

Investigating the characteristics of A&E attendances by mental health service users: patient-level matching of two large datasets

Summary

This paper sets out how we used NHS administrative data to compare the characteristics of A&E attendances by mental health service users to those of the rest of the population.

Background

In April 2016, our [report](#) on *Mental health services: preparations for improving access* (HC 492, Session 2015-16) examined the arrangements being put in place by the Department of Health and NHS England to implement access and waiting times standards for mental health (MH).

We reported a clear consensus that 'parity of esteem' between mental health and physical health is an important objective for the NHS. However, we found that data were not available to understand the gap between existing services and what would be needed to achieve parity of esteem.

There is already evidence that patients with mental illness make up a disproportionate number of frequent A&E attenders, receive more investigations, and arrive and leave in different ways compared to A&E users without a known mental health diagnosis.¹ As part of our study, we explored whether and how much these distinctive characteristics can be linked to differences between the two patient populations.

Data

Since 2013, NHS Digital (formerly HSCIC) has produced a 'linkage file', which allows activity data for mental health services (Mental Health Minimum Dataset, MHMDS²) to be matched to activity data for acute secondary care services (Hospital Episode Statistics, HES) anonymously.

We used the linked file to create a combined dataset. The combined dataset was then linked to data from NHS England describing how much Clinical Commissioning groups (CCGs) spent on different conditions. All data were from April 2013 to March 2014.

Outcome variables

We defined seven binary variables to represent a range of different outcomes related to an A&E attendance. These were:

- *Arrival by ambulance*;
- *Out-of-hours arrival* (attendance between 6:30pm and 8am Monday to Friday and the duration of the weekend);
- *Admission* to the provider where the patient attended A&E;
- *'Leaving'*, where the patient left before receiving, or having refused, treatment;
- A *'long wait'*, where the patient was seen just before the 4 hour A&E waiting time target;
- *Multiple investigations*, where a patient received four or more investigations;³
- *Frequent attendance*, for patients who made four or more A&E attendances during the year.

Method

We used SPSS to apply multivariate regression techniques to examine differences in patterns of A&E attendances by individuals who used, and did not use, MH services during the year. We also explored variation in patients' experiences or outcomes following an A&E attendance between health service providers (NHS trusts).

The explanatory (control) variables included were:

- Patients' characteristics such as gender, age, ethnicity;
- Details of the attendance – day of week, hour of arrival and primary diagnosis;
- Provider characteristics – type of A&E department, provider type, urban vs. rural setting, and level of local deprivation;
- Indicators to represent local health spending – the logarithm of total CCG spend and CCG spend on unscheduled care respectively for 13-14, normalised by the size of the CCG's registered population.

1 Now known as the Mental Health Services Data Set (MHSDS).

2 E R Williams et al., Psychiatric status, somatization, and health care, utilization of frequent attenders at the emergency department: a comparison with routine attenders, *Journal of Psychosomatic Research*, vol. 50, 2001, pp. 161–167.

3 56 providers coded no more than two or three investigations and were therefore excluded from the analysis.

Results

In this section, we summarise some high-level findings only. A more complete set of results is included in the Appendix.

Comparison of A&E attendances by the two groups

We found that MH service users are more likely to experience each outcome we investigated than are the general population. In particular, after controlling for the factors described above, we found MH service users are:

- 2.37 times more likely to *arrive by ambulance* but only 1.13 times more likely to *arrive out-of-hours*;
- 1.22 times more likely to experience a *'long wait'*, 1.40 times more likely to be admitted as an *inpatient* and 1.72 times more likely to *'leave without any treatment'*;
- 3.78 times more likely to be a *frequent attender*.

Provider-level analysis

Our provider-level analysis found that these differences vary between providers ([Figure 1](#)). For two outcomes (arriving out of hours including weekends, and leaving without being seen) MH service users had higher rates for every provider.

There is a high level of correlation at provider level between a given outcome for MH service users and the same outcome for the general population ([Figure 2](#)). For example, at hospitals where a relatively large proportion of the general population leaves A&E without being seen, generally even more patients with psychiatric conditions do so.

