



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.