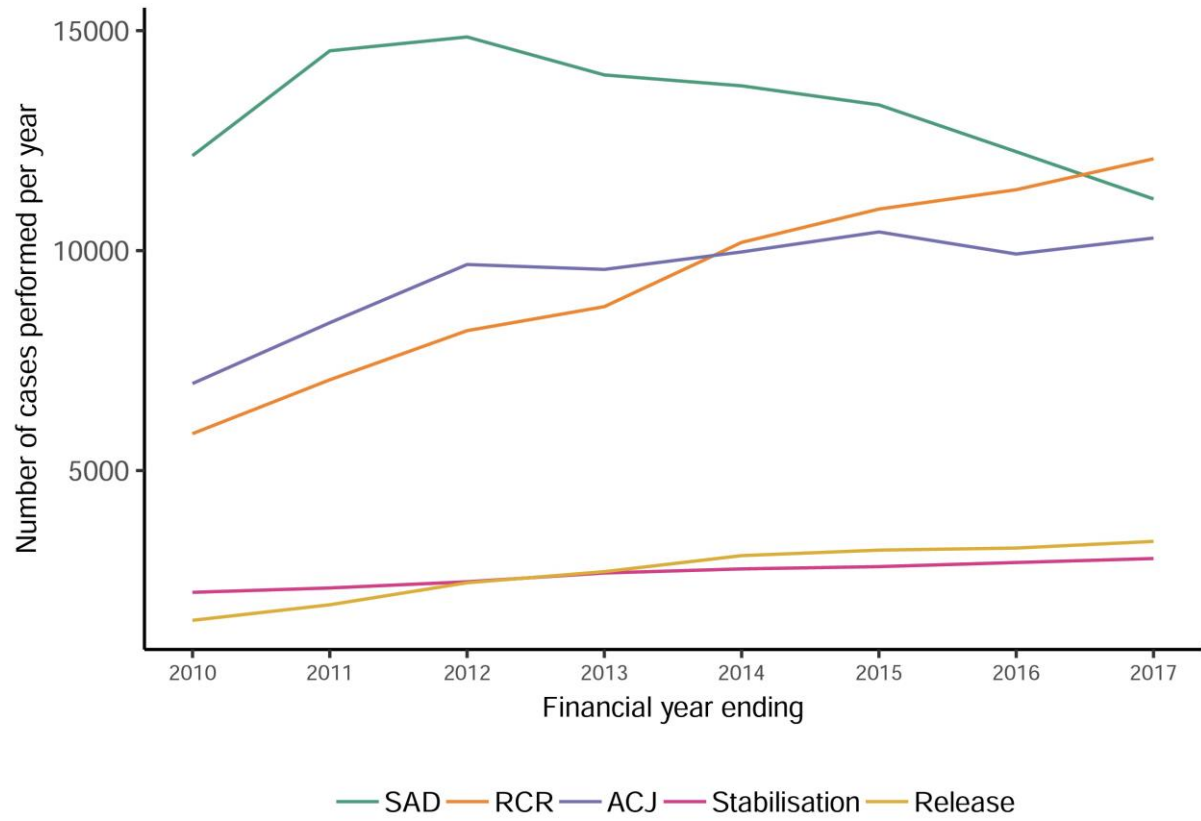


Supplementary materials

Supplementary figure 1: Number of arthroscopic shoulder procedures performed per financial year 2010 to 2017