There is also a correlation between *different* outcome variables ([Figure 3](#)) for MH service users. For example, at providers where MH service users experience long waits, patients from this group are also more likely to be admitted. It is not possible to tell whether this is due to varying case-mix at different providers, or organisational factors, or both.

Frequent attenders

We found that a disproportionate number of frequent A&E attenders (those with four or more A&E attendances) are MH service users. Frequent attenders represented only 5.4% of all A&E users but 19.9% of attendances. The proportion of frequent attendees who are also MH service users increases with the frequency of attendance: almost 50% of individuals with 10 or more visits were MH service users ([Figure 4](#)).

Psychiatric patients without a previous diagnosis

A small proportion of patients, but a large absolute number, receive a psychiatric diagnosis in A&E but do not interact with mental health services during the year (roughly 35,000 attendances; more if 'poisoning' and 'social problems' are included). 41.8% of these patients were not admitted and received no onward referral from A&E. By comparison, the equivalent number for all patients who attended A&E is 64.3%.

The method described here may also represent a novel way to estimate the level of unmet need for MH services.

Limitations

There are a number of limitations to the analysis. The most significant is that the methodology only counts an individual as a 'MH service user' if they had an interaction with MH services in 2013-14. Individuals who used MH services in previous or subsequent years (but not 2013-14) are included in the control group.

We were unable to control for a number of potentially important factors including: *severity* of presentation, for which ambulance usage is only an imperfect proxy; *housing status or homelessness*, which has widely-reported associations with mental illness; and *the presence of multiple diagnoses* (only primary diagnosis was used as a control variable in our analysis, but comorbidity may be an important predictor of A&E usage).

Limiting the analysis to a single year also makes any inference of causality impossible. Finally, a number of other issues with MHMDS are known to exist.⁴ Due to these limitations, the results should be interpreted with caution.

Acknowledgements

The analysis was conducted as part of the National Audit Office's study on *Mental health services: preparations for improving access*. The data analysis was conducted by Robin Firth while on a placement at the National Audit Office, as part of his MSc in International Health Policy at the London School of Economics and Political Science. He is also the primary author of this paper.

Access to and the use of anonymised Hospital Episode Statistics and Mental Health Minimum Datasets during this analysis was in accordance with the statutory role of the National Audit Office and followed protocols agreed with the Health and Social Care Information Centre. No patient-identifiable information was used or disclosed in the process. The work was carried out under the supervision of David Raraty, David Xu and Will Palmer from the National Audit Office.

4 See [HSCIC. Background Quality Report](#). Monthly Mental Health Minimum Dataset Reports: 2013-14, England. (2014); Raleigh *et al.* Inpatient mental healthcare in England and Wales: patterns in NHS and independent healthcare providers. *J. R. Soc. Med.* 101, 544-551 (2008).

Appendix One: Detailed results

Figure 1

Variation in attendance characteristics by provider (general acute providers only)

	Mean (%)	SD (%)	Range (%)
Share of attendances by MH service users	13.6	2.9	0.2–20.5
Proportion of patients arriving by ambulance			
Non-MH service users	29.0	6.6	1.4–45.5
MH service users	57.5	8.5	2.4–73.2
MH excess	28.5	5.2	-2.5–38.5
Proportion arriving OOH (Mon to Fri 6:30pm and 8am and weekend)			
Non-MH service users	53.5	3.6	39.8–61.8
MH service users	59.4	2.9	43.4–70.5
MH excess	5.9	2.4	0.0–13.5
Proportion arriving OOH (Mon to Fri 6:30pm – 8am only)			
Non-MH service users	35.7	4.1	19.2–49.4
MH service users	44.1	3.2	24.6–50.4
MH excess	8.4	2.4	-0.4–15.7
Proportion arriving OOH (weekend only)			
Non-MH service users	17.8	1.6	12.4–24.7
MH service users	15.4	1.3	13.3–24.2
MH excess	-2.4	1.2	-4.9–5.8
Proportion admitted			
Non-MH service users	25.7	6.4	7.8–41.1
MH service users	40.0	9.0	5.3–62.7
MH excess	14.3	6.3	-33.3–28.1
Proportion leaving without being seen			
Non-MH service users	2.9	1.5	0.8–15.4
MH service users	5.9	2.6	1.4–22.7
MH excess	3.0	1.4	0.1–8.1
Proportion waiting 3hr50 to 4hr			
Non-MH service users	10.0	4.1	2.8–23.8
MH service users	15.2	5.4	4.2–36.4
MH excess	5.1	2.1	-3.4–12.6
Proportion receiving four or more investigations			
Non-MH service users	21.2	14.8	0.0–67.4
MH service users	30.0	19.7	0.0–76.6
MH excess	8.8	6.8	-15.8–23.9

