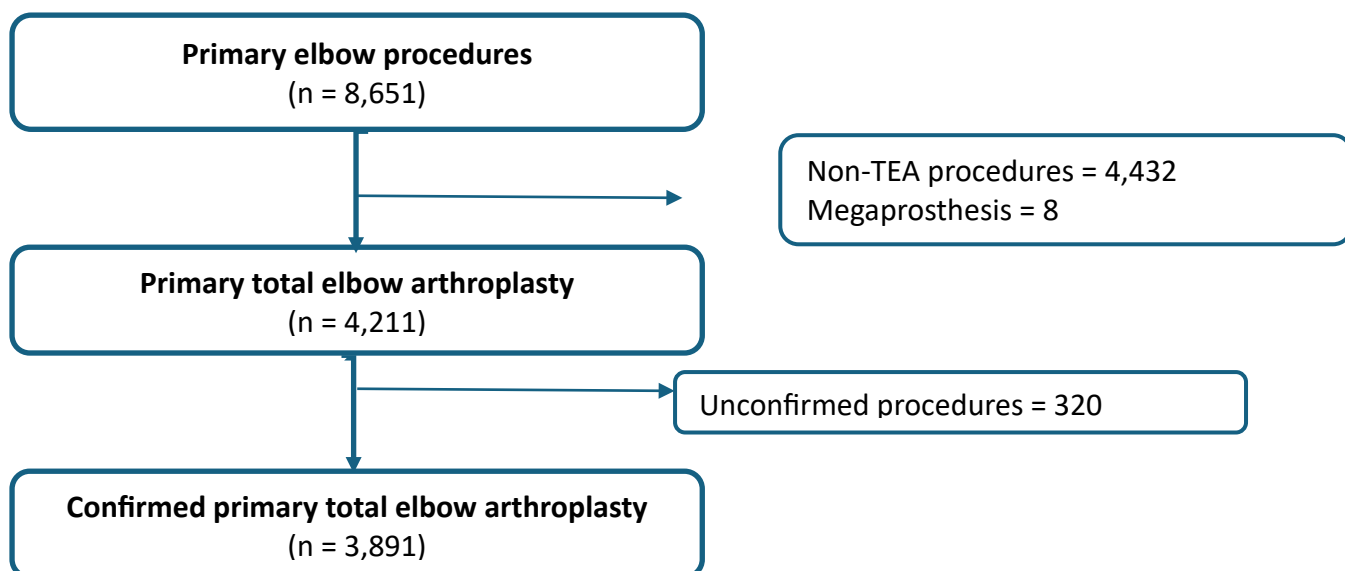


Fig a. Flow diagram showing the exact steps undertaken for the National Joint Registry (NJR) data preparation.