Risk of any adverse events within 30 days – regression

Outcome: Any adverse event including reoperation

Variables: Age, procedure type, sex, grouped Charlson index

Sample size: 288 250

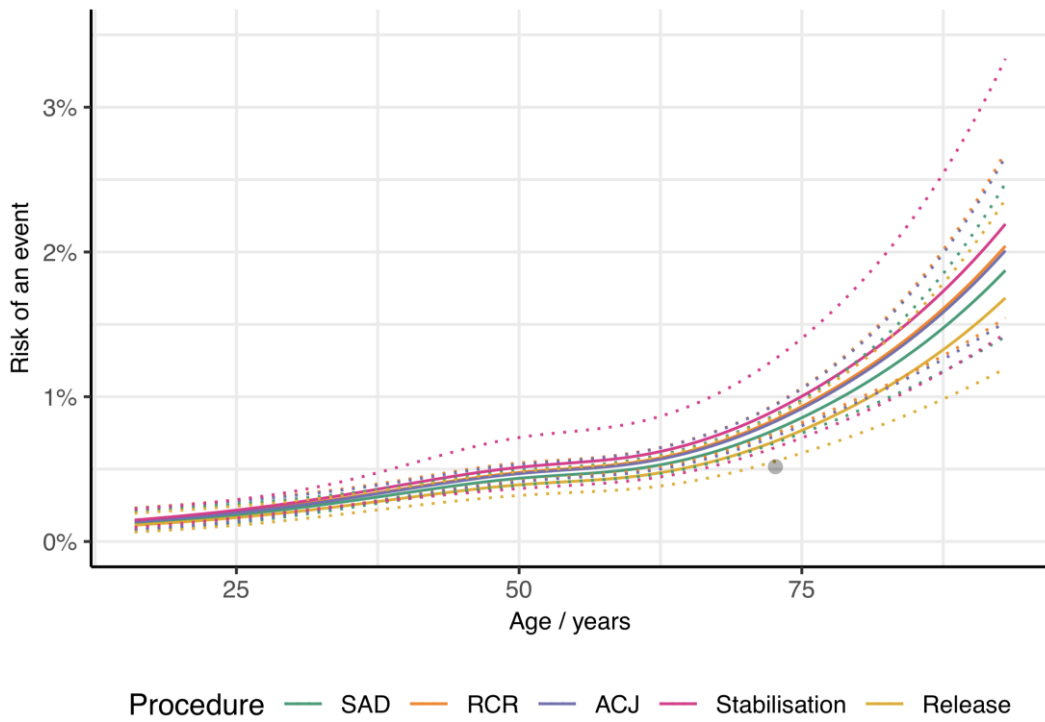
Events: 1782

Degrees of freedom in final model: 10

Age was modelled with splines. Knots at 28, 50, 60 and 75 years. Non-linear effects of age were significant and preserved. There was no significant interaction between age and procedure type. Inclusion of ethnic origin and IMD did not significantly alter the coefficients and did not improve the models (Likelihood ratio test Chi-squared 10.047 on 6 degrees of freedom, $p=0.123$).

Supplementary table 1: Coefficients from regression for any adverse event within 30 days

Variable	Odds ratio (95% CI)
Age (46 vs 64 years)	1.38 (1.20 to 1.58)
SAD	Reference
RCR	1.09 (0.97 to 1.23)
ACJ	1.07 (0.95 to 1.21)
Stabilisation	1.17 (0.85 to 1.63)
Release	0.90 (0.73 to 1.10)
Male	Reference
Female	0.73 (0.66 to 0.80)
Charlson 0	Reference
Charlson 1	1.59 (1.42 to 1.78)
Charlson 2	2.74 (2.44 to 3.08)



Supplementary figure 2: Non-linear effect of age on risk of adverse events within 30 days, adjusted to male sex and Charlson Index of 0.

