

Use of electronic health records in identifying drug and alcohol misuse among psychiatric in-patients

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Aims and method To assess the usefulness of the electronic patient record, we used the search engine Clinical Record Interactive Search (CRIS) to scan all acute admissions during 2008 for possible substance use disorders. In addition, screening interviews were undertaken with 75 in-patients, and documentation in their files was compared with results of screening interviews.

Results Of 839 acute admissions during 2008, 47% of males and 29% of females had reference to a substance misuse problem in their file. Documentation was unsystematic and inconsistent and mostly occurred in progress notes rather than in structured questionnaires. Screening interviews and manual review of files of 75 current in-patients confirmed that substance use disorders were common, but poorly documented.

Clinical implications The study highlights the power of search engines in scanning electronic clinical records, but also identified the limitations of unsystematic documentation in research and practice. Mental health staff were reluctant to diagnose or rate severity of substance misuse problems.

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A decade ago, a study on the wards of the Maudsley Hospital found that there was a substantial burden of alcohol-related problems among in-patients, but that recognition and documentation of these problems was poor.¹ The investigators interviewed 200 acute admissions using the Alcohol Use Disorders Identification Test (AUDIT) questionnaire.² They reported that 49% of respondents reported drinking at hazardous levels, 22% met the cut-off for probable alcohol dependence and 27% reported illicit drug use in the month prior to admission. Less than a third of patients had an alcohol history or a drug-use history recorded in the files. They noted that very few patients were referred to addiction services and concluded that although problems were common, they were seldom identified and little intervention was offered. Among the recommendations made by Barnaby and colleagues¹ was for the implementation of a structured approach to documenting alcohol and drug-related problems. Since that study was undertaken, there have been two developments. First, the Maudsley Hospital, like most National Health Service (NHS) facilities, has moved to electronic patient records, including the use of many standardised questionnaires. The electronic record is called the Electronic Patient Journey System (ePJS). The primary objective of this study was to determine what impact this may have had on the completeness of documentation and the identification of drug- and

alcohol-related problems. Second, per capita alcohol consumption in the UK continued to increase until 2007 and in tracking this increase there has been a steep rise in the burden of alcohol-related disease managed in general hospitals.³ In particular, many hospitals have identified a problem of 'revolving-door' patients, among whom patients who are homeless and misuse substances are thought to be overrepresented. A secondary objective of the study was to investigate the relationship between identified substance misuse, homelessness and risks of readmission.

Electronic patient record systems are widely applied throughout hospitals in Europe. They can potentially enhance clinical and managerial processes, and have been claimed to produce more cost-effective care, as well as providing care programmes across clinical disciplines and healthcare sectors.⁴ The electronic system also can provide greater clarity of communication between professionals, and increase the availability of information. These potential advantages might be hypothesised to improve the management of patients with both addiction and mental health disorders. However, the present time can be seen as a period of transition from paper records to an electronic record era. As a consequence, there are inevitable frustrations associated with the introduction of the electronic record system, including 'technical glitches' and 'increased administrative burden'.⁵ The input of data in the electronic

system requires more work from clinicians. Difficulties with data entry can decrease the rate of usage of the electronic health records among clinicians.⁶ Given the change in record keeping, we thought it timely to revisit the issue of estimating the burden of alcohol- and drug-related morbidity being managed in the acute admission wards of the Maudsley Hospital, and whether implementation of the electronic health record has improved the identification and response to alcohol- and drug-related problems.

Method

The study was primarily based on the use of a research infrastructure tool, the Clinical Record Interactive Search (CRIS). This is a search facility designed to facilitate research while protecting patient confidentiality. It provides a Biomedical Research Centre Identification (BRC ID) for each patient and allows for information gathering without exposing data that can be used to identify a patient.⁷ In order to compliment analysis of data from the electronic clinical records, interviews were conducted on wards of the hospital in July 2011, using standard screening tools, and the results of screening with documentation in the patient records were compared.

