**Online Appendix 1.** Patient-reported scales used in the measurement of patient safety in primary care

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| **A – PREOS-PC SCALES USED AS DEPENDENT VARIABLES**  **Experiences of safety problems (Cronbach’s α = 0.75)**  Thinking about the healthcare you have received in your GP surgery in the last 12 months, do you believe you had any problem related to … (No; Only once; More than once)   * Diagnosis of your problems? (e.g. wrong diagnosis) * The medication prescribed or given to you at your GP surgery? (e.g. receiving a medication that was meant for a different patient) * Other treatments prescribed or administered at your GP surgery? (such as minor surgery, or acupuncture) * Vaccines prescribed or administered at your GP surgery? (e.g. receiving a vaccine that you already knew you were allergic to) * Blood tests and other laboratory tests ordered or performed at your GP surgery? (e.g. the test results being misplaced) * Diagnostic and monitoring procedures other than blood and laboratory tests (such as an ear examination, or biopsy, etc.) ordered or performed at your GP surgery? (e.g. not receiving a procedure when needed) * Communication between you and the healthcare professionals in your GP surgery? (e.g. not receiving the information you needed about your health problems or healthcare) * Communication and co-ordination between the healthcare professionals in your GP surgery? (e.g. important information about your healthcare not being passed between the healthcare professionals) * Communication and co-ordination between professionals in your GP surgery and other professionals outside of the GP surgery? (e.g. a letter being missing from a hospital consultant) * Your appointments? (e.g. not getting an appointment when you needed one) * Your health records? (e.g. your health records not being available when needed)   **Harm (Cronbach’s α = 0.89)**  Do you think you have experienced any of the following types of harm as a result of the healthcare provided in your GP surgery in the last 12 months? (Not at all; Hardly any; Yes, somewhat; Yes, a lot; Yes, extreme)   * Pain * Harm to your physical health * Harm to your mental health * Increased limitations in doing your usual social activities   **Overall perceptions of patient safety**  On a scale of 0-10, how safe do you think the healthcare you received in your GP surgery was in the last 12 months? Please do this by putting a mark on the line below like this:    **B – PREOS-PC SCALES USED AS PREDICTORS**  **Practice activation for patient safety (Cronbach’s α = 0.89)**  Thinking about the healthcare you have received in your GP surgery in the last 12 months, in general how often did you feel that your GP(s)… (Always; Often; Sometimes; Rarely; Never; Not applicable)   * Was (were) available when you needed to see or talk to them? * Gave you enough time to say what you wanted to say and to ask questions? * Encouraged you to talk about any concerns about your healthcare? * Explained your tests and treatments in a way you could understand? * Told you about what side effects of your treatments to watch for? * Took your concerns seriously? * Helped you to arrange/organise the right type of care (referrals, follow-up, etc.)? * Had access to relevant information when needed (medical history, test results, etc.)? * Seemed to be aware of the recommendations for care from other professionals treating you? * Seemed to work well together with the other professionals in the practice? * Thinking about the healthcare you have received in your GP surgery in the last 12 months, to what extent would you agree that delivering safe care was a top priority for your GPs, nurses and other staff in your GP surgery? [Strongly agree; Agree; Neither agree nor disagree; Disagree; Strongly disagree; I don’t know]   **Patient activation for patient safety (Cronbach’s α = 0.80)**  Thinking about the healthcare you have received in your GP surgery in the last 12 months, how often did you … (Always; Often; Sometimes; Rarely; Never; Not applicable)   * Raise a concern to your GPs, nurses or other staff in your GP surgery when you thought something was wrong with your healthcare? * Make a suggestion to your GPs, nurses or other staff in your GP surgery when you thought something could be done to improve the service provided? |

**Online Appendix 2.** Score distribution of the three different measures of safety: experience of safety problems, harm, and overall perceptions of patient safety

\*Higher “Experiences of safety problems” score indicates lower frequency of safety problems, and therefore safer healthcare.

\*Higher “Harm” score indicates lower frequency and severity of harm, and therefore safer healthcare.