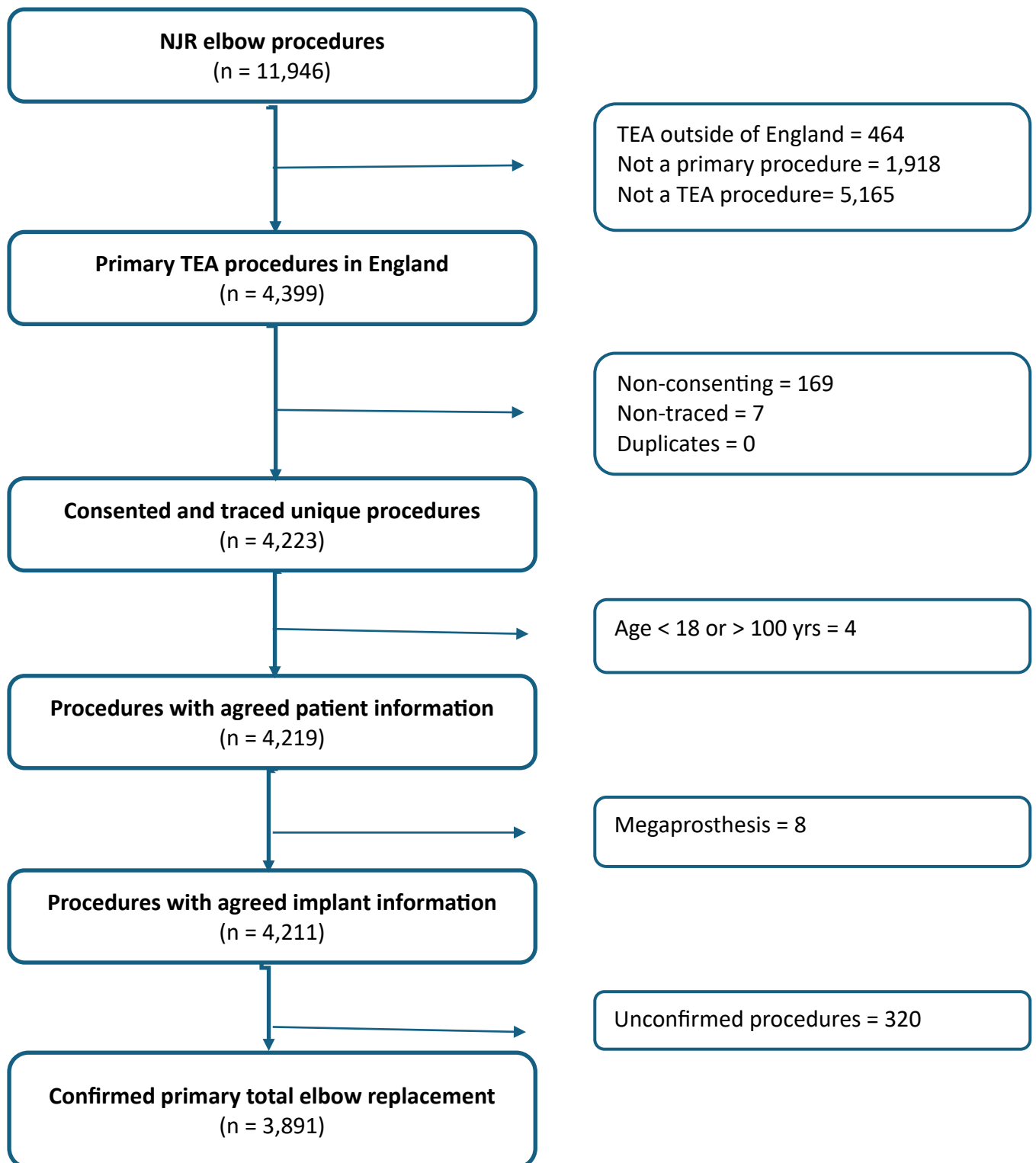


Fig b. A simplified flow diagram showing data preparation of the National Joint Registry (NJR) data. TEA, total elbow arthroplasty.

Table i. Sensitivity analysis of confirmed vs unconfirmed total elbow arthroplasty (TEA). In the unconfirmed group, there was a higher proportion of acute trauma procedures than in the confirmed TEA (43% vs 24% respectively). Most (71%) of unconfirmed procedures were performed before the National Joint Registry started collecting data of distal humeral hemiarthroplasty in 2018 and there were 88 (28%) unconfirmed Latitude elbow replacement with an anatomical spool submitted as part of the construct which is only used in distal humeral hemiarthroplasty. There were 36 (11%) unconfirmed procedures with no submitted components, 25 (8%) with radial head components only and the remaining 171 (53%) had a mix of components that did not match the procedure submitted.

Variable	Confirmed procedures	Unconfirmed procedures	Total	p-value
Procedures, n (%)	3,891 (92)	320 (8)	4,211 (100)	
Mean age at operation, yrs (SD)	70 (12.0)	68 (14.2)	69 (12.2)	0.081*
Sex, n (%)				0.685†
Female	2,878 (74)	240 (75)	3,118 (74)	
Male	1,013 (26)	80 (25)	1,093 (26)	
ASA grade, n (%)				0.492†
I	161 (4)	19 (6)	180 (4)	
II	2,177 (56)	176 (55)	2,353 (56)	
III	1,498 (39)	120 (38)	1,618 (38)	
IV	55 (1)	5 (2)	60 (1)	
Indication for surgery, n (%)				< 0.001†
Acute trauma	947 (24)	138 (43)	1,085 (26)	
Trauma sequelae	527 (14)	37 (12)	564 (13)	
Inflammatory	1,378 (35)	69 (22)	1,447 (34)	
Osteoarthritis	928 (24)	58 (18)	986 (23)	
Other	111 (3)	18 (6)	129 (3)	
Indication trauma/elective, n (%)				< 0.001†
Elective	2,944 (76)	182 (57)	3,126 (74)	
Acute trauma	947 (24)	138 (43)	1,085 (26)	
IMD quintiles, n (%)				0.292†
1 (Most deprived areas)	695 (18)	69 (22)	764 (18)	
2	709 (18)	55 (18)	764 (18)	
3	801 (21)	59 (18)	860 (20)	
4	855 (22)	60 (19)	915 (22)	
5 (Least deprived areas)	794 (20)	75 (23)	869 (21)	
Missing	37 (1)	< 4 (< 1)	39 (1)	
Funding, n (%)				0.090†
NHS	3,747 (96)	314 (98)	4,061 (96)	
Independent sector	144 (4)	6 (2)	150 (4)	

*Independent-samples *t*-test.

†Chi-squared test

ASA, American Society of Anesthesiologists; IMD, Index of Multiple Deprivation.

