European Journal of Public Health, Vol. 17, No. 4, 387–393

doi:10.1093/eurpub/ckl248 Advance Access published on October 25, 2006

Miscellaneous

Are mental health problems associated with use of Accident and Emergency and health-related harm?

J. Keene*, J. Rodriguez*

Background: Previous findings indicate that mental health problems are common in Emergency departments; however, there are few studies of the extent of health-related problems and emergency service use in mental health populations as a whole. **Methods:** Record linkage methods were used to map the association between mental health, age, gender, and health-related harm across total health and mental health care populations in one geographical area, over three years. By examining patterns of health-related harm, an accurate profile of mentally ill Emergency patients was generated enabling identification of factors that increased vulnerability to harm. **Results:** Of the total population of 625 964 individuals, 10.7% contacted Accident and Emergency (A&E) over three years, this proportion rose to 28.6% among the total secondary care mental health population. Young men and older women were more likely to contact A&E, both overall and within mental health populations and were also more likely to be frequent attendees at A&E. Four distinct groups (typologies) of mental health patients attending A&E emerged: young, male frequent attendees with self-inflicted and other traumatic injuries; young females also presenting with self-harm; older patients with multiple medical conditions; and very old patients with cardiac conditions and fractures. **Conclusion:** The study indicates increased A+E service use and unmet health-related need within a total mental health population. It identifies specific 'care populations' particularly vulnerable to accidents and self-harm and highlights the need for targeted services for mentally ill groups who may not access traditional health and social care services effectively.

Keywords: Accident and Emergency, health-related harm, mentally ill, populations.

Introduction

The recognition that individuals with mental illness make frequent use of Accident and Emergency (A&E) services has led to an interest in the extent of mental health need among A&E patients[1,2] and in the wider needs and service use of mental health groups.[3,4] However, reviews of research identify only fragmented studies of need in clinical subgroups.[5–7]

Work combining subsets of A&E and other health care populations in order to identify wider needs has been informative but limited. Ruzicka[8] combined datasets to study causes of deaths in suicides; Crandall *et al.*[9] studied injuries and emergency attendance in high risk families. Saliou *et al.*[1] assessed the prevalence of psychiatric disorders in a hospital emergency service. They found that 38% of the emergency service sample had psychiatric disorders.[3] Hisley and Meldon[2] found that one in six older people in an A&E had dementia. Payne[4] found that 45% of 556 contacts presented to an A&E department had mental health problems. Whereas previous studies have identified unmet mental health needs in emergency health care services,[10,11] this study also focuses on the unmet needs of mental health populations.

A key focus of epidemiological research is to investigate the role of individual and social factors in determining health behaviours.[12] These behaviours result from complex 'chains of causation' difficult to identify and measure[13] Cummins.[14] Glass and McAtee[15] advocate mapping out interactions between mental health and of factors responsible for well-known patterns of health behaviour. Studying these interactions is difficult[13] but feasible. For example, Ford *et al.*[16] explored patterns of mental health, health, and class, assessing their generalisability across age/sex groups and health domains.

This study contributes to this work by examining total care populations to identify vulnerable groups utilising multiple services.[7,17,18] It maps, for the first time in the UK, changing patterns along the life cycle and across genders, of mental disorder, health-related harm, and health problems in a total health care population. It explores whether attendance and frequent attendance to A&E services is greater in the subpopulation of the mentally disordered than in the population at large. It compares characteristics and medical conditions of A&E populations with and without mental health problems, and identifies distinct groups of mentally ill A&E patients according to their medical conditions, age, and gender.

Methods

Case linkage methods were used to combine disaggregated data and link total population records of different agency populations.[19,20] This method has been limited in the UK to health care populations,[20] with the exception of Godden and Pollock's[21] work combining health and social care populations for a cross-sectional study of one day. This study combines total mental health and health care populations for a 3-year period. Data from a Health Authority population of one English county ($N = 625\,964$) were linked with data from the Mental Health Trust population (comprising all secondary care mental health services; $N = 18\,899$) and the Accident and Emergency population ($N = 66\,973$). Only individuals older than 15 at the beginning of the period were studied. The estimated rate of error was 5–10% and assumed to be random, so that datasets can be treated as large random samples of the

* University of Reading, Reading, UK
Correspondence: University of Reading, Bulmershe Court, Earley, Reading RG6 1HY, UK, tel.: +44 118 987 5841, fax: +44 118 931 6808, e-mail: j.keene@reading.ac.uk

target populations. Data were anonymised at source using the SOUNDEX-PHLS system. NHS ethics committees covering the Community Mental Health Trust and Hospital Trust granted ethical approval.[4] The database included date of reception, age, sex, frequency of contact with A&E, assessed health and health-related needs, and contact with mental health services.

