Supplementary Fig. 1



*Flow chart of data cleaning and exclusion of admission episodes.*

Supplementary Table 1

*Extracted mental health diagnoses frequencies and composite variable categories.*

|  |  |  |
| --- | --- | --- |
| Mental health diagnosis category | ICD-10 codes from data extraction | N admissions |
| Anxiety disorders a | F40, F41, F42, F43, Z73 | 1129 |
|  |  |
| Bipolar affective disorders a | F30, F31, F34 | 303 |
|  |  |
| Dementia, delirium and organic disorders a | F00, F01, F02, F03, F04, F05, F06, F07, F09 | 524 |
|  |  |
| Depressive disorders a | F32, F33, F34, F38-39 | 1758 |
|  |  |
| ~~Dissociative disorders~~ ab | ~~F04, F44, F48~~ | 35 |
|  |  |
| ~~Eating disorders~~ ab | ~~F50~~ | 48 |
|  |  |
| Personality disorders a | F60-F69 | 703 |
|  |  |
| Psychotic disorders and schizophrenia | F20, F21, F22, F23, F25, F29, F28, R44 | 956 |
|  |  |
| ~~Somatisation disorders~~b | ~~F45, F59, R52~~ | 32 |
|  |  |
| Substance related problems | F10-19, F55, Y91, K70 | 1459 |
|  |  |
| ~~Self-harm~~b | ~~X60-63, X70-83, Z91, S00, S51, T39, T40, T42, T43, T96~~ | 31 |
|  |  |
| ~~Developmental disorders~~b | ~~F70-F98~~ | 94 |

aOriginal Emergency Care Data Set diagnostic category.
bCategory removed from analysis variable due to low frequencies.