Risk of reoperation within 365 days – regression

Outcome: Any reoperation on ipsilateral shoulder within 365 days

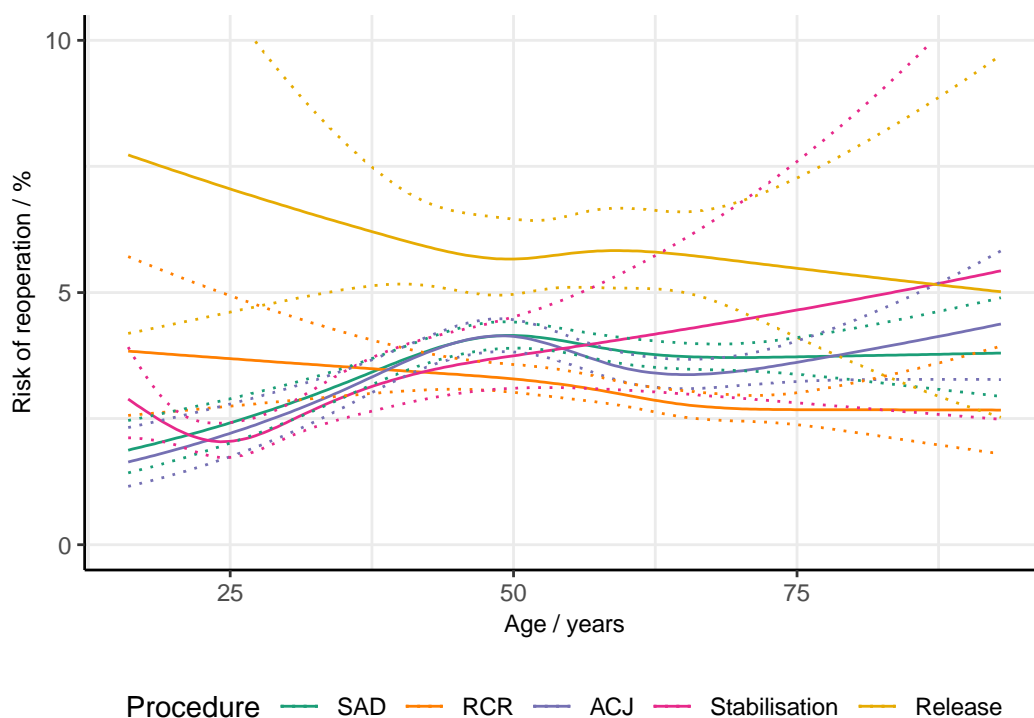
Variables: Age, procedure type, sex, grouped Charlson index

Sample size: 251 418

Events: 10 091

Degrees of freedom in final models: 6

Age was modelled with splines. Non-linear effects of age were significant and preserved. When an initial model was fit, there was a significant interaction between age and procedure type. Therefore, five separate models were fit for each of the procedure types rather than reporting a model with interaction terms since the interpretation is more intuitive.



Supplementary figure 3: Partial-effect plot demonstrating the influence of age and procedure type on predicted risk of reoperation within 1 year, adjusted to male sex and Charlson Index of 0.

Supplementary table 2: Coefficients from regression for any reoperation within one year. Values are odds ratios with 95% CIs

Procedure	SAD	RCR	ACJ	Release	Stabilisation
N	91928	60463	63262	17810	17955
Events	3903	2014	2623	1042	509
Age contrast	46 vs 63	53 vs 68	47 vs 64	47 vs 59	22 vs 35
Age effect	0.92 (0.84 to 1.01)	0.84 (0.75 to 0.95)	0.82 (0.73 to 0.91)	1.02 (0.87 to 1.21)	1.39 (1.12 to 1.72)
Male	Ref	Ref	Ref	Ref	Ref
Female	1.15 (1.08 to 1.22)	1.11 (1.02 to 1.22)	1.15 (1.06 to 1.24)	0.92 (0.81 to 1.04)	1.17 (0.94 to 1.44)
Charlson 0	Ref	Ref	Ref	Ref	Ref
Charlson 1	1.13 (1.05 to 1.23)	1.16 (1.04 to 1.29)	1.15 (1.05 to 1.26)	1.16 (1.00 to 1.34)	1.16 (0.91 to 1.47)
Charlson 2	1.06 (0.96 to 1.18)	1.26 (1.11 to 1.44)	1.17 (1.04 to 1.32)	1.13 (0.95 to 1.35)	1.78 (1.12 to 2.83)