\*Higher “Overall rating of patient safety” score indicates perception of safer healthcare.

**Online Appendix 3.** Relation between patient characteristics and each outcome (univariate regression tests)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **Experiences of safety problems** | | | **Harm** | | | **Overall rating of patient safety** | | |
| **Categorical variables** | | **N (%)** | **Mean score (SD)** | ***P¶*** | **N (%)** | **Mean score (SD)** | ***P*¶** | **N (%)** | **Mean score (SD)** | ***P¶*** |
| Gender | |  |  | 0.525 |  |  | 0.189 |  |  | 0.618 |
|  | Male | 466 (41%) | 95.42 (9.47) |  | 417 (40%) | 94.19 (17.82) |  | 444 (40%) | 86.31 (16.63) |  |
|  | Female | 673 (59%) | 95.08 (9.38) |  | 635 (60%) | 95.56 (14.34) |  | 663 (60%) | 85.97 (16.75) |  |
| UK born | |  |  | 0.024 |  |  | 0.324 |  |  | 0.006 |
|  | Yes | 1037 (91%) | 95.42 (8.94) |  | 968 (90%) | 95.24 (15.28) |  | 1018 (91%) | 86.58 (16.46) |  |
|  | No | 100 (9%) | 92.55 (13.15) |  | 102 (10%) | 93.06 (20.37) |  | 100 (9%) | 80.74 (18.16) |  |
| English as a second language | |  |  | 0.022 |  |  | 0.091 |  |  | 0.002 |
|  | Yes | 76 (7%) | 91.45 (14.14) |  | 80 (7%) | 90.69 (23.69) |  | 78 (7%) | 78.63 (18.57) |  |
|  | No | 1061 (93%) | 95.47 (8.86) |  | 990 (93%) | 95.40 (14.99) |  | 1040 (93%) | 86.69 (16.32) |  |
| Educational attainment | |  |  | 0.290 |  |  | 0.327 |  |  | 0.599 |
|  | Degree or equivalent | 394 (36%) | 95.11 (9.67) |  | 378 (36%) | 94.77 (16.77) |  | 380 (35%) | 85.84 (17.35) |  |
|  | Other qualifications | 506 (46%) | 95.1 (9.43) |  | 480 (46%) | 95.53 (14.27) |  | 495 (46%) | 86.61 (16.04) |  |
|  | No qualifications | 209 (19%) | 95.95 (8.34) |  | 187 (18%) | 95.97 (14.34) |  | 209 (19%) | 86.36 (16.11) |  |
| Ethnicity | |  |  | 0.001 |  |  | 0.286 |  |  | 0.004 |
|  | White | 1024 (92%) | 95.54 (8.90) |  | 959 (91%) | 95.24 (15.51) |  | 1008 (91%) | 86.79 (16.25) |  |
|  | Non-white | 95 (8%) | 91.72 (13.03) |  | 94 (9%) | 93.81 (17.43) |  | 94 (9%) | 78.79 (19.53) |  |
| Economically active | |  |  | 0.018 |  |  | 0.503 |  |  | 0.540 |
|  | Yes | 577 (53%) | 94.73 (9.86) |  | 548 (53%) | 95.00 (15.71) |  | 555 (51%) | 85.81 (16.51) |  |
|  | No | 520 (47%) | 95.94 (8.43) |  | 482 (47%) | 95.50 (15.38) |  | 525 (49%) | 86.52 (16.69) |  |
| Times seen a GP | |  |  | 0.000 |  |  | 0.000 |  |  | 0.367 |
|  | 1-5 | 716 (%) | 95.87 (7.90) |  | 714 (68%) | 97.08 (11.06) |  | 737 (%) | 86.77 (15.70) |  |
|  | >5 | 353 (%) | 93.01 (12.12) |  | 340 (32%) | 91.43 (21.14) |  | 364 (%) | 85.59 (17.42) |  |
| Time registered in the practice | |  |  | 0.122 |  |  | 0.147 |  |  | 0.423 |
|  | >5 years | 949 (83%) | 95.37 (9.09) |  | 881 (82%) | 95.15 (15.53) |  | 939 (84%) | 86.28 (16.89) |  |
|  | 2-5 years | 98 (9%) | 95.27 (8.99) |  | 97 (9%) | 96.80 (12.90) |  | 91 (8%) | 86.27 (15.63) |  |
|  | <2 years | 95 (8%) | 93.3 (12.24) |  | 94 (9%) | 92.86 (19.26) |  | 94 (8%) | 84.64 (15.61) |  |
| Patient activation | |  |  | 0.000 |  |  | 0.000 |  |  | 0.000 |
|  | Not Proactive | 569 (52%) | 96.53 (6.38) |  | 556 (52%) | 97.62 (9.82) |  | 585 (52%) | 89.03 (13.52) |  |
|  | Proactive | 340 (31%) | 90.35 (13.84) |  | 341 (32%) | 88.16 (23.88) |  | 358 (32%) | 79.26 (20.76) |  |
|  | Unknown | 185 (17%) | 98.06 (4.09) |  | 181 (17%) | 99.40 (3.56) |  | 190 (17%) | 89.53 (12.69) |  |
| **Continuous variables** | | **β†** | | ***P¶*** | **β†** | | ***P¶*** | **β†** | | ***P¶*** |
| Age (years) | | 0.136 | | 0.000 | 0.063 | | 0.076 | 0.074 | | 0.013 |
| Health related quality of life (EQ5D) | | 0.141 | | 0.000 | 0.262 | | 0.000 | 0.077 | | 0.054 |
| Number of medications | | -0.059 | | 0.035 | -0.119 | | 0.002 | 0.034 | | 0.222 |
| Number of long term conditions | | -0.095 | | 0.008 | -0.152 | | 0.000 | 0.018 | | 0.590 |

