



Patient Reported Outcome Measures (PROMs) in England

*A Methodology for applying casemix adjustment
Annex B: Coefficients for Varicose Vein Models*

Annex B: Coefficients for Varicose Vein models

Table B1 gives the variables that were statistically significant at the 95% level from the estimation step and their coefficients for predicting post-operative (Q2) scores for the Varicose Vein EQ-5D Index instrument¹.

Factor	Definition	Coefficient	Standard error
Q1 score	Patient's pre-operative questionnaire score	0.382	0.025
Sex: Female	Takes value 1 if patient is female, 0 if not	-0.014	0.004
Ethnicity: Asian	Takes value 1 if patient is of Asian ethnicity, 0 if not	-0.043	0.013
IMD (Deprivation)	The IMD (Deprivation) 2004 score for the area the patient lives in	-0.001	0.0001
Assisted at Q2	Takes value 1 if patient was assisted in completing post-operative questionnaire, 0 if not	-0.032	0.010
Living arrangements: Live alone	Takes value 1 if patient lives alone, 0 if not	-0.017	0.005
Disabled at Q1	Takes value 1 if patient considers themselves to have a disability, 0 if not	-0.146	0.007
Previous Surgery: Yes	Takes value 1 if patient has had previous surgery on their varicose veins, 0 if not	-0.021	0.004
PRC: Poor circulation	Takes value 1 if patient has poor circulation, 0 if not	-0.038	0.006
PRC: Lung disease	Takes value 1 if patient has lung disease, 0 if not	0.019	0.009
PRC: Liver Disease	Takes value 1 if patient has liver disease, 0 if not	0.104	0.028
PRC: Depression	Takes value 1 if patient has depression, 0 if not	-0.073	0.008
PRC: Arthritis	Takes value 1 if patient has arthritis, 0 if not	-0.023	0.006
Patient has 3 HESRC	Takes value 1 if patient has three or more HES-reported comorbidities, 0 if not	-0.296	0.106
Patient has 2 PRCs	Takes value 1 if patient has self-reported exactly two comorbidities, 0 if not	-0.019	0.008
Patient has 3 PRCs	Takes value 1 if patient has self-reported exactly three comorbidities, 0 if not	-0.041	0.013
Patient has 4 PRCs	Takes value 1 if patient has self-reported four or more comorbidities, 0 if not	-0.095	0.019
Constant term		0.633	0.066

Table B1: Descriptions and coefficients of variables included in the Varicose Vein EQ-5D Index statistical prediction model for PROMs case-mix adjustment

The predicted score is found by multiplying each coefficient by the patient's response, summing the values and adding the constant term i.e. the predicted Q2 score is calculated as:

¹ Note:
 PRC = Patient Reported Comorbidity
 HESRC = HES Reported Comorbidity

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$Q2_{predicted} = 0.382 * (Q1 \text{ Score}) - 0.014 * (\text{Female}) - 0.043 * (\text{Asian}) - 0.001 * (\text{IMD score}) - 0.032 * (\text{Assisted Q2}) - 0.017 * (\text{Live Alone}) - 0.146 * (\text{Disabled Q2}) - 0.021 * (\text{Yes Previous Surgery}) - 0.038 * (\text{Circulation}) + 0.019 * (\text{Lung Disease}) + 0.104 * (\text{Liver Disease}) - 0.073 * (\text{Depression}) - 0.023 * (\text{Arthritis}) - 0.296 * (\text{3+ HES CoM}) - 0.019 * (\text{2 Self CoM}) - 0.041 * (\text{3 Self CoM}) - 0.095 * (\text{4+ Self CoM}) + 0.633$

The key drivers in this model are:

- the patient's Q1 score,
- the patient's disability status, and
- whether the patient has depression or poor circulation.

All the other factors included in the table above have a statistically significant impact on predicting post-operative scores (at a 5% level), but they are less influential in driving Q2 scores.

Varicose Vein – EQ-5D VAS

Table B2 gives the variables that were statistically significant at the 95% level from the estimation step and their coefficients for predicting post-operative (Q2) scores for the Varicose Vein EQ-5D VAS instrument.

Factor	Definition	Coefficient	Standard error
Q1 score	Patient's pre-operative questionnaire score	-0.256	0.046
Q1 score (squared)	Patient's pre-operative questionnaire score, squared	0.005	0.0003
Ethnicity: Asian	Takes value 1 if patient is of Asian ethnicity, 0 if not	-3.451	1.060
Ethnicity: Black	Takes value 1 if patient is of Black ethnicity, 0 if not	-3.864	1.769
Ethnicity: Not given	Takes value 1 if patient's ethnicity is not given through HES, 0 if not	1.078	0.421
IMD (Deprivation)	The IMD (Deprivation) 2004 score for the area the patient lives in	-0.060	0.010
Assisted at Q2	Takes value 1 if patient was assisted in completing post-operative questionnaire, 0 if not	-3.204	0.816
Living arrangements: Live alone	Takes value 1 if patient lives alone, 0 if not	-1.273	0.393
Disabled at Q1	Takes value 1 if patient considers themselves to have a disability, 0 if not	-8.527	0.535
Previous Surgery: Yes	Takes value 1 if patient has had previous surgery on their varicose veins, 0 if not	-0.624	0.296
PRC: Poor circulation	Takes value 1 if patient has poor circulation, 0 if not	-1.988	0.478
PRC: Nervous system diseases	Takes value 1 if patient has nervous system diseases, 0 if not	-7.424	2.122
PRC: Liver disease	Takes value 1 if patient has liver disease, 0 if not	6.451	2.232
PRC: Depression	Takes value 1 if patient has depression, 0 if not	-4.087	0.590
PRC: Arthritis	Takes value 1 if patient has arthritis, 0 if not	-1.811	0.471
Patient has 2 PRCs	Takes value 1 if patient has self-reported exactly two comorbidities, 0 if not	-1.773	0.638
Patient has 3 PRCs	Takes value 1 if patient has self-reported exactly three comorbidities, 0 if not	-2.221	1.004
Patient has 4 PRCs	Takes value 1 if patient has self-reported four or more comorbidities, 0 if not	-5.313	1.530
Constant term		72.018	4.601