CRIS data analysis

This project was approved by the Addictions Division Clinical Governance Committee, and by the CRIS committee. All searches were conducted from the BRC Nucleus at Mapother House, Camberwell. The approach to data extraction was to select six acute admission wards and scan all new admissions over a 12-month period from 1 January 2008. Patients who were subsequently discharged and readmitted were only counted once. For each patient admitted in 2008, the first admission was identified as the index admission. In order to estimate readmission, a search of any further admissions within a 12-month period (1 January 2009 to 31 December 2009) was undertaken, and dates of admission and discharge were recorded for all admissions. Files were scanned to determine whether a National Drug Treatment Monitoring System (NDTMS) record had been completed in the ePJS. The NDTMS is a mandatory table in registering an episode of care with addiction services, and this field was used as a marker of whether individuals had at any time been registered for an episode of care within addiction services.

The ePJS contains a number of fields in which alcohol and drug issues may be identified.

- An alcohol- or drug-related diagnosis may be coded (ICD-10 codes F10–F19).⁸
- The Health of the Nation Outcome Scales (HoNOS)⁹ is a mandatory table within the electronic record, and includes a single item of ‘problem drinking and drug taking’, in which the interviewer is asked to rate the severity of alcohol or drug misuse in the 12 days prior to admission on a five-point scale, ranging from zero (‘no problem’), to four (‘severe to very severe problem’).
- A structured physical health assessment is included as a form in the ePJS, and has information on the quantity and frequency of alcohol consumption, allowing the interviewer to calculate a ‘problem drinking score’

(details available from the authors on request). It is recommended that all patients have a physical health assessment completed during an admission.

- Free text could be scanned for key words – ‘alcohol’, ‘EtOH’ [shorthand for alcohol], ‘methadone’ and ‘homeless’. The wildcard “*” was used at the ends of these words to ensure all results relating to these words were brought back, for example, the use of the stem ‘alcohol*’ allowed identification of phrases such as ‘alcohol misuse’, ‘alcoholic’ or ‘does not drink alcohol’.

Using the CRIS software, several sections of data were taken from the ePJS. One of the authors, a founder and developer of CRIS (M.B.) advised on the search strategy and undertook this search. Patient data were then tabulated at three levels.

- Level one: this included general patient data such as age, gender and date of first admission, number of admissions, and NDTMS status.
- Level two: this incorporated data more specific to patient admissions, and included date of all admissions, end date for all admissions (if applicable) and place of admission.
- Level three: this included all ICD-10 diagnostic information (from index admission, prior admissions, subsequent admissions); and from the index admission the HoNOS score for problem drug or alcohol use, and the physical health assessment problem-drinking scores. Additional information was gathered from running free-text searches within the ‘events’ and ‘correspondence’ fields for index admissions. Because free-text references had to be manually screened to determine whether the phrase denoted a problem or the absence of a problem, the free-text search was limited to alcohol*, ‘EtOH’, ‘methadone’ and ‘homeless*’.

This search strategy will not identify free-text documentation of drugs such as cocaine and cannabis. It was adopted for pragmatic reasons. Free-text searching is time-consuming as free-text references had to be manually screened to determine whether the phrase denoted a problem or the absence of a problem. Our primary interest was in prevalence of drinking problems. ‘Methadone’ was included because, whereas use of many other drugs is common and it can be difficult to know how problematic it is, receipt of a prescription for methadone is a clear marker of past or current drug dependence. The data were extracted from CRIS and analysed in SPSS version 19 on Windows Vista. Only aggregated data were approved to be removed from the BRC Nucleus. Analysis was undertaken by a postgraduate student (C.K.).