¶ Univariate *P* Value; † Regression Coefficient Beta; sd, standard deviation.

**Online Appendix 4.** Relation between practices characteristics and each outcome (univariate regression tests)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | |  | **Experiences of safety problems** | | **Harm** | | **Overall rating of patient safety** | |
| **Categorical variables** | | **N (%)** | **Mean score (SD)** | ***P¶*** | **Mean score (SD)** | ***P¶*** | **Mean score (SD)** | ***P¶*** |
| Rurality | |  |  | 0.817 |  | 0.450 |  | 0.792 |
|  | Urban ≥ 10K | 40 (89%) | 95.12 (9.39) |  | 94.84 (16.26) |  | 85.95 (16.77) |  |
|  | Town and Village < 10K | 5 (11%) | 95.5 (9.49) |  | 95.46 (14.08) |  | 86.27 (16.82) |  |
| **Continuous variables** | | **mean (sd)** | **β†** | ***P¶*** | **β†** | ***P¶*** | **β†** | ***P¶*** |
| QOF score‡ | | 975.6 (30.8) | 0.027 | 0.357 | -0.001 | 0.988 | 0.026 | 0.493 |
| Deprivation\* | | 25.5 (12.8) | -0.078 | 0.029 | -0.039 | 0.144 | -0.106 | 0.011 |
| Safety climate˨ | | 5.2 (0.5) | 0.016 | 0.761 | 0.045 | 0.374 | 0.043 | 0.399 |
| Practice activation | | 82.8 (6.7) | 0.597 | 0.000 | 0.250 | 0.014 | 0.631 | 0.000 |
| Registered patients | | 8744 (6288) | 0.023 | 0.470 | -0.003 | 0.912 | 0.016 | 0.678 |
| Patients aged >65 (%) | | 16.48 (6.01) | 0.019 | 0.699 | 0.034 | 0.172 | 0.035 | 0.472 |
| Number of GPs per practice | | 5.5 (3.1) | -0.001 | 0.972 | -0.024 | 0.322 | -0..024 | 0.551 |
| Male GPs (%) | | 53.7 (20.6) | -0.008 | 0.811 | 0.021 | 0.305 | -0.013 | 0.745 |
| GPs aged ≥50 (%) | | 20.3 (24.9) | -0.037 | 0.273 | 0.025 | 0.147 | -0.036 | 0.408 |
| GPs aged ≤35 (%) | | 11.44 (14.12) | -0.009 | 0.824 | -0.006 | 0.785 | 0.006 | 0.835 |
| Long-term condition case load | | 0.61 (0.15) | -0.038 | 0.270 | -0.013 | 0.622 | -0.019 | 0.631 |