Table B2: Descriptions and coefficients of variables included in the Varicose Vein EQ-5D VAS statistical prediction model for PROMs case-mix adjustment

The predicted score is found by multiplying each coefficient by the patient's response, summing the values and adding the constant term i.e. the predicted Q2 score is calculated as:

$$Q2_{predicted} = -0.256 * (Q1 \text{ score}) + 0.005 * (Q1 \text{ Score squared}) - 3.451 * (\text{Asian}) - 3.864 * (\text{Black}) + 1.078 * (\text{Eth Not Given}) - 0.060 * (\text{IMD Score}) - 3.204 * (\text{Assisted Q2}) - 1.273 * (\text{Live alone}) - 8.527 * (\text{Disability Q1}) - 0.624 * (\text{Yes Previous Surgery}) - 1.988 * (\text{Circulation}) - 7.424 * (\text{Nervous System}) +$$

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$6.451 * (\text{Liver Disease}) - 4.087 * (\text{Depression}) - 1.811 * (\text{Arthritis}) - 1.773 * (\text{2 Self CoM}) - 2.221 * (\text{3 Self CoM}) - 5.313 * (\text{4+ Self CoM}) + 72.018$

The key drivers in this model are:

- the patient's Q1 score,
- the patient's disability status,
- whether the patient has depression or circulatory problems, and
- their IMD deprivation score.

All the other factors included in the table above have a statistically significant impact on predicting post-operative scores (at a 5% level), but they are less influential in driving Q2 scores.

Varicose Vein – Aberdeen Varicose Vein Score

Table B3 gives the variables that were statistically significant at the 95% level from the estimation step and their coefficients for predicting post-operative (Q2) scores for the Varicose Vein Aberdeen Score instrument. Under this model, the scale under which a patient’s questionnaire score sits has been reversed. The scale runs from 0 to 100, where 0 represents the best possible outcome and 100 the worst possible outcome. For the purposes of the case-mix adjustment model, this scale is reversed such that 100 now represents the best possible outcome and 0 is the worst possible outcome. Scores are then reversed at the end of the case-mix adjustment process to maintain consistency.

Factor	Definition	Coefficient	Standard error
100 - Q1 score	100 minus the patient’s pre-operative questionnaire score	0.651	0.058
(100 - Q1 score) squared	(100 minus the patient’s pre-operative questionnaire score) squared	-0.001	0.0004
Sex: Female	Takes value 1 if patient is female, 0 if not	-1.226	0.164
Ethnicity: Asian	Takes value 1 if patient is of Asian ethnicity, 0 if not	-3.068	0.549
Ethnicity: Other	Takes value 1 if patient has an Ethnic category of “Other”, 0 if not	-2.595	0.763
IMD (Deprivation)	The IMD (Deprivation) 2004 score for the area the patient lives in	-0.012	0.006
Assisted at Q2	Takes value 1 if patient was assisted in completing post-operative questionnaire, 0 if not	-1.171	0.437
Living arrangements: live alone	Takes value 1 if patient lives alone, 0 if not	-0.898	0.219
Disabled at Q1	Takes value 1 if patient considers themselves to have a disability, 0 if not	-1.522	0.286
Previous Surgery: Yes	Takes value 1 if patient has had previous surgery on their varicose veins, 0 if not	-2.354	0.164
PRC: Heart disease	Takes value 1 if patient has heart disease, 0 if not	0.923	0.427
PRC: Poor circulation	Takes value 1 if patient has poor circulation, 0 if not	-1.486	0.267
PRC: Kidney disease	Takes value 1 if patient has kidney disease, 0 if not	2.239	0.866
PRC: Liver disease	Takes value 1 if patient has liver disease, 0 if not	-2.869	1.253
Constant term		45.489	3.890

Table B3: Descriptions and coefficients of variables included in the Varicose Vein Aberdeen Score statistical prediction model for PROMs case-mix adjustment

The predicted score is found by multiplying each coefficient by the patient’s response, summing the values and adding the constant term i.e. the predicted Q2 score is calculated as:

$$Q2_{predicted} = 0.651 * (100 - Q1 \text{ score}) - 0.001 * ((100 - Q1 \text{ score}) \text{ squared}) - 1.226 * (\text{Female}) - 3.068 * (\text{Asian}) - 2.595 * (\text{Eth Other}) - 0.012 * (\text{IMD Score}) - 1.171 * (\text{Assisted Q2}) - 0.898 * (\text{Live Alone}) - 1.522 * (\text{Disabled Q1}) - 2.354 *$$

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$(Yes\ Previous\ Surgery) + 0.923 * (Heart\ Disease) - 1.486 * (Circulation) + 2.239 * (Kidney\ Disease) - 2.869 * (Liver\ Disease) + 45.489$

The key drivers in this model are:

- the patient's Q1 score,
- their gender,
- the patient's disability status, and
- whether the patient has had previous surgery.

All the other factors included in the table above have a statistically significant impact on predicting post-operative scores (at a 5% level), but they are less influential in driving Q2 scores.