Risk of reoperation for infection within 365 days – regression

Outcome: Any reoperation on ipsilateral shoulder for infection within 365 days

Variables: Age, procedure type, sex, diagnosis of diabetes mellitus

Sample size: 251 418

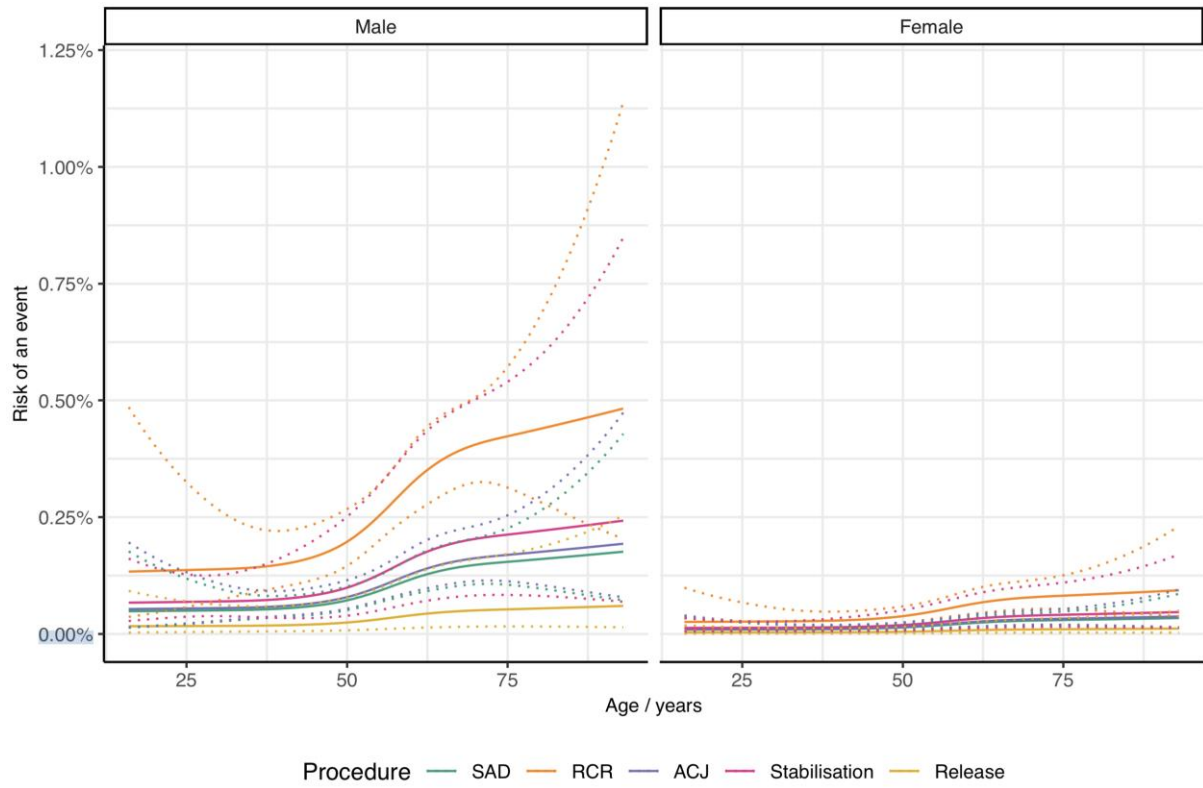
Events: 225

Degrees of freedom in final model: 6

Age was modelled with splines. Knots at 28, 50, 60 and 75 years. Non-linear effects of age were significant and preserved. There was no significant interaction between age and procedure type. Inclusion of ethnic origin and IMD did not significantly alter the coefficients and did not improve the model.

Supplementary table 3: Coefficients from regression for reoperation for infection within 365 days

Variable	Odds ratio (95% CI)
Age (46 vs 64 years)	2.14 (1.44 to 3.19)
SAD	Reference
RCR	2.75 (1.97 to 3.83)
ACJ	1.09 (0.72 to 1.66)
Stabilisation	1.38 (0.55 to 3.42)
Release	0.34 (0.11 to 1.10)
Male	Reference
Female	0.19 (0.13 to 0.28)
No diabetes	Reference
Diabetes	0.99 (0.68 to 1.34)



Adjusted to:DM=0

Supplementary figure 4: Partial-effect plot demonstrating the influence of age, sex and procedure type on predicted risk of reoperation for infection within 1 year, adjusted to no diagnosis of diabetes.