¶ Univariate P Value; † Regression Coefficient Beta; sd, standard deviation;

‡Quality and outcomes framework overall score achieved in the financial year 2012/2013 [theoretical score ranges from 0 (lowest quality) to 1000 (highest quality)]

\* Measured using the Index of Multiple Deprivation22 [theoretical score ranges from 1 (most deprived area) to 100 (least deprived area)]

˨ Safety climate (PC-SafeQuest) total score [theoretical score ranges from 1 (lowest perceived practice safety) to 7 (highest perceived practice safety)]. Analysis based on 30 practices only.

**Online Appendix 5.** Relation between potential explanatory variables and patient-reported experiences of safety problems, of harm, and overall rating of patient safety [multivariate sensitivity analysis based on Multiple Imputation analysis; N=1,190]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | | **Experiences of safety problems** | **Harm** | **Overall perceptions of patient safety** |
| **Practice characteristics** | | **Coefficient (95% CI)** | **Coefficient (95% CI)** | **Coefficient (95% CI)** |
| Practice deprivation¶ | | 0.033 (-0.025; 0.089) |  | -0.006 (-0.050; 0.038) |
| Practice activation | | 0.400 (0.252; 0.549) \*\*\* | 0.048 (-0.142; 0.238) | 0.474 (0.305; 0.643)\*\*\* |
| **Patient clinical characteristics** | |  |  |  |
| Health status (EQ5D) | | 0.059 (-0.015; 0.134) | 0.182 (0.074; 0.289)\*\* | 0.043 (-0.036; 0.122) |
| Number of long term conditions | | -0.048 (-0.125; 0.030) | -0.047 (-0.157; 0.063) | N/A |
| Number of medications | |  | 0.010 (-0.084; 0.105) | N/A |
| Patient activation | | \*\*\* | \*\*\* | \*\*\* |
|  | Not Proactive | 1 | 1 | 1 |
|  | Proactive | -0.531 (-0.678; -0.385) | -0.471 (-0.600; -0.342) | -0.484 (-0.624; -0.342) |
|  | Unknown | 0.095 (-0.009; 0.199) | 0.010 (-0.086; 0.106) | 0.002 (-0.130; 0.135) |
| Times seen a GP | | \* |  | N/A |
|  | 0-5 | 1 | 1 | - |
|  | >5 | -0.163 (-0.318; -0.007) | -0.102 (-0.259; 0.054) | - |
| **Patient sociodemographic characteristics** | | \*\* | \* |  |
| Age (years) | | 0.124 (0.043; 0.205) | 0.098 (0.015; 0.181) | 0.054 (-0.008; 0.117) |
| UK born | |  | N/A |  |
|  | Yes | 1 | - | 1 |
|  | No | 0.009 (-0.271; 0.289) | - | 0.000 (-0.308; 0.309) |
| English as a second language | |  | N/A |  |
|  | No | 1 | - | 1 |
|  | Yes | -0.011 (-0.423; 0.401) | - | 0.138 (-0.286; 0.562) |
| Ethnicity | |  | N/A |  |
|  | Non-white | 1 | - | 1 |
|  | White | 0.027 (-0.334; 0.388) | - | -0.008 (-0.318; 0.303) |
| Economically active | |  | N/A | N/A |
|  | Yes | 1 | - | - |
|  | No | 0.101 (-0.052; 0.253) | - | - |

N/A, not applicable (independent variable not included in the multivariate model due to p>0.1 in the univariate analyses).The following variables were excluded all the three multivariate models (due to p>0.1 in the univariate analyses): gender; time registered at the practice; educational attainment; proportion of patients aged >65 in each practice; rurality index of the practices; number of GPs per practice; proportion of male GPs in each practice; proportion of GPs aged<35 in each practice; QOF score of each practice; time registered in the practice; long-term condition caseload in each practice.