The county studied was classified as 'Coast and Country', that is an area with coastal, rural, and urban characteristics but including a predominance of sparse rural populations.[5] Age range, population density, employment patterns, Jarman index scores, and DoE index of deprivation scores were similar to other 'peer group' UK counties within this category.[22]

Results

Demographic overview

table 1 presents counts and percentages of different gender and age groups and of individuals in contact with mental health services in the overall population, the subpopulation of A&E attendees, and the subpopulation of frequent A&E attendees (more than two visits). Row percentages provide information about the prevalence of A&E attendance and frequent attendance, both overall (bottom row) and among age and gender groups. The comparison of column percentages across the three subpopulations allows a preliminary assessment of the presence of any over- or under-representations of gender, age, and mentally disturbed groups in each population.[1]

Of the 625 964 Health Authority patients, 66 873 (10.7%) had contacted A&E during the 3-year period (see totals in last row). Of these, 10.2% attended three or more times. Males contacted A&E in slightly larger proportions than females, and more frequently. The younger the age group, the higher the proportion of A&E users and frequent users (except for the oldest group, who attended A&E proportionally to its demographic size).

Of the Health Authority population, 3% contacted Mental Health services. Of the mental health population patients, 28.6% contacted A&E (almost three times the rate of the overall health Authority population), much more than twice (24.1%, as against 10.2% overall).[6] In summary, males, young people, and the mental disordered attended A&E disproportionately, and more frequently.

Unfortunately, table 1 cannot establish whether the gender and age distributions of mental health patients in contact with A&E services are proportional to the distributions of gender and age groups in the separate populations of mental health patients and A&E attendees. Nor is it possible to determine whether any over- or under-representations, including those detected in table 1, are significant. The next subsection settles these issues.

Testing associations and interactions

table 2 summarises results from modelling associations and interactions between previous variables with the help of two logistic regressions. Both have the same independent variables—age (six groups), gender, and contact with mental health—and different dependent variables—the log-odds (logits) of contacting A&E (Model 1) or of doing it frequently for individuals who attended A&E at least once during the period (Model 2). We use logistic regression because its results are easier to present than equivalent log-linear models of association, but in truth we are not trying to predict A&E attendance (or frequent attendance) from a set of independent regressors, only to establish the association between A&E attendance and gender, age, and mental health status (and combinations or interactions between these factors), based on any over- and under-representations of these groups in the population of A&E patients.[1] The models in table 2 are hierarchical—including all lower order effects contained in more complex interactions. Only effects that are statistically significant are shown, except when a non-significant effect helps maintain models' hierarchy or interpret other coefficients. The models fit the data well, but *significantly* less so than the saturated model, i.e., than the model including all possible interactions between the independent variables (see goodness of fit). Whilst adding more interactions (coefficients) improves the fit, it makes the

Table 1 Demographics and mental health status of A&E and non-A&E populations

	All Population		Contacted Accident & Emergency services?						Frequency of contact with A&E					
	Count	Col %	No			Yes			1–2 times			3 or more times		
			Count	Col %	Row %	Count	Col %	Row %	Count	Col %	Row %	Count	Col %	Row %
Gender														
Male	302 599	48.5	265 641	47.6	87.8	36 958	55.6	12.2	32 638	54.4	88.3	4 319	63.6	11.7
Female	321 698	51.5	292 196	52.4	90.8	29 502	44.4	9.2	27 027	45.0	91.6	2 471	36.4	8.4
Age in October 1st 1996 (6 groups)														
16–25	92 086	14.7	76 598	13.7	83.2	15 488	23.2	16.8	13 034	21.7	84.2	2 451	35.8	15.8
26–35	112 272	17.9	97 813	17.5	87.1	14 459	21.6	12.9	12 794	21.3	88.5	1 664	24.3	11.5
36–45	102 789	16.4	92 773	16.6	90.3	10 016	15.0	9.7	9 128	15.2	91.1	887	13.0	8.9
46–55	110 149	17.6	101 171	18.1	91.8	8 978	13.4	8.2	8 379	14.0	93.3	599	8.7	6.7
56–70	127 785	20.4	118 778	21.2	93.0	9 007	13.5	7.0	8 530	14.2	94.7	477	7.0	5.3
>70	80 883	12.9	71 958	12.9	89.0	8 925	13.3	11.0	8 156	13.6	91.4	769	11.2	8.6
Contact with mental health?														
No	607 065	97.0	545 594	97.6	89.9	61 471	91.9	10.1	55 926	93.2	91.0	5 543	81.0	9.0
Yes	18 899	3.0	13 497	2.4	71.4	5 402	8.1	28.6	4 095	6.8	75.8	1 304	19.0	24.1
Total	625 964	100.0	559 091	100.0	89.3	66 873	100.0	10.7	60 021	100.0	89.8	6 847	100.0	10.2