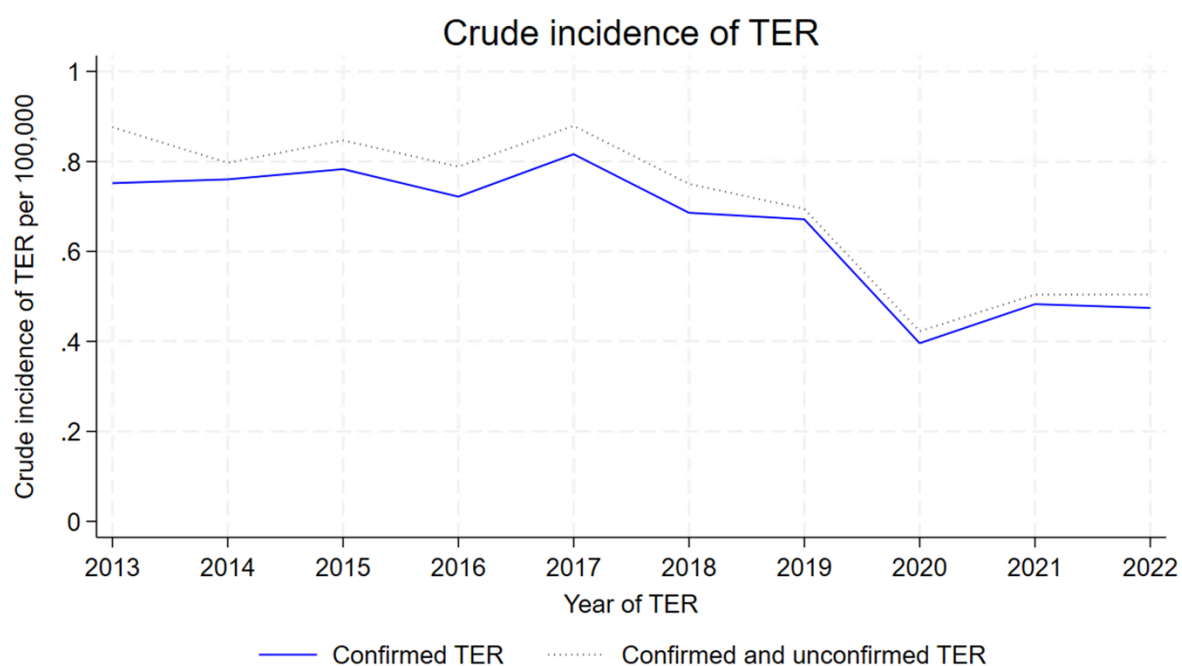


Fig c. Crude incidence of total elbow replacement (TER).

Table ii. Rates of total elbow arthroplasty for different Index of Multiple Deprivation groups.

Year	Crude rate					Age and sex standardized rates				
	IMD 1	IMD 2	IMD 3	IMD 4	IMD 5	IMD 1	IMD 2	IMD 3	IMD 4	IMD5
2013	0.89	0.80	0.97	1.07	1.14	1.10	0.88	0.92	1.04	1.00
2014	0.99	0.72	1.00	1.14	1.08	1.21	0.86	0.98	1.08	1.00
2015	1.08	0.75	1.14	1.11	0.97	1.30	0.89	1.10	1.04	0.84
2016	0.90	0.89	0.97	1.09	0.85	1.10	1.05	0.96	1.00	0.74
2017	1.01	1.15	0.85	1.22	1.05	1.24	1.35	0.78	1.08	0.95
2018	0.75	0.81	0.88	0.90	1.12	0.96	0.93	0.84	0.80	0.94
2019	0.92	0.87	0.83	0.92	0.85	1.12	1.06	0.79	0.80	0.75
2020	0.34	0.54	0.59	0.53	0.57	0.37	0.61	0.47	0.44	0.50
2021	0.54	0.64	0.67	0.65	0.65	0.69	0.71	0.63	0.55	0.48
2022	0.59	0.55	0.59	0.71	0.67	0.66	0.61	0.52	0.63	0.54

IMD, indices of multiple deprivation.