Figure 2

Correlation between each dependent variable for MH service users and non-service users

Variable	Pearson correlation
Arrival by ambulance	.796 ¹
OOH arrival (Mon to Fri 6:30pm – 8am and weekend)	.743 ¹
Admitted	.711 ¹
Left without being seen	.916 ¹
Wait of 3hr50 to 4hr	.940 ¹
Four or more investigations	.923 ¹

Note

1 p<0.01

Figure 3

Correlation between each dependent variable at provider level (MH services users only)

	Arrival by ambulance	OOH arrival	Admitted	Left without being seen	Wait of 3hr50 to 4hr	Four or more investigations
Arrival by ambulance	–					
OOH arrival (Mon to Fri 6:30pm – 8am, weekend)	.281 ²	–				
Admitted	.422 ²	0.06	–			
Left without being seen	-0.05	0.05	-.297 ²	–		
Wait of 3hr50 to 4hr	0.15	0.09	.290 ²	0.03	–	
Four or more investigations	.292 ²	0.04	.212 ¹	0.03	.370 ²	–

Notes

1 p<0.05

2 p<0.01

Figure 4

Frequent attenders

A&E attendances during 2013/14	Proportion of attendees who are MH service users (%)
1 or more	8.2
2 or more	13.6
3 or more	19.2
4 or more	24.8
5 or more	30.1
6 or more	34.9
7 or more	39.5
8 or more	43.2
9 or more	46.6
10 or more	49.4
15 or more	58.2
25 or more	66.1
50 or more	71.8

Figure 5

Estimated coefficients for binary logit models with addition of control variables