Table 2 Estimated odds of contacting A&E and of doing it 3 or more times, conditional to having mental health problems, being male, and being in diffferent age groups (and interactions)

	Model 1[a]		Model 2[b]	
	Odds[c]	(95% CI)	Odds[c]	(95% CI)
Category				
Constant	0.20***	0.19–0.2	0.14***	0.14–0.15
Age (16–25)	1.7***	1.67–1.73	1.89***	1.8–1.99
Age (26–35)	1.21***	1.19–1.23	1.22***	1.15–1.29
Age (36–45)	0.9***	0.89–0.92	0.95	0.89–1.02
Age (46–55)	0.76***	0.75–0.78	0.75***	0.69–0.81
Age (56–70)	0.67***	0.66–0.68	0.61***	0.57–0.67
Age (>70)[d]	1.03		0.96	
Male	1.13***	1.11–1.15	1.16***	1.12–1.19
Female[d]	0.87		0.86	
Mental Health	1.88***	1.84–1.91	1.83***	1.77–1.89
No Mental Health[d]	0.53		0.54	
Age (16–25)* Male	1.17***	1.15–1.19	1.08***	1.03–1.13
Age (26–35)* Male	1.18***	1.16–1.2	1.12***	1.06–1.19
Age (36–45)* Male	1.1***	1.08–1.12	1.06[e]	0.99–1.14
Age (46–55)* Male	1	0.98–1.02	0.94	0.87–1.01
Age (56–70)* Male	0.87***	0.85–0.88	1	0.92–1.09
Age (>70)* Male[d]	0.74		0.8	
Male* Mental Health	0.97[e]	0.96–1.00		
Female* Mental Health[d]	1.01			
Goodness of fit				
Likelihood ratio	22.14		34.94	
Degrees of Freedom	10		11	
Probability	0.014		0.000	

a: Dependent variable: Contact with A&E; *N* = All population (625 964)
b: Dependent variable: Frequent Contact (>2) with A&E; N = All A&E attendees (66 873)
c: Odds of A&E contact vs. no A&E contact (Model 1) or of frequent A&E contact vs. no frequent A&E contact (Model 2) in each category (relative to expectations)
d: Reference category. Odds for reference categories have been fixed using ANOVA (deviation) normalization
e: Nearly significant at the 0.05 level
***Significant at the 0.001 level; **Significant at the 0.01 level; *Significant at the 0.05 level

interpretation unnecessarily complex. Logits have been transformed into odds to simplify interpretations. If larger than 1, they indicate that A&E patients (Model 1) or A&E frequent patients' (Model 2) odds of being, say, 16–25, rather older than 70, were 1.7 times higher than for non-patients or non-frequent patients. Smaller than 1 odds mean that the odds were as many times smaller as indicated by dividing 1 by the corresponding number. Odds near 1 indicate similar odds, i.e., that the pertinent group is not more or less likely to attend A&E or of doing so more frequently than expected by the overall numbers of individuals in the group.[1]

Effects in Model 1 confirm that many of the over- and under-representations observed in table 1 were statistically significant. They also provide an alternative metric to measure them. Finally, they indicate that there were significant differences in the age and gender distributions of mentally disturbed A&E patients relative to the age and gender compositions of mental health and A&E patients considered separately.