Supplementary Table 2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Hospital | Mental health diagnosis category | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | 2015/16 |
| Croydon University Hospital | Anxiety disorders  | 150 (58.82) | 33 (25.78) | 27 (21.95) | 53 (21.46) | 45 (20.74) | 23 (16.08) |
| Bipolar affective disorders  | 6 ( 2.35) | 2 ( 1.56) | 0 | 17 ( 6.88) | 15 ( 6.91) | 6 ( 4.20) |
| Dementia, delirium and organic disorders  | 16 ( 6.27) | 41 (32.03) | 1 ( .81) | 3 ( 1.21) | 2 ( 0.92) | 2 ( 1.40) |
| Depressive disorders  | 25 ( 9.80) | 10 ( 7.81) | 15 (12.20) | 38 (15.38) | 38 (17.51) | 41 (28.67) |
| Personality disorders  | 11 ( 4.31) | 11 ( 8.59) | 25 (20.33) | 41 (16.60) | 35 (16.13) | 15 (10.49) |
| Psychotic disorders and Schizophrenia  | 16 ( 6.27) | 12 ( 9.38) | 20 (16.26) | 37 (14.98) | 37 (17.05) | 22 (15.38) |
| Substance related problems  | 31 (12.16) | 19 (14.84) | 35 (28.46) | 58 (23.48) | 45 (20.74) | 34 (23.78) |
|  |  |  |  |  |  |  |  |
| King's College London | Anxiety disorders  | 5 ( 4.50) | 24 (14.91) | 18 (10.23) | 38 (19.10) | 39 (13.04) | 39 (10.40) |
| Bipolar affective disorders  | 4 ( 3.60) | 13 ( 8.07) | 7 ( 3.98) | 10 ( 5.03) |  14 ( 4.68) | 17 ( 4.53) |
| Dementia, delirium and organic disorders  | 20 (18.02) | 10 ( 6.21) | 19 (10.80) | 20 (10.05) | 29 ( 9.70) | 33 ( 8.80) |
| Depressive disorders  | 38 (34.23) | 51 (31.68) | 58 (32.95) | 38 (19.10) | 83 (27.76) | 108 (28.80) |
| Personality disorders  | 6 ( 5.41) | 11 ( 6.83) | 16 ( 9.09) | 25 (12.56) | 34 (11.37) | 28 ( 7.47) |
| Psychotic disorders and Schizophrenia  | 16 (14.41) | 21 (13.04) | 26 (14.77) | 28 (14.07) | 47 (15.72) | 84 (22.40) |
| Substance related problems  | 22 (19.82) | 31 (19.25) | 32 (18.18) | 40 (20.10) | 53 (17.73) | 66 (17.60) |
|  |  |  |  |  |  |  |  |
| Lewisham Hospital | Anxiety disorders  | 25 (15.92) | 32 (16.00) | 37 (20.56) | 42 (18.75) | 40 (14.65) | 61 (21.18) |
| Bipolar affective disorders  | 2 ( 1.27) | 2 ( 1.00) | 5 ( 2.78) | 4 ( 1.79) | 8 ( 2.93) | 15 ( 5.21) |
| Dementia, delirium and organic disorders  | 17 (10.83) | 27 (13.50) | 3 ( 1.67) | 10 ( 4.46) | 14 ( 5.13) | 12 ( 4.17) |
| Depressive disorders  | 69 (43.95) | 67 (33.50) | 54 (30.00) | 52 (23.21) | 54 (19.78) | 62 (21.53) |
| Personality disorders  | 9 ( 5.73) | 5 ( 2.50) | 14 ( 7.78) | 32 (14.29) | 34 (12.45) | 30 (10.42) |
| Psychotic disorders and Schizophrenia  | 8 ( 5.10) | 9 ( 4.50) | 15 ( 8.33) |  21 ( 9.38) | 31 (11.36) | 40 (13.89) |
| Substance related problems  | 27 ( 7.20) | 58 (29.00) | 52 (28.89) | 63 (28.13) | 92 (33.70) | 68 (23.61) |
|  |  |  |  |  |  |  |  |
| St Thomas' Hospital | Anxiety disorders  | 28 ( 9.00) | 52 (12.78) | 70 (15.28) | 58 (10.55) | 59 (12.80) | 63 (14.48) |
| Bipolar affective disorders  | 8 ( 2.57) | 14 ( 3.44) | 27 ( 5.90) | 29 ( 5.27) | 14 ( 3.04) | 26 ( 5.98) |
| Dementia, delirium and organic disorders  | 26 ( 8.36) | 35 ( 8.60) | 18 ( 3.93) | 16 ( 2.91) | 14 ( 3.04) | 6 ( 1.38) |
| Depressive disorders  | 113 (36.33) | 130 (31.94) | 117 (25.55) | 177 (32.18) | 115 (24.95) | 115 (26.44) |
| Personality disorders  | 22 ( 7.07) | 38 ( 9.34) | 61 (13.32) | 75 (13.64) | 65 (14.10) | 58 (13.33) |
| Psychotic disorders and Schizophrenia  | 33 (10.61) | 58 (14.25) | 53 (11.57) | 70 (12.73) | 83 (18.00) | 69 (15.86) |
| Substance related problems  | 81 (26.05) | 80 (19.66) | 112 (24.45) | 125 (22.73) | 111 (24.08) | 98 (22.53) |

*Number and percentage of psychiatric diagnoses seen by each liaison team from April 1st 2010 and March 31st 2016 (n(%)).*