Control(s) added	(i) None	(ii) Male	(iii) Age	(iv) Ethnicity	(v) Timing	(vi) Diagnosis	(vii) Provider	(viii) Area	(ix) Spend	(x) 'Severity'
Arrival by ambulance										
OR (MH_user)	3.51 ³ [3.49-3.52]	3.50 ³ [3.49-3.52]	3.48 ³ [3.47-3.50]	3.47 ³ [3.45-3.49]	3.23 ³ [3.21-3.25]	2.52 ^{**} [2.51-2.53]	2.44 ³ [2.42-2.45]	2.37 ³ [2.35-2.38]	2.37 ³ [2.35-2.38]	n/a
Change in OR		-0.2%	-0.5%	-0.3%	-7.0%	-22.0%	-3.4%	-2.8%	0.1%	
Pseudo-r ² n	.044-.062 7,003,429	.044-.063	.175-.246	.175-.246	.220-.310	.291-.411	.322-.453	.324-.456	.324-.456	
OOH arrival (Mon to Fri 6:30pm and 8am and weekend)										
OR (MH_user)	1.29 ³ [1.29-1.30]	1.30 ³ [1.29-1.30]	1.31 ³ [1.30-1.32]	1.32 ³ [1.31-1.32]	n/a	1.16 ³ [1.16-1.17]	1.12 ³ [1.12-1.13]	1.13 ³ [1.12-1.13]	1.13 ³ [1.12-1.13]	1.04 ³ [1.04-1.05]
Change in OR		0.3%	1.0%	0.4%		-11.5%	-3.4%	0.2%	0.0%	-7.4%
Pseudo-r ² n	.002-.003 7,003,429	.002-.003	.006-.008	.006-.008		.020-.027	.036-.049	.036-.049	.037-.049	.045-.060
Admitted										
OR (MH_user)	2.04 ³ [2.03-2.05]	2.03 ³ [2.02-2.04]	1.80 ³ [1.79-1.81]	1.80 ³ [1.79-1.81]	1.70 ³ [1.69-1.70]	1.47 ³ [1.47-1.48]	1.40 ³ [1.39-1.41]	1.40 ³ [1.39-1.41]	1.40 ³ [1.39-1.41]	1.18 ³ [1.17-1.19]
Change in OR		-0.3%	-11.3%	0.0%	-5.7%	-13.1%	-4.9%	-0.2%	0.2%	-15.7%
Pseudo-r ² n	.013-.019 6,996,388	.014-.020	.118-.173	.118-.173	.129-.189	.254-.372	.283-.415	.283-.415	.284-.416	.304-.446
Left without being seen										
OR (MH_user)	2.23 ³ [2.20-2.25]	2.26 ³ [2.24-2.29]	2.54 ³ [2.51-2.57]	2.54 ³ [2.51-2.56]	2.23 ³ [2.20-2.25]	1.82 ³ [1.80-1.84]	1.78 ³ [1.76-1.80]	1.72 ³ [1.70-1.74]	1.72 ³ [1.70-1.74]	1.70 ³ [1.68-1.72]
Change in OR		1.4%	12.4%	-0.2%	-12.2%	-18.4%	-2.0%	-3.7%	0.2%	-1.3%
Pseudo-r ² n	.003-.013 6,996,388	.003-.016	.011-.051	.011-.051	.016-.075	.044-.209	.045-.212	.045-.214	.045-.215	.045-.215
Wait of 3hr50 to 4hr										
OR (MH_user)	1.66 ³ [1.65-1.67]	1.66 ³ [1.65-1.67]	1.49 ³ [1.48-1.50]	1.50 ³ [1.49-1.51]	1.43 ³ [1.43-1.44]	1.26 ³ [1.25-1.27]	1.22 ³ [1.21-1.22]	1.22 ³ [1.21-1.23]	1.22 ³ [1.21-1.23]	1.13 ³ [1.12-1.14]
Change in OR		-0.4%	-10.0%	0.8%	-4.6%	-12.2%	-3.4%	0.1%	0.0%	-7.1%
Pseudo-r ² n	.003-.007 7,002,460	.003-.007	.019-.040	.019-.041	.024-.050	.046-.098	.060-.127	.060-.127	.060-.128	.063-.135

Notes

1 95% CI given in square brackets

2 p<0.05

3 p<0.01

4 ^Lower bound represents Cox & Snell-r², upper bound represents Nagelkerke-r²

Figure 5 *continued*

Estimated coefficients for binary logit models with addition of control variables

Control(s) added	(i) None	(ii) Male	(iii) Age	(iv) Ethnicity	(v) Timing	(vi) Diagnosis	(vii) Provider	(viii) Area	(ix) Spend	(x) 'Severity'
Four or more investigations undertaken										
OR (MH_user)	1.69 ³ [1.68-1.70]	1.68 ³ [1.67-1.69]	1.49 ³ [1.48-1.50]	1.51 ³ [1.50-1.52]	1.44 ³ [1.43-1.44]	1.26 ³ [1.26-1.27]	1.22 ³ [1.21-1.22]	1.21 ³ [1.21-1.22]	1.21 ³ [1.21-1.22]	1.01 ² [1.00-1.01]
Change in OR		-0.6%	-11.1%	1.3%	-4.9%	-12.0%	-3.9%	-0.1%	-0.1%	-17.0%
Pseudo-r ² n	.007-.011 5,480,217	.008-.012	.080-.116	.082-.119	.092-.133	.239-.344	.268-.386	.268-.386	.268-.387	.292-.421
Frequent attender										
OR (MH_user)	4.16 ³ [4.13-4.19]	4.16 ³ [4.12-4.19]	3.93 ³ [3.90-3.96]	3.93 ³ [3.90-3.96]	n/a	n/a	n/a	3.78 ³ [3.75-3.81]	3.78 ³ [3.75-3.81]	n/a
Change in OR		-0.1%	-5.4%	0.9%				-4.6%	0.0%	
Pseudo-r ² n	.015-.044 6,989,363	.015-.044	.016-.047	.017-.047				.019-.055	.020-.056	