Young individuals'[7] (16–35) over-representations and adults' (36–70) under-representations among A&E patients were significant. Males and mental health patients' over-representations among A&E attendees were also significant: Males' and mentally disordered individuals' odds of contacting A&E were, respectively, 1.13 and 1.88 times significantly higher than expected by the numbers of males and mental health patients in the population.[2]

Interaction effects in Model 1 of table 2 show that the over-representations of males and young people among A&E attendees were even stronger than expected when both factors were combined: 16- to 35-year-old males were 1.17–1.18 times more likely to attend A&E services than males or young people alone. On the contrary, mental health males were slightly less likely to contact A&E than males and mental health patients considered separately, although the coefficient only approaches significance.[2]

Model 2 shows that the effects on the odds of contacting A&E frequently were quite similar to the odds of contact per se.

Younger people, males, and the mentally disordered had higher odds of contacting A&E frequently, and younger males even more so.[2]

Profiles of A&E patients with mental health problems

We next identify profiles of mentally ill A&E patients based on their medical conditions (as diagnosed at A&E and recoded into 20 groups), age and gender, and frequency of attendance to A&E. After identifying an overall profile, we distinguish four distinct subprofiles of shared A&E and MH patients.

To conduct the analyses, we no longer rely on log-linear models (as there are[8] too few degrees of freedom), but on two closely interrelated multivariate techniques that identify *patterns* of interactions between multiple factors: Non-Linear Canonical Correlation (NLCC) and Categorical Principal Component Analysis (CPCA). Both are briefly described next.

The techniques

Both NLCC and CPCA uncover 'latent' dimensions in patterns of co-variation between variables. They resemble regular canonical correlation and principal component analyses except that they apply optimal scaling to categorical data.[23] Categories are replaced with scores that best capture their 'distances'—frequency distribution profiles—across other variables' categories. Scaling helps extract orthogonal components—'eigenvalues'—with standard methods and order them according to the proportion of variance explained. The correlations—'loadings'—between the optimally scaled variables and the components facilitate the latter's interpretation.

Non-linear canonical correlation differs from categorical principal component analysis in finding patterns of correlations *within* sets of variables whilst also maximizing correlations *between* sets. If two sets are defined, one including individuals' medical conditions, age, gender, and frequency of use of A&E services, the other with one variable measuring whether or not individuals contacted mental health services, the technique will find a pattern contrasting the characteristics of mentally and non-mentally disordered A&E patients. The squared correlation ('fit') between sets provides a measure of strategy's success. If high and significant, as in our case (fit $= 0.812$; $p \leq 0.000$), it shows that the uncovered profile is very distinctive of A&E patients with mental health problems and significantly different from those without them. The 'profile' is measured with a continuous, normalized variable. It can be interpreted by looking at its correlations ('loadings') with the quantified versions of the original variables or by comparing percentages experiencing each trait/condition and having positive scores in the profile (thus more likely to experience mental problems) with all A&E patients having the trait.

In contrast with non-linear canonical correlation, categorical principal components analysis uncovers several profiles within one group rather than across many. Whilst the profile uncovered by NLCC represents an 'average' distinguishing mentally from non-mentally disordered A&E patients, CPCA's profiles identify subgroups of shared A&E and MH patients. As before, they can be interpreted using the 'loadings' or correlations with the scaled versions of the original variables.

The results

Figure 1 plots variables' loadings in the component identified by non-linear canonical correlation as maximising the differences between mentally disordered and non-mentally disordered A&E patients (against the left-hand *y*-axis). It also plots, against the right-hand *y*-axis, percentages of individuals with each condition/trait in the population at large (white bars) and in the subpopulation of individuals with positive scores in the uncovered profile (striped bars), thus more likely to have contacted mental health agencies.

Figure 1 shows that A&E patients who were likely to contact MH agencies were also slightly more likely to be female and older than 45. This is in agreement with the interaction effect between gender and mental health detected with logistic regression in Model 1 of table 2. Figure 1 shows that mental health patients were almost five times more likely to be frequent A&E attendees (see differences in percentages) than individuals never in contact with mental health services. Finally, figure 1 illustrates which factors best explain mental health patients' contacts with A&E: deliberate self-harm (DSH), psychiatric disorders, poisoning, unknown diagnoses, no waiting for a