Codes used to identify cases and outcomes

OPCS-4 CODES (procedures)

Shoulder girdle anatomic codes (where not otherwise specified)

Z812, Z813, Z814, Z682, Z542

Arthroscopy codes (where not otherwise specified)

W844, W848, W849, W868, W869, Y767, W888, W889, O198, O199

Procedure codes (combined with anatomic codes where necessary)

SAD

O291, W844

RCR

Primary: T791, T794

Revision: T793, T795

ACJ excision

W572, W844, W573

Frozen shoulder release

W781, W784, W788, W789

Stabilisation

O271, O278, O279, O272, O273, O274

W721, W722, W723, W724, W725, W726, W728

W731, W732, W733, W734, W738, W739

W741, W742, W743, W748, W749

W751, W752, W753, W758, W759 (open procedure codes only used for reoperations)

W771, W772, W773, W774, W775, W777, W778, W779

W816, W841, W842

Additional codes used to remove cases and produce a more cleanly defined SAD group

Tenotomy/tenodesis

T70, T645

Chondral procedures

W83, W845, W891, W892, W898, W899, O191

W711, W712, W713, W714

Synovial procedures

T711, W691, W692, W693, W694, W695, W698, W699

Soft tissue recon – SLAP repair

W847

Laterality of surgery codes

Z941, Z942, Z943

Reoperations (in addition to those already stated above)

Debridement/drainage/washout type procedures
T774, T963, W181, W182, W183, W184, W185, W188
W336, W337, W338, W339
W691, W692, W693, W694, W713
W801, W802, W803, W808, W809
W813, W814, W817, W818, W819

Bursal procedures including excision
T621, T622, T626, T628, T629

Excision arthroplasty
W572

Fasciotomy
T551, T552

Arthrodesis
W601, W602, W603, W608, W609
W611, W612, W613, W614, W618, W619
W621, W622, W628, W629
W631, W632, W638, W639
W641, W642, W648, W649

Manipulation or hydrodistension
W911, W913, W918, W919, W922

Others, not specified
W811, W812, W815
W881, W888, W889
W921, W923, W924, W925
O198, O199, W843, W846, W848, W849, W861, W868, W869
W072, W073, W078
W928, W929, W588, W589
O101, W108, W109

Arthroplasty codes (with anatomy codes as needed)
W491, W494, W501, W504, W511, W515, W581
W430, W431, W432, W433, W438, W439
W440, W441, W442, W443, W443, W448, W449
W450, W451, W452, W453, W454, W458, W459
W490, W492, W493, W498, W499
W500, W502, W503, W508, W509
W510, W512, W513, W514, W518, W519
W575, W579
W580, W582
W960, W961, W962, W963, W964, W965, W966, W968, W969
W970, W971, W972, W973, W974, W975, W976, W978, W979

W980, W981, W982, W983, W984, W985, W986, W987, W988, W989
W601, W602, W603, W608, W609
W611, W612, W613, W618, W619
W621, W622, W628, W629
W631, W632, W638, W639
W641, W642, W648, W649
O060, O061, O062, O063, O068, O069
O070, O071, O072, O073, O078, O079
O080, O082, O083, O084, O081, O088, O089
X071, X072
Y037

ICD-10 CODES (diagnoses)

(3 or 4 character where required)

Frozen shoulder (adhesive capsulitis)

M750

Infection

M00, M01, M710, M711, M251, M86, T845, T846, T847, T813, T814

Fractures (shoulder girdle only – for exclusion)

S42

W19, W20, W21, W22, W23, W24, W25, W26, W191, W241, W651, W653, W654, W656,
W661, W663, W664, W671, W673, W677, W332, O172, O173, O175, O178, O179 (*OPCS
codes for surgical management of fractures)

Dislocation

S430, S431

W652, W658, W689, W662, W668, W669, W672, W674, W678, W679 (*OPCS codes for
relocations)

Tumours of interest

C795, C400, M907, M122, C81, C82, C83, C84, C85, C90, D160

Myocardial infarction

I21, I22

Pulmonary embolism

I26

Lower respiratory tract infection

J12, J13, J14, J15, J16, J18, J20, J22, J86, J440, J851, J690

Acute kidney injury

N17

Urinary tract infection

N10, N300, N308, N309, N390

Cerebrovascular event/stroke

I60, I61, I62, I63, I64

Neurovascular injury

T812 (within same spell only)