¶ Measured using the Index of Multiple Deprivation 201022 [theoretical score ranges from 1 (most deprived area) to 100 (least deprived area)]

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001.

**Online Appendix 6.** Relation between “Practice Activation” score and other practice characteristics [summary of univariate regression model at the practice level (n=45 practices)]

|  |  |
| --- | --- |
| **Practice characteristics** | **Coefficient (95% CI)** |
| QOF score‡ | 0.044 (-0.065; 0.153) |
| Deprivation† ¶ | -0.116 (-0.214; -0.0178) |
| Safety climate ˨ | 0.004 (-0.158; 0.164) |
| Registered patients | 0.013 (-0.083; 0.109) |
| Patients aged >65 (%) | 0.0525 (-0.048; 0.152) |
| Rurality | 0.022 (-0.346; 0.391) |
| Number of GPs per practice | -0.034 (-0.138; 0.070) |
| Male GPs (%) | -0.04 (-0.113; 0.105) |
| GPs aged ≤35 (%) | 0.021 (-0.089; 0.133) |
| GPs aged ≥50 (%) | -0.041 (-0.159; 0.077) |
| Long-term condition case load | 0.001 (-0.096; 0.984) |

† P<0.05;

‡ Quality and outcomes framework overall score achieved in the financial year 2012/2013 [theoretical score ranges from 0 (lowest quality) to 1000 (highest quality)]

¶ Measured using the Index of Multiple Deprivation 201022 [theoretical score ranges from 1 (most deprived area) to 100 (least deprived area)]

˨ Safety climate (PC-SafeQuest) total score [theoretical score ranges from 1 (lowest perceived practice safety) to 7 (highest perceived practice safety)]. Analysis based on 30 practices only.

**Online Appendix 7.** Relation between the individual items included in the “Practice Activation” scale and patient-reported experiences of safety problems, of harm, and overall rating of patient safety [summary of univariate regression model at the patient level\*]

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Experiences of safety problems** | **Harm** | **Overall perceptions of patient safety** |
| **Practice activation scale individual items** | **Coefficient (95% CI)** | **Coefficient (95% CI)** | **Coefficient (95% CI)** |
| Was available when needed? | 0.70 (0.59; 0.80) | 0.39 (0.30; 0.48) | 0.61 (0.51; 0.72) |
| Gave you enough time? | 0.80 (0.66; 0.93) | 0.43 (0.28; 0.57) | 0.84 (0.69; 0.99) |
| Encouraged you talk about concerns? | 0.68 (0.56; 0.79) | 0.42 (0.29; 0.55) | 0.70 (0.59; 0.80) |
| Explained tests/treatments? | 0.89 (0.75; 1.04) | 0.55 (0.40; 0.70) | 0.95 (0.82; 1.08) |
| Told you about side effects? | 0.64 (0.53; 0.74) | 0.50 (0.34; 0.58) | 0.60 (0.48; 0.72) |
| Took your concerns seriously? | 0.84 (0.71; 0.96) | 0.65 (0.50; 0.79) | 0.93 (0.80; 1.06) |
| Helped you to arrange/organise care? | 0.84 (0.69; 0.99) | 0.62 (0.46; 0.79) | 0.86 (0.72; 1.00) |
| Had access to information? | 0.85 (0.71; 0.99) | 0.60 (0.45; 0.76) | 0.95 (0.81; 1.01) |
| Aware of the recommendations from other professionals? | 0.74 (0.59; 0.88) | 0.59 (0.44; 0.74) | 0.79 (0.65; 0.94) |
| Worked well together with other professionals? | 0.81 (0.64; 0.97) | 0.57 (0.45; 0.69) | 0.72 (0.58; 0.86) |

\* Given their highly skewed distribution, the responses categories of all the items in the “Practice Activation” scale were dichotomized as follows: always/ not applicable vs never/rarely/sometimes/often.