Notes

- 1 95% CI given in square brackets
- 2 p<0.05
- 3 p<0.01
- 4 ^Lower bound represents Cox & Snell-r², upper bound represents Nagelkerke-r²

Figure 6

Estimated coefficients by MH condition

	Non-psychotic		First episode psychosis	Psychotic			Organic		All MH users
	Common mental health problems	Non-psychotic (more severe)		Psychotic (less severe)	Psychotic (more severe)	Dual diagnosis	Organic (less severe)	Dementia	
Arrival by ambulance									
OR (no controls)	2.92 ³ [2.84-3.01]	2.44 ³ [2.42-2.47]	1.57 ³ [1.50-1.64]	2.25 ³ [2.19-2.32]	2.55 ³ [2.50-2.60]	2.85 ³ [2.75-2.96]	5.32 ³ [5.20-5.44]	9.42 ³ [9.26-9.59]	3.51 ³ [3.49-3.52]
OR (all controls)	2.30 ³ [2.22-2.38]	2.14 ³ [2.11-2.17]	1.58 ³ [1.50-1.66]	1.81 ³ [1.75-1.87]	2.04 ³ [1.99-2.09]	2.38 ³ [2.28-2.48]	1.38 ³ [1.35-1.42]	2.29 ³ [2.25-2.34]	2.37 ³ [2.35-2.38]
Change in OR	-21.4%	-12.4%	0.6%	-19.8%	-19.9%	-16.7%	-74.0%	-75.6%	-32.5%
OOH arrival (Mon to Fri 6:30pm and 8am and weekend)									
OR (no controls)	1.40 ³ [1.36-1.44]	1.39 ³ [1.37-1.40]	1.46 ³ [1.40-1.53]	1.27 ³ [1.24-1.31]	1.37 ³ [1.34-1.40]	1.62 ³ [1.56-1.68]	1.02 [1.00-1.04]	1.13 ³ [1.12-1.15]	1.29 ³ [1.29-1.30]
OR (all controls)	1.16 ³ [1.12-1.19]	1.10 ³ [1.09-1.11]	1.04 [1.00-1.09]	1.11 ³ [1.08-1.15]	1.14 ³ [1.11-1.16]	1.21 ³ [1.17-1.26]	1.07 ³ [1.05-1.09]	1.16 ³ [1.14-1.17]	1.13 ³ [1.12-1.13]
Change in OR	-17.6%	-20.8%	-28.8%	-12.6%	-16.9%	-25.1%	5.0%	2.1%	-12.4%
Admitted									
OR (no controls)	1.61 ³ [1.56-1.66]	1.45 ³ [1.43-1.46]	0.90 ³ [0.85-0.94]	1.37 ³ [1.33-1.41]	1.31 ³ [1.28-1.34]	1.26 ³ [1.21-1.31]	3.32 ³ [3.25-3.39]	3.77 ³ [3.71-3.82]	2.04 ³ [2.03-2.05]
OR (all controls)	1.46 ³ [1.40-1.51]	1.50 ³ [1.48-1.52]	1.46 ³ [1.38-1.54]	1.22 ³ [1.18-1.27]	1.21 ³ [1.18-1.24]	1.41 ³ [1.35-1.48]	1.02 [1.00-1.05]	1.10 ³ [1.08-1.12]	1.40 ³ [1.39-1.41]
Change in OR	-9.7%	3.9%	62.3%	-10.8%	-8.0%	12.6%	-69.2%	-70.9%	-31.4%
Left without being seen									
OR (no controls)	2.85 ³ [2.68-3.03]	2.96 ³ [2.89-3.02]	3.28 ³ [3.02-3.56]	2.42 ³ [2.28-2.58]	3.16 ³ [3.03-3.30]	5.45 ³ [5.14-5.77]	0.44 ³ [0.39-0.48]	0.34 ³ [0.32-0.38]	2.23 ³ [2.20-2.25]
OR (all controls)	1.63 ³ [1.53-1.74]	1.70 ³ [1.66-1.74]	1.45 ³ [1.33-1.58]	1.62 ³ [1.51-1.73]	1.83 ³ [1.75-1.92]	2.46 ³ [2.31-2.62]	1.15 ² [1.03-1.28]	0.86 ³ [0.79-0.94]	1.72 ³ [1.70-1.74]
Change in OR	-42.6%	-42.4%	-55.8%	-33.2% ^w	-42.0%	-54.9%	163.7%	148.9%	-22.9%
Wait of 3hr50 to 4hr									
OR (no controls)	1.48 ³ [1.42-1.54]	1.45 ³ [1.43-1.48]	1.05 [0.98-1.13]	1.42 ³ [1.36-1.48]	1.45 ³ [1.41-1.50]	1.36 ³ [1.29-1.44]	2.10 ³ [2.04-2.16]	2.34 ³ [2.29-2.38]	1.66 ³ [1.65-1.67]
OR (all controls)	1.23 ³ [1.18-1.29]	1.29 ³ [1.27-1.31]	1.18 ³ [1.09-1.27]	1.20 ³ [1.14-1.25]	1.20 ³ [1.16-1.24]	1.23 ³ [1.16-1.30]	1.08 ³ [1.05-1.11]	1.14 ³ [1.12-1.17]	1.22 ³ [1.21-1.23]
Change in OR	-16.8%	-11.4%	11.7%	-16.0%	-17.3%	-9.8%	-48.7%	-51.0%	-26.5%