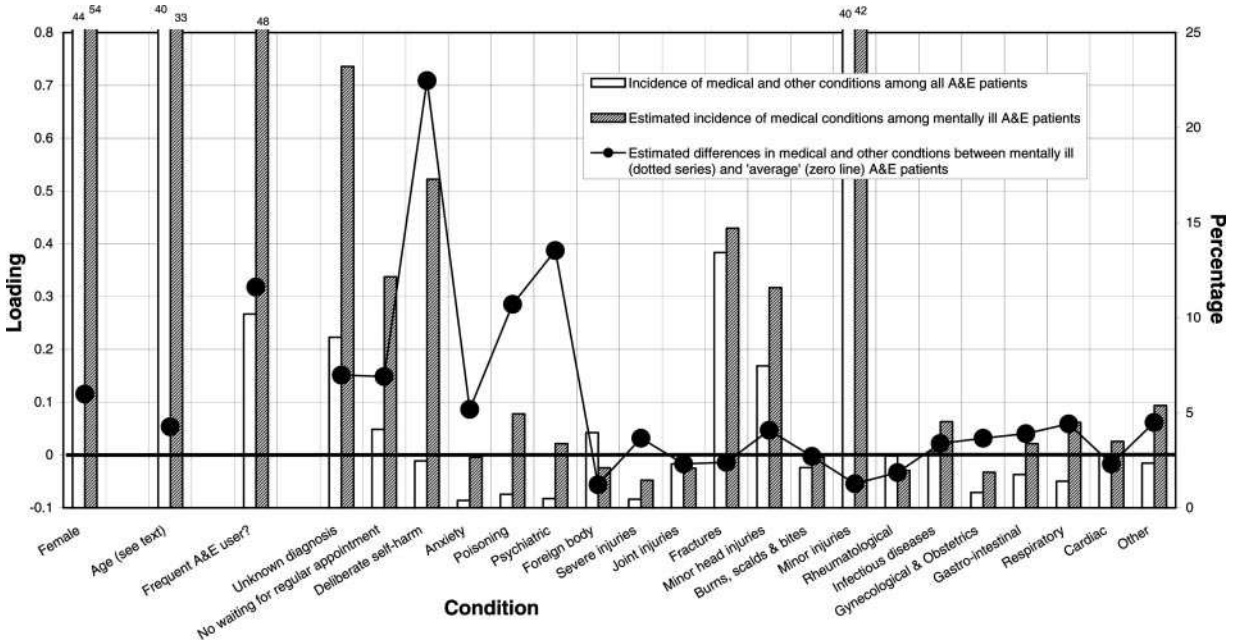

Figure 1 Main profile of mentally ill A&E patients according to their conditions. Results from non-linear canonical correlation

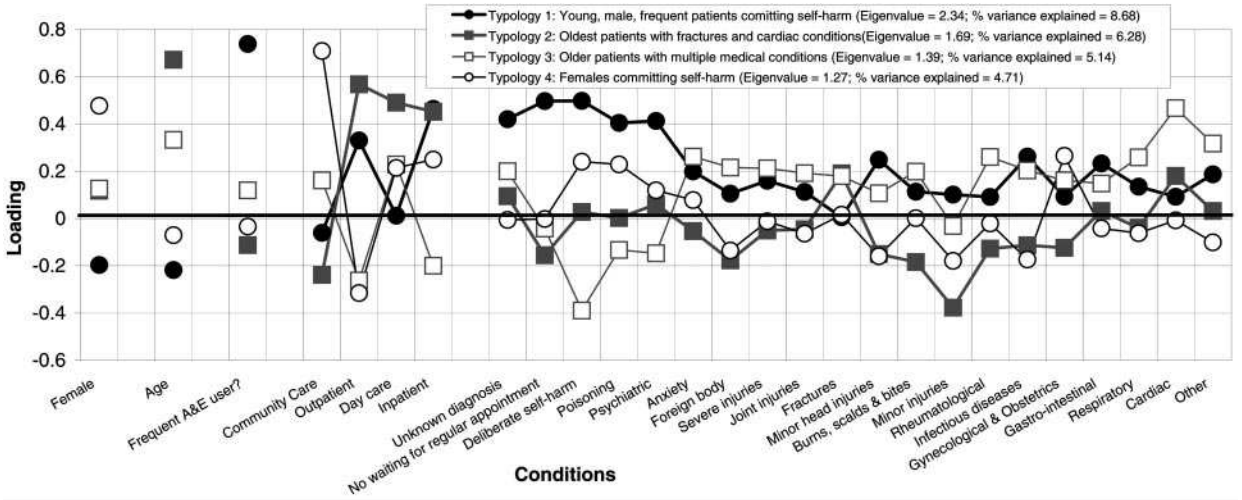

Figure 2 Typologies of mental health and A&E patients based on their medical conditions

regular appointment with the general practitioner, and anxiety, in this order.