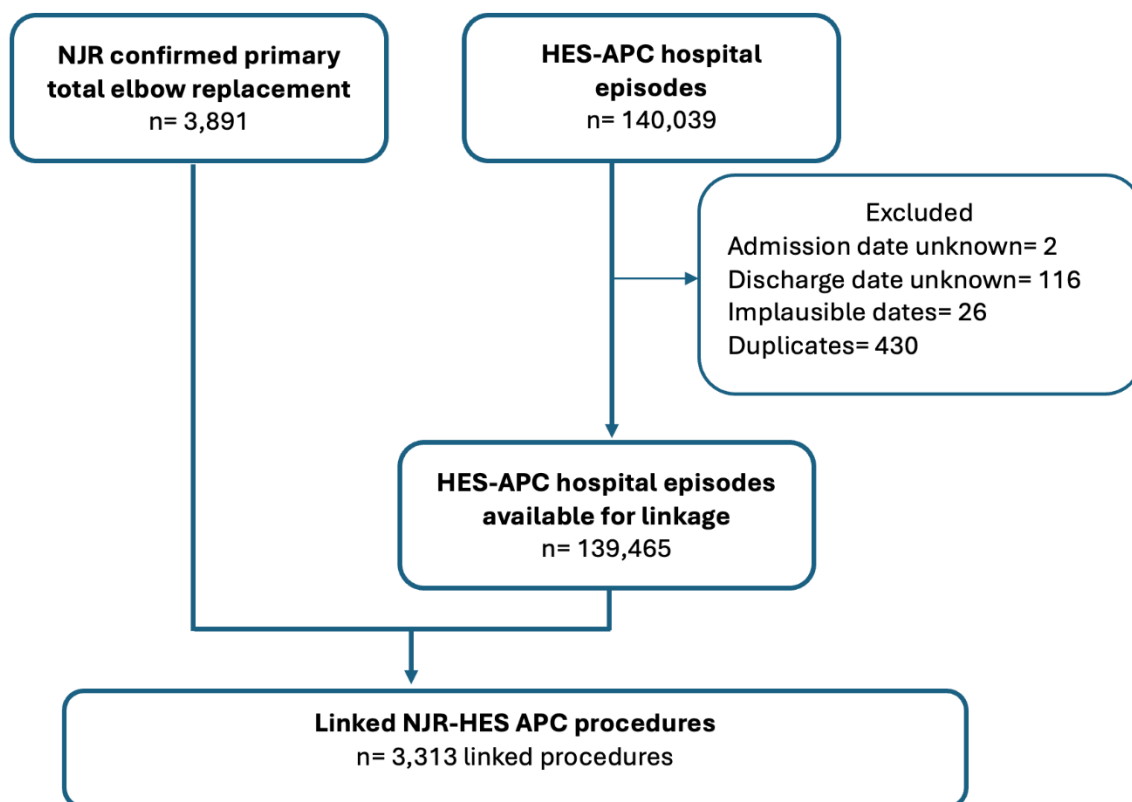


Fig d. Flow diagram for the linked National Joint Registry (NJR) and NHS England Hospital Episode Statistics-Admitted Patient Care (HES-APC). A total of 578 total elbow arthroplasties (TEAs) were not linked, with 204 (35%) being performed after 31 March 2022 - the end date for available HES-APC data. Additionally, the independent sector funded 144 (25%) TEAs, and these data are not included in the HES-APC dataset.

Table iii. Sensitivity analysis of linked National Joint Registry (NJR) and NHS England Hospital Episode Statistics-Admitted Patient Care data vs unlinked NJR data.

Variable	Linked	Unlinked	Total	p-value
Procedures, n (%)	3,313 (85)	578 (15)	3,891 (100)	
Mean age at operation, yrs (SD)	70 (12.1)	70 (12.1)	70 (12.1)	0.700*
Sex, n (%)				0.337†
Female	2,466 (74)	412 (75)	2,878 (74)	
Male	874 (26)	139 (25)	1,013 (26)	
ASA grade, n (%)				0.427†
I	135 (4)	26 (5)	161 (4)	
II	1,866 (56)	311 (56)	2,177 (56)	
III	1,287 (39)	211 (38)	1,498 (39)	
IV	51 (1)	4 (1)	55 (1)	
Indication for surgery, n (%)				< 0.120†
Acute trauma	947 (25)	122 (21)	947 (24)	
Trauma sequelae	527 (13)	93 (16)	527 (14)	
Inflammatory	1,378 (35)	216 (37)	1,378 (35)	
Osteoarthritis	928 (24)	131 (23)	928 (24)	
Other	111 (3)	16 (3)	111 (3)	
IMD quintiles, n (%)				0.008†
1 (Most deprived areas)	617 (19)	78 (13)	695 (18)	
2	615 (19)	94 (16)	709 (18)	
3	672 (20)	129 (22)	801 (21)	
4	709 (21)	146 (25)	855 (22)	
5 (Least deprived areas)	667 (20)	127 (22)	794 (20)	
Missing	33 (1)	4 (1)	37 (1)	
Funding, n (%)				< 0.001†
NHS	3,169 (96)	578 (98)	3,747 (96)	
Independent sector	144 (4)	0 (2)	144 (4)	
90-day mortality, n (%)	24 (1)	3 (1)	27 (1)	0.487

*Independent-samples *t*-test.

†Chi-squared test.

ASA, American Society of Anesthesiologists; IMD, Index of Multiple Deprivation.