Notes

1 95% CI given in square brackets

2 p<0.05

3 p<0.01

Figure 6 *continued*

Estimated coefficients by MH condition

	Non-psychotic		First episode psychosis	Psychotic		Dual diagnosis	Organic		All MH users
	Common mental health problems	Non-psychotic (more severe)		Psychotic (less severe)	Psychotic (more severe)		Organic (less severe)	Dementia	
Four or more investigations undertaken									
OR (no controls)	1.32 ³ [1.27-1.36]	1.26 ³ [1.25-1.28]	0.81 ³ [0.76-0.85]	1.23 ³ [1.19-1.27]	1.25 ³ [1.22-1.28]	1.07 ³ [1.02-1.12]	2.70 ³ [2.64-2.76]	2.98 ³ [2.93-3.03]	1.69 ³ [1.68-1.70]
OR (all controls)	1.04 [1.00-1.08]	1.18 ³ [1.17-1.20]	1.01 [0.95-1.08]	0.98 [0.94-1.02]	0.99 [0.97-1.02]	0.99 [0.94-1.04]	1.07 ³ [1.04-1.10]	1.14 ³ [1.12-1.16]	1.21 ³ [1.21-1.22]
Change in OR	-21.3%	-6.2%	25.6%	-20.5%	-20.6%	-7.2%	-60.4%	-61.7%	-28.4%
Frequent attender									
OR (no controls)	4.91 ³ [4.67-5.16]	5.15 ³ [5.06-5.25]	3.68 ³ [3.43-3.95]	3.17 ³ [3.02-3.32]	4.38 ³ [4.24-4.54]	6.71 ³ [6.33-7.11]	2.48 ³ [2.38-2.57]	3.35 ³ [3.27-3.44]	4.16 ³ [4.13-4.19]
OR (all controls)	4.52 ³ [4.30-4.75]	5.19 ³ [5.10-5.29]	3.45 ³ [3.22-3.70]	3.04 ³ [2.90-3.18]	4.20 ³ [4.06-4.35]	6.71 ³ [6.33-7.12]	1.72 ³ [1.65-1.79]	2.21 ³ [2.16-2.27]	3.78 ³ [3.75-3.81]
Change in OR	-8.0%	0.8%	-6.2%	-4.1%	-4.1%	0.1%	-30.5%	-34.0%	-9.1%

Notes

1 95% CI given in square brackets

2 p<0.05

3 p<0.01