Figure 1 provides only an overview of the characteristics of mental health patients in contact with A&E services. To avoid the risk of statistically stereotyping mentally disordered A&E patients, we present in figure 2 the main results of applying categorical principal analysis to the subpopulation of A&E patients with records of contact with MH agencies. The analyses include the same variables listed in figure 1, plus four dichotomies recording whether or not the MH patient was treated as an inpatient, outpatient, community care, or day-care patient for his/her mental condition. Four typologies are identified and listed according to how much variance they explain of the original variables (or 'relative importance').

Type 1 was composed of disproportionate numbers of young, male, frequent A&E attendees, more likely than other mentally ill A&E patients to be treated as inpatients and outpatients for their mental conditions, and presenting above-average numbers of self-inflicted injuries and psychiatric problems at A&E. The second group was composed of older patients with disproportionate numbers of minor head injuries and cardiac problems, and more likely to receive out-, in- or day-mental health care. The third profile identified adult individuals suffering from cardiac and many other medical conditions and presenting fewer self-inflicted injuries or psychiatric problems at A&E. They received above-average day and community mental health care. Young females receiving community mental health services and presenting moderately disproportionate numbers of self-inflicted injuries and poisoning at A&E conformed the last group.

Discussion

First, we established the existence of a strong and positive statistical association between mental health problems and usage and frequent usage of A&E services. The proportion of the county's Health Authority population attending A&E in the 3-year period was 10.7%; it rose to 28.6% among the mental health population. This figure is slightly lower than the 35% that Saliou *et al.*[1] estimated for a sample of A&E attendees, which is to be expected, as our data included only individuals utilising secondary care mental health services.

The youngest and (less markedly) oldest groups were significantly over-represented in A&E, both overall and among frequent attendees. Males were disproportionately present at A&E; younger males, even more so. These over-representations applied also to the mental health subpopulation of A&E patients and frequent patients, with an additional and slight—almost significant—over-representation of older females.

Second, we established differences in health conditions, age, and gender characteristics between A&E patients with and without mental health problems. A&E patients with mental health problems were slightly more likely to be old and females, presenting histories of self-inflicted harm and trauma, than non-mentally ill A&E patients. This confirms previous findings on mentally disordered patients being more likely to be vulnerable to and/or involved in violence[1] and self-harm.[24,25]

Our method has limitations: it only estimates minimum extent of problems as it records only those who utilised services.[26] This utilisation is influenced by administrative, resource, and organisational factors. Findings may also be affected by factors such as physical accidents leading to mental health problems.[27] However, our research raises useful questions regarding interaction effects between gender, age, health, and mental health. For example, are health services less accessible for the mentally ill?[28] Do hospitals respond differently to different age groups' needs?[2,29] Does A&E attendance signal vulnerable groups' lack of access to adequate health care?[29]

Finally, we identified four distinct groups (typologies) of mental health patients attending A&E. Two typologies were disproportionately made of young men and young women who had self-harmed, been harmed by others, or had accidents. In contrast, the other two captured older people who attended A&E for multiple medical reasons. These two classes of mental health care populations resemble the two age-related groups of users of residential mental health facilities found by Prior and Hayes.[30] These care populations—and subpopulations within them—have different problems and service needs. For example, in many countries DSH is an important cause of A&E attendance and emergency hospital admission for young males and females with mental health problems.[18,24,31,32] However, we know little about their assessed needs or service uses.[32,33] We contributed to filling this gap by showing how young males presenting self-harm at A&E were disproportionately treated as in- or outpatients for their mental conditions, while young females received community care. Neither treatment appeared to have eliminated their higher odds of self-harm. Similarly, we documented the health needs of older people with mental health problems. Their cardiovascular and respiratory problems, pneumonia, and fractures, have been identified in clinical studies.[29,34] More research is needed in this area.[2]

Mental health services for those in hospital are often limited.[34–36] However, recent solutions include supporting

mental health populations in A&E[26,37] and other health settings[38] through the introduction of mental health expertise and training. Also improving health care access for mental health populations through targeted interventions, screening, referral protocols, and inter-professional liaison.[17,26,31,39] Initiatives for dual diagnosis, self-harm, or non-medical interventions also reduce over-use of emergency services.[24,31] There are fewer services meeting the health needs of the mentally ill who do not access health care services.[38,40,41] Solutions might include training for mental health care staff to recognise and assess non-mental health needs or health care provision within mental health services.