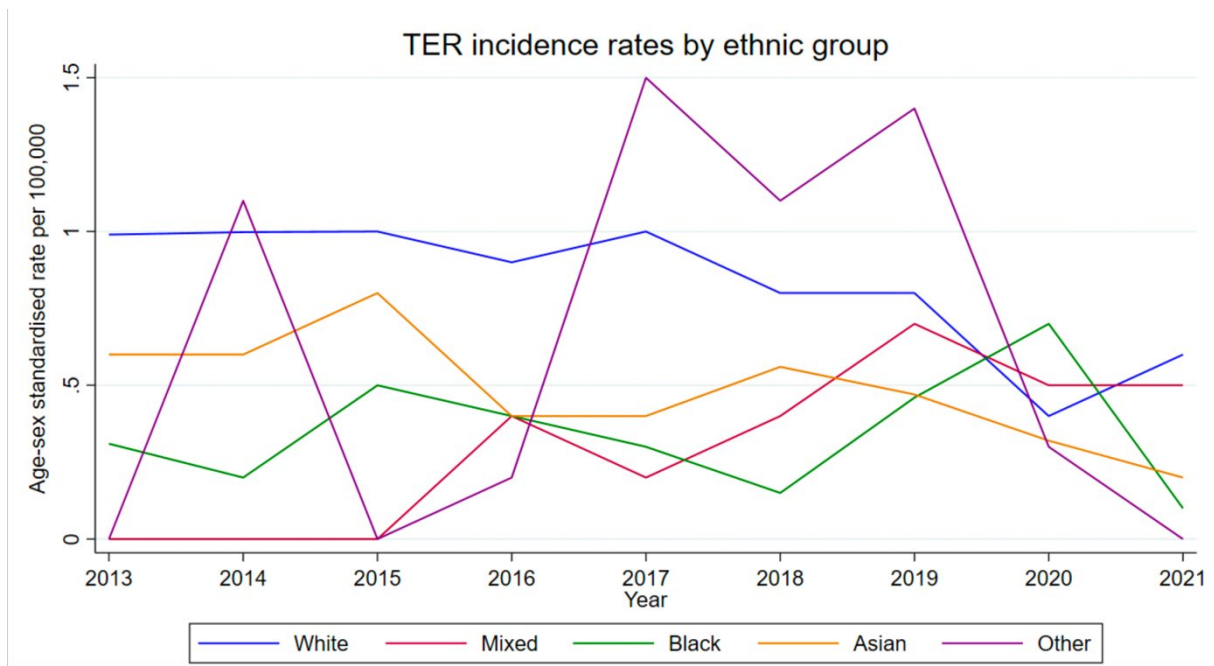


Fig e. Total elbow replacement (TER) rates by ethnic group.

Table iv. Sex-age standardized total elbow arthroplasty incidence rates per different ethnic groups.

Year	White	Mixed	Black	Asian	Other
2013	1.0	0	0.3	0.6	0
2014	1.0	0	0.2	0.6	1.1
2015	1.0	0	0.5	0.8	0
2016	0.9	0.4	0.4	0.4	0.2
2017	1.0	0.2	0.3	0.4	1.5
2018	0.8	0.4	0.2	0.6	1.1
2019	0.8	0.7	0.5	0.5	1.4
2020	0.4	0.5	0.1	0.5	0.3
2021	0.6	0.5	0.1	0.2	0

Table v. Comorbidities.

Comorbidity	Elective	Acute trauma	Total
Patients, n	2,488	825	3,313
Acute myocardial infarction	162 (7)	75 (9)	237 (7)
Anxiety	176 (7)	56 (7)	232 (7)
Cancer	287 (12)	150 (18)	437 (13)
Cerebral vascular accident	141 (6)	74 (9)	215 (6)
Congestive heart failure	88 (4)	70 (8)	158 (5)
Inflammatory arthritis and connective tissue disorder	1,443 (58)	157 (19)	1,600 (48)
Dementia	30 (1)	21 (3)	51 (2)
Depression	315 (13)	84 (10)	399 (12)
Diabetes	322 (13)	131 (16)	453 (14)
Diabetes complications	35 (1)	12 (1)	47 (1)
Hemiplegia or paraplegia	27 (1)	14 (2)	41 (1)
HIV	0	0	0
Metastatic cancer	5 (< 1)	22 (3)	57 (2)
Mild liver disease	10 (< 1)	4 (< 1)	14 (< 1)
Moderate/severe liver disease	35 (1)	3 (< 1)	8 (< 1)
Osteoporosis	467 (19)	196 (24)	663 (20)
Peptic ulcer	146 (6)	29 (4)	175 (5)
Peripheral vascular disease	108 (4)	40 (5)	148 (4)
Pulmonary disease	667 (27)	198 (24)	865 (26)
Renal disease	267 (11)	104 (13)	371 (11)

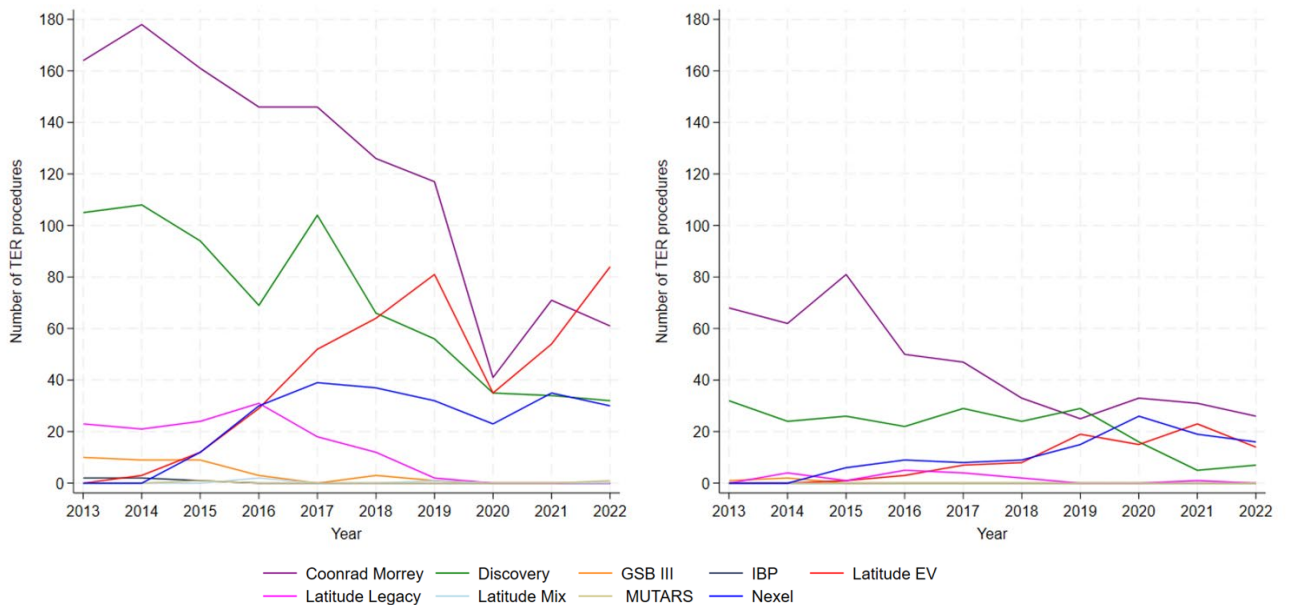


Fig f. The number of annual total elbow replacements (TER) by different implant brands.