Supplementary Table 3

*Mixed effects model for the association between mental health diagnoses and LOS* *including all confounders as fixed effects and id as random effect (n=6046).*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Fixed Effects** | **Estimate** | ***SE*** | **z-statistic** | ***p*-value** | **LL 95% CI** | **UL 95% CI** |
| Mental Health dx categorya |  |  |  |  |  |  |
| Anxiety Disorders | .786 | .958 | .82 | .041 | -1.091 | 2.664 |
| Bipolar Affective Disorders | -5.008 | 1.652 | -3.03 | .002 | -8.247 | -1.769 |
| Dementia, Delirium & Organic | 7.148 | 1.356 | 5.27 | p<.001 | 4.491 | 9.807 |
| Personality Disorders | -2.078 | 1.163 | -1.79 | .074 | -4.358 | .202 |
| Psychotic Disorders | -1.792 | 1.085 | -1.65 | .099 | -3.919 | .335 |
| Substance related Disorders | -2.806 | .926 | -3.03 | .002 | -4.621 | -.992 |
|  |  |  |  |  |  |  |
| Medical dxa |  |  |  |  |  |  |
| Chapter 10 | -8.079 | 3.074 | -2.63 | .009 | -14.103 | -2.054 |
| Chapter 11 | -1.544 | 2.966 | -5.20 | .603 | -7.356 | 4.269 |
| Chapter 12 | -11.486 | 3.729 | -3.08 | .002 | -18.794 | -4.177 |
| Chapter 13 | -8.947 | 3.545 | -2.52 | .012 | -15.894 | -2.000 |
| Chapter 14 | -14.451 | 3.403 | -4.25 | p<.001 | -21.120 | -7.782 |
| Chapter 15 | -22.203 | 3.933 | -5.65 | p<.001 | -29.910 | -14.495 |
| Chapter 17 | -21.536 | 23.957 | -.90 | .369 | -68.490 | 25.418 |
| Chapter 18 | -24.790 | 2.837 | -8.74 | p<.001 | -30.350 | -19.229 |
| Chapter 19 | -23.560 | 2.726 | -8.64 | p<.001 | -28.903 | -18.217 |
| Chapter 2 | 2.051 | 3.657 | .56 | .575 | -5.117 | 9.220 |
| Chapter 21 | -24.145 | 3.713 | -6.50 | p<.001 | -31.423 | -16.867 |
| Chapter 3 | -16.634 | 4.386 | -3.79 | p<.001 | -25.230 | -8.038 |
| Chapter 4 | -15.471 | 3.301 | -4.69 | p<.001 | -21.941 | -9.001 |
| Chapter 5 | -24.608 | 2.781 | -8.85 | p<.001 | -30.058 | -19.158 |
| Chapter 6 | 3.606 | 3.383 | 1.07 | .286 | -3.024 | 10.235 |
| Chapter 7 | -16.433 | 8.872 | -1.85 | .064 | -33.822 | .955 |
| Chapter 8 | -13.222 | 12.202 | -1.08 | .279 | -37.136 | 10.693 |
| Chapter 9 | -.540 | 3.119 | -.17 | .863 | -6.654 | 5.574 |
|  |  |  |  |  |  |  |
| Age | .212 | .275 | 7.70 | p<.001 | .158 | .266 |
|  |  |  |  |  |  |  |
| Ethnicitya |  |  |  |  |  |  |
| Any Black | -.620 | .958 | -.65 | .518 | -2.497 | 1.258 |
| Any Asian | 1.124 | 1.656 | .68 | .497 | -2.121 | 4.369 |
| Any mixed | -.787 | 2.267 | -.35 | .729 | -5.230 | 3.656 |
| Any other | -1.181 | 1.361 | -.87 | .385 | -3.849 | 1.486 |
| Not known | -1.017 | 1.037 | -.98 | .327 | -3.049 | 1.016 |
|  |  |  |  |  |  |  |
| Sexa |  |  |  |  |  |  |
| Female | -.483 | .688 | -.70 | .048 | -1.831 | .066 |
|  |  |  |  |  |  |  |
| IMD Rank score | -.098 | .029 | -3.36 | .001 | -.156 | 0.041 |
|  |  |  |  |  |  |  |
| Liaison teama |  |  |  |  |  |  |
| KCH | 8.603 | 1.323 | 6.47 | p<.001 | 5.998 | 11.208 |
| Lewisham | 3.581 | 1.071 | 3.34 | .001 | 1.482 | 5.679 |
| St Thomas’ | 4.186 | .992 | 4.22 | p<.001 | 2.242 | 6.130 |
|  |  |  |  |  |  |  |
| Investment per admission | .0005 | .0002 | 2.19 | .028 | .0001 | .0009 |
| Constant Intercept | 18.719 | 3.342 | 5.60 | p<.001 | 12.168 | 25.269 |
| **Random Effects** | **Variance** | ***SE*** | **LL 95% CI** | **UL 95% CI** |  |  |
| Individual | 294.524 | 12.195 | 271.566 | 319.422 |  |  |
| Residual | 270.541 | 9.631 | 252.308 | 290.092 |  |  |

aReference categories are: Depressive Disorders, ICD-10 Chapter 1 (Certain infectious and parasitic diseases), Any White ethnicity, Male and Croydon Hospital Liaison team.