This method used in this study could inform these interventions by identifying characteristics and needs of vulnerable groups in total populations. However, there is a wider need to further explore the social factors that impact on both health and mental health. Our findings have identified that patterns of association between mental health and health conditions at A&E differ across age and gender groups. This suggests that mental health may be a 'risk regulator'[15,41] health-related harm through the life-course. If so, there is a need for future research to examine the factors which influence this regulatory mechanism.

Acknowledgements

The authors express thanks to Regional Health Authority and Pilgrim Trust for funding.

The authors have no competing interests.

Key points

- Previous research findings, mainly derived from clinical studies of small groups, indicate that mental health problems are common in Accident and Emergency populations. However, there are few studies of the extent of mental health problems across total health care populations such as A&E and little information concerning the physical health and health-related problems of mental health populations themselves.
- This study maps patterns of mental disorder and health problems across a total health care population in order to examine associations between mental health and other factors and thus identifies the wider risks and needs of mental health populations.
- It demonstrates for the first time in the UK the actual extent of increased A+E service use and health-related need within a total mental health population, identifies specific 'care populations' vulnerable to health-related harm and highlights the need for targeted services for mentally ill groups who may not have access to adequate health care.
- It highlights four distinct groups (typologies) of mental health patients attending A&E. Two typologies of young men and young women who had self-harmed, been harmed by others, or had accidents and two typologies of older people who attended A&E for medical reasons.[9]

References

1 Saliou V, Fichelle A, McLoughlin M, et al. Psychiatric disorders among patients admitted to a French medical emergency service. *Gen Hosp Psychiatr* 2005;27:263–8.

2 Hisley FM, Meldon SW. The prevalence and documentation of impaired mental status in elderly emergency department patients. *Ann Emerg Med* 2002;39:248–53.

3 Keene J, Rodriguez J. Mentally disordered offenders: a case linkage study of criminal justice and mental health populations in the UK. *J Foren Psychiatr Psychol* 2005;16:167–91.

4 Payne F. Utilization of out-of-hours services by patients with mental health problems. *J Public Health Med* 2000;22:302–6.

5 Hagell A, Dowling SD. Scoping review of literature on the health and care of mentally disordered offenders. *CRD Report 16*. London: Policy research Bureau, 1999.

6 O'Keefe S, Leven J. The prognostic significance of delirium in older hospital patients. *J Am Geriatr Soc* 1997;45:174–8.

7 Petrou S, Murray L, Cooper P, et al. The accuracy of self-reported healthcare resource utilization in health economic studies. *Int J Technol Assess Health Care* 2002;18:705–10.

8 Ruzicka LT, Choi CY, Sadkowsky K. Medical disorders of suicides in Australia: analysis using a multiple-cause-of-death approach. *Social Sci Med* 2005;61:333–41.

9 Crandall M, Chiu B, Sheehan S. Injury in the first year of life: risk factors and solutions for high risk families. *J Surg Res* 2006;133:7–10.

10 Tse SK, Wong TW, Lau CC, et al. How good are accident and emergency doctors in the evaluation of psychiatric patients? *Eur J Emerg Med* 1999;6:297–300.

11 Oterino D, Peiro S, Calvo R, et al. Accident and emergency department inappropriate utilization. An evaluation with explicit criteria. *Gac Sanit* 1999;13:361–70.

12 Arbor S, Khlat M. Introduction to social and economic patterning of womens health in a changing world. *Social Sci Med* 2002;54:643–7.

13 Hernan MA, Robins JM. Estimating causal effects from epidemiological data. *J Epidemiol Commun Health* 2006;60:578–86.

14 Cummins S, Macintyre S, Davidsons S, et al. Measuring neighbourhood social and material context: generation and interpretation of ecological data from routine and non-routine sources. *Health Place* 2005;11:249–60.