Table viii. The duration of wait for elective total elbow arthroplasties for the entire study period per Index of Multiple Deprivation groups.

IMD quintiles	Median duration of elective wait in days (IQR)
1 (most deprived areas)	106 (67 to 179)
2	111 (55 to 174)
3	103 (60 to 158)
4	105 (64 to 174)
5 (least deprived areas)	100 (58 to 152)

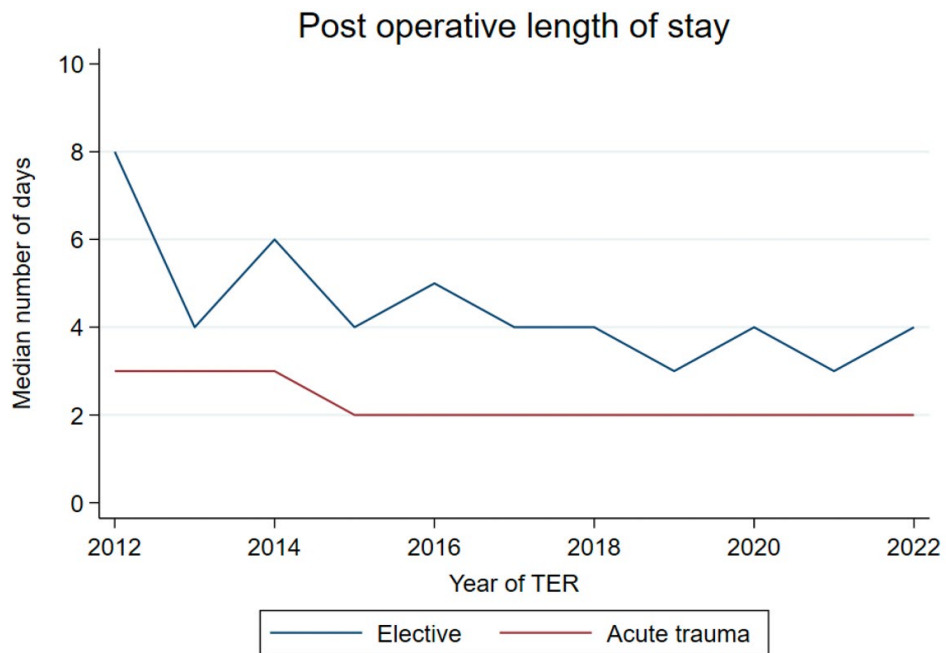


Fig g. Postoperative length of stay. TER, total elbow replacement.

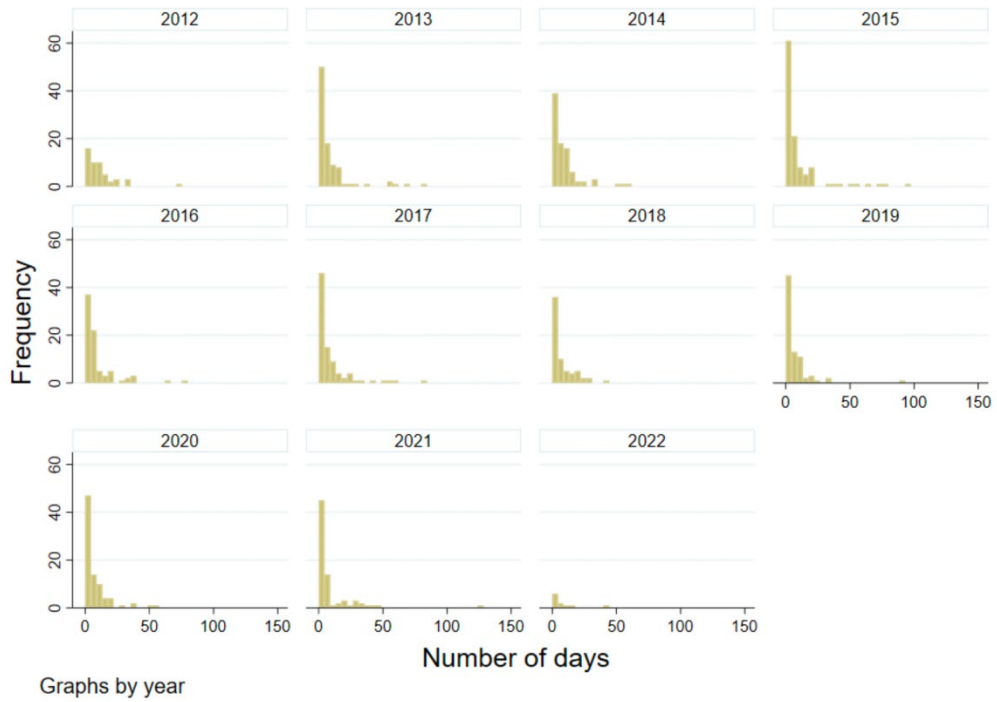


Fig h. Postoperative length of stay per year for acute trauma total elbow arthroplasties.

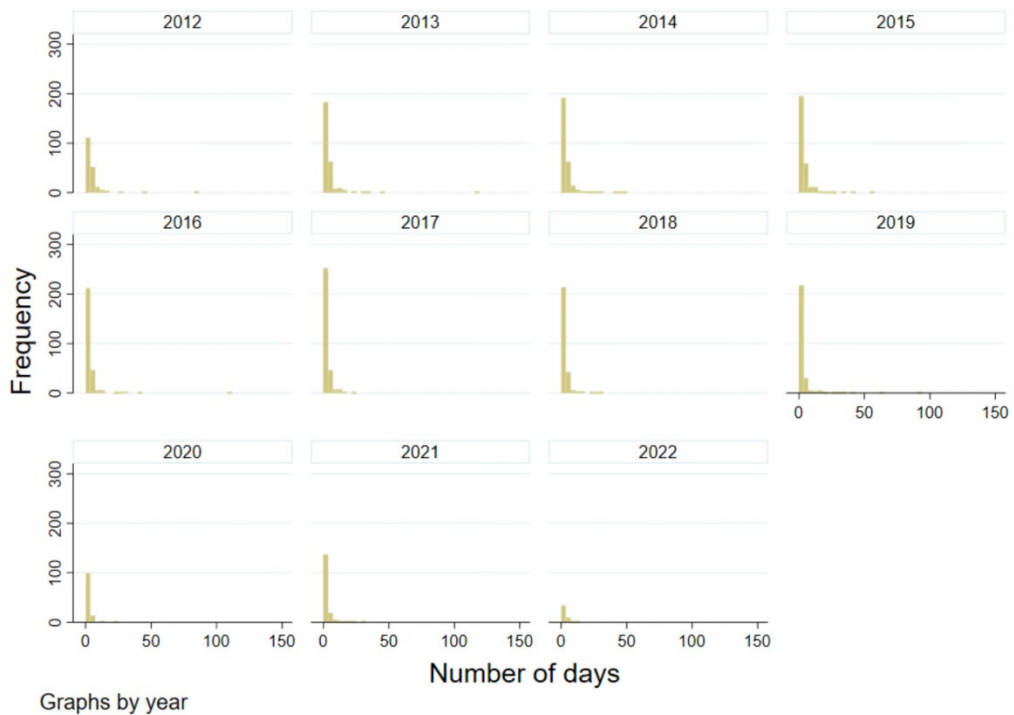


Fig i. Postoperative length of stay per year for elective total elbow arthroplasties.

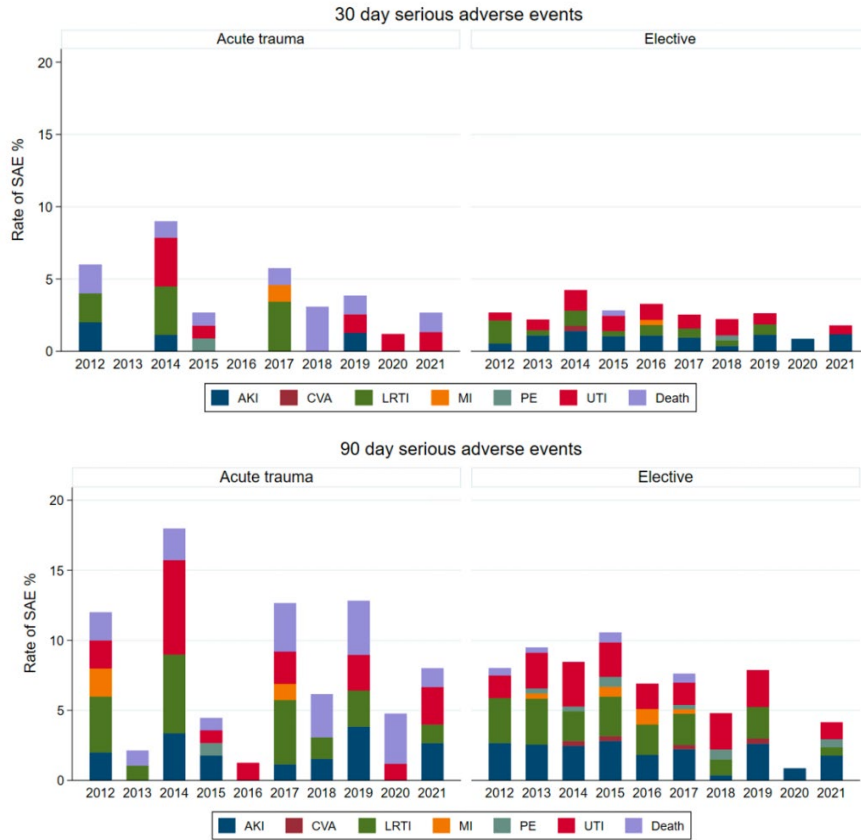


Fig j. 30- and 90-day serious adverse events. AKI, acute kidney injury; CVA, cerebrovascular accident; LRTI, lower respiratory tract infection; MI, myocardial infarction; PE, pulmonary embolism; UTI, urinary tract infection.