15 Glass TA, McAtee MJ. Behavioural science at the cross-roads in public health: extending horizons, envisioning the future. *Social Sci Med* 2006;62:1650–71.

16 Ford G, Ecob R, Hunt K, et al. Patterns of class inequality in health through the lifecourse. *Social Sci Med* 1994;39:94–9.

17 Allen D, Griffiths L, Lyne P. Understanding complex trajectories in health and social care provision. *Sociol Health Illness* 2004;26:1008–30.

18 Murphy AW, Leonard C, Plunkett PK, et al. Characteristics of attenders and their attendances at an urban Emergency department over a one year period. *J Emerg Med* 1999;16:425–7.

19 Goldacre M, Kurina L, Yeates D, et al. Use of large medical databases to study associations between diseases. *Quart J Med* 2000;93:669–75.

20 Acheson ED, Baldwin G. *Textbook of Medical Record Linkage*. Oxford: Oxford University Press, 1978.

21 Godden S, Pollock AM. How to profile the population's use of health care and social care in one district. *J Public Health Med* 1998;20:175–9.

22 Office of National Statistics. *Living in Britain; Results from the 1996 General Household Survey*. London: The Stationary Office, 1998.

23 van der Heijden PGM, de Falguerolles A, de Leeuw J. A combined approach to contingency table analysis using correspondence analysis and log-linear analysis. *Appl Stat—J Royal Stat Soc, Series C* 1989;38:249–92.

24 Gairin I, House A, Owens D. Attendance at the Emergency department in the year before suicide: retrospective study. *Br J Psychiatr* 2003;183:28–33.

25 Gunnell D, Bennewith O, Peters TJ, et al. The epidemiology and management of self-harm amongst adults in England. *J Public Health* 2005;27:67–73.

26 Callaghan P, Eales S, Coates T, et al. A review of research on the structure, process and outcome of liaison mental health services. *J Psychiatr Mental Health Nursing* 2003;10:155–65.

27 Klein S, Alexander DA, Hutchinson JD, et al. The Aberdeen Trauma Screening Index: an instrument to predict post-accident psychopathology. *Psychol Med* 2002;32:863–71.

28 Goldberg D. Findings from London's Mental Health: a service in crisis. *Acta Psychiatr Scand Suppl* 2000;399:57–60.

29 Holmes J, House A. Psychiatric illness in hip fracture. Systematic review. *Age Ageing* 2000;29:537–46.

30 Prior PM, Hayes BC. Changing places: men replace women in MH beds in Britain. *Social Pol Admin* 2003;35:397–410.

31 NICE. Self harm: the physical and psychological management and secondary prevention of self harm in primary and secondary care. *Clinical Guideline 16*. National Institute for Clinical Excellence: London, 2004.

32 Colman I, Dryden DM, Thompson AH, et al. Utilization of the emergency department after self-inflicted injury. *Acad Emerg Med* 2004;11: 136–42.

33 Repper J. A review of the literature on the prevention of suicide through interventions in Emergency departments. *J Clin Nursing* 1999;8:3–12.

34 Holmes J, Bentley K, Cameron I. A UK survey of psychiatric services for older people in general hospitals. *Int J Geriatric Psychiatr* 2003;18:716–21.

35 Lynch RM, Simpson M, Higson M, et al. Section 136, The Mental Health Act 1983; levels of knowledge among accident and emergency doctors, senior nurses, and police constables. *Emerg Med J* 2002;19:295–300.

36 Crowley JJ. A clash of cultures: A&E and Mental Health. *Acc Emerg Nursing* 2000;8:2–8.

37 Callaghan P, Eales S, Leigh L, et al. Characteristics of an Accident and Emergency liaison mental health service in East London. *J Adv Nursing* 2001;35:812–8.

38 Reynolds KM, Chesney BK, Capobianco J. A collaborative model for integrated mental and physical health care for the individual who is seriously and persistently mentally ill: The Washtenaw Community Health Organization. *Fam Syst Health* 2006;24:19–27.

39 Department of Health. *National Suicide Prevention Strategy for England*. London: Department of Health, 2002.

40 Rodriguez J, Keene J, Li X. The substantial demands of offenders and frequent offenders. *Eur J Criminol* 2006;3:149–79.

41 Boardman JB. Health Access and integration for adults with serious and persistent mental illness. *Fam Syst Health* 2006;24:3–18.

Received 28 August 2006, accepted 22 September 2006