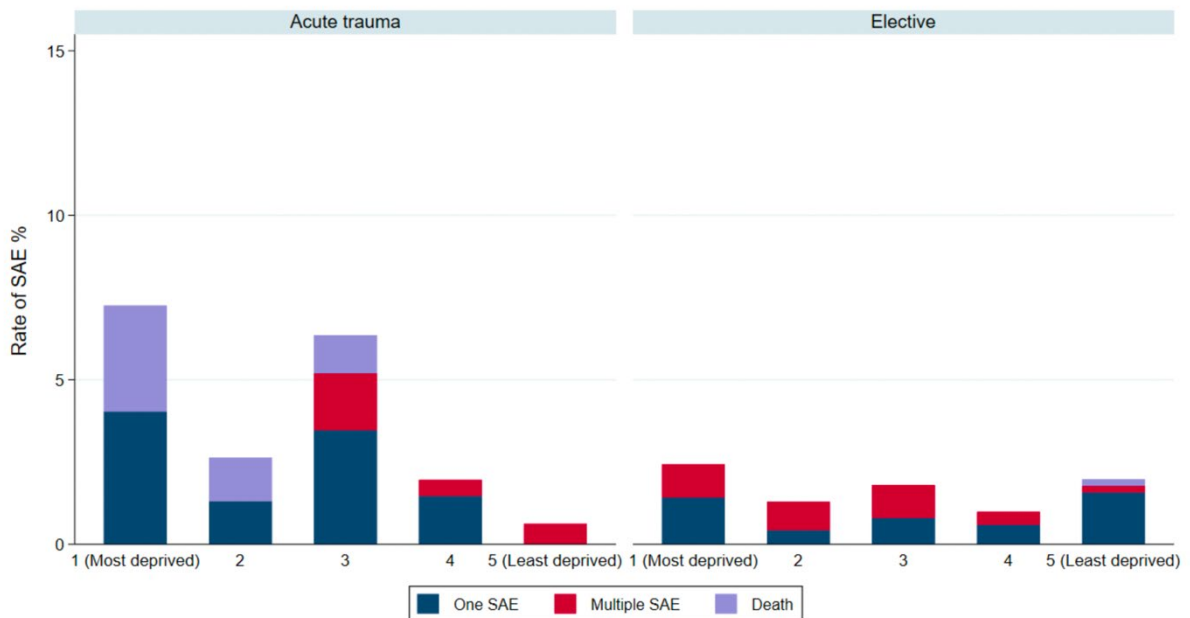


Fig k. Rate of 30-day serious adverse events (SAEs) per Index of Multiple Deprivation groups.

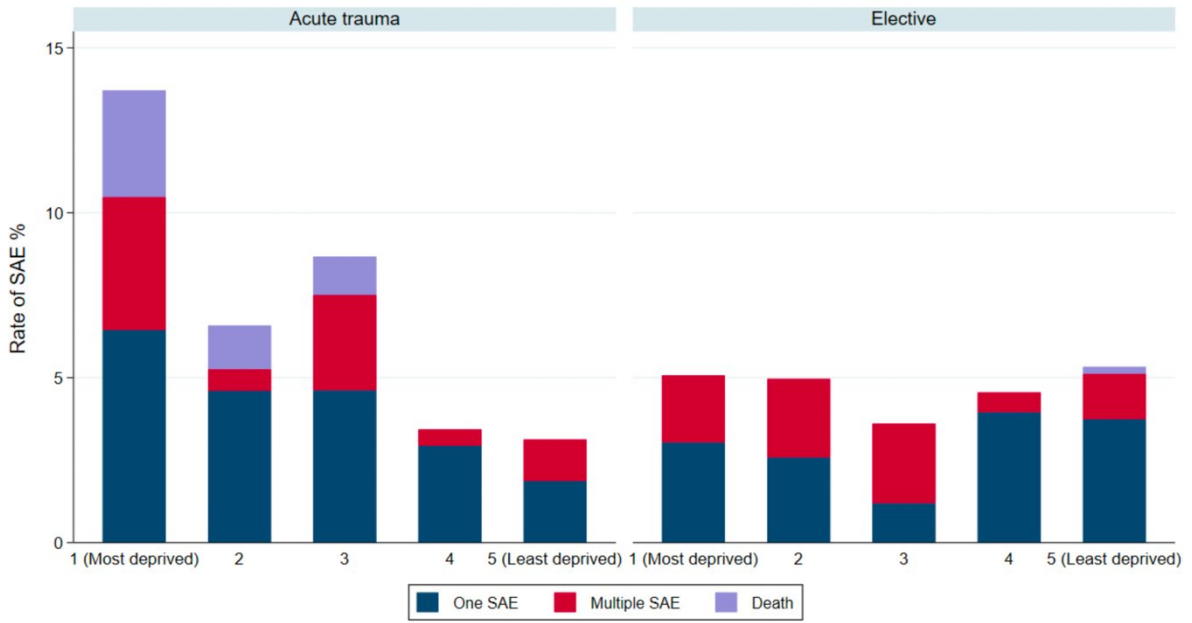


Fig I. Rate of 90-day serious adverse events (SAEs) per Index of Multiple Deprivation groups.