The initial task was to determine how many patients had entries in their clinical record suggesting a possible or probable substance use disorder. A stepwise approach was undertaken, based on an assessment of the strength of the clinical documentation. Patients who in their index admission were coded as having a substance use diagnosis were identified as having the strongest evidence of a substance use disorder. Next, patients who were coded with a substance use diagnosis in a prior or subsequent admission were added. Then, people who at their index admission pre-treatment HoNOS were given a rating of

three or four on 'Problem Drug or Alcohol use' were included, followed by those who at the physical health assessment were documented as drinking above recommended levels. Finally, the most informal documentation of potential substance use disorders was considered to be those with a free-text mention indicating alcohol misuse or who were identified as being on methadone.

This approach generated a group of people with possible substance use disorders, and a picture of how this data was derived from clinical records. Secondary analysis was then undertaken, and characteristics of these patients were then compared with those who did not have documentary evidence suggesting a disorder. The relationships between possible substance use disorders, homelessness and length of stay and risk of readmission were investigated, to test the hypothesis that substance use disorders and homelessness increased the risk of relapse and prolonged length of stay. The groups were compared in terms of primary diagnosis for the index admission.

Interviews

In order to make an estimate of the extent to which the documentation in the ePJS corresponded to alcohol and drug misuse as reported during interviews using structured assessment instruments, a clinical audit was undertaken in July 2011, on five of the six acute admission wards that had been used in the CRIS analysis. The proposal to recruit volunteer patients to be interviewed, and have their clinical records analysed, was approved by the NHS ethics committee of Southampton REC B, and by the R&D Office, King's College London. Interviews were undertaken by postgraduate students (R.P. and Y.Y.W.). Two questionnaires were administered: the AUDIT² and the Maudsley Addiction Profile (MAP).¹⁰

The AUDIT questionnaire is a widely validated ten-item self-completion screening questionnaire for alcohol use disorders, and is said to be valid for individuals with severe mental illness. It is a tool that provides a simple detection of hazardous and harmful alcohol use in primary

healthcare settings. The results of AUDIT are classified as: 1–7, low-risk drinking; 8–15, hazardous drinking; 16–19, harmful drinking; >20, possible dependence.

The MAP for current alcohol and drug use was administered. The MAP is a brief, interviewer-administered questionnaire for treatment outcome research applications. It measures problems in four domains: substance use, health risk behaviour, physical and psychological health, and personal/social functions. Participants were asked to provide a summary of their drug and alcohol use for the past 30 days. Interviewers did not receive specialist training in the administration of the AUDIT or MAP, both of which are designed for widespread clinical application.

The case notes of consenting patients were reviewed to determine whether a history of substance misuse had been recorded, and where in the ePJS record it was to be found. The ward managers and the charge nurses for each ward were briefed on the project details and permission was requested for a list of current patients on the wards including those who were too unwell to be asked to participate. The remaining patients were then approached sequentially, and consenting patients were then interviewed. Exclusion criteria were nurses' judgement that a patient was too unwell to be interviewed and whether they did not speak English. The wards were general admission wards, and did not include specialist units such as eating disorders, forensic or addiction units. There was no checking of interrater reliability in administration of questionnaires or in assessing clinical records. Because sampling on the wards was non-random, confidence intervals were not calculated around proportions.

Results

Analysis of admissions 2008

During 2008, there were 839 patients admitted to the 6 wards. Table 1 shows the identification of possible substance misuse among the patients. In total, 99 people had a substance use diagnosis made for the index admission. In

Prevalence	Male		Female		Total, <i>n</i> (%)
	<i>n</i>	Progressive total, <i>n</i> (%)	<i>n</i>	Progressive total, <i>n</i> (%)	
Substance use disorders diagnoses at index admission	61	61	38	38	99
Prior or subsequent substance use disorders diagnoses	57	118	30	68	186
The Health of the Nation Outcome Scales score 3 or 4	76	128	49	88	216
Problem drinking score >28 units/week	3	131	3	90	221
Free-text alcohol misuse	84	174	62	125	299
Free-text 'Methadone'	27	178	11	126	304
Free-text misuse of EtOH ^a	14	179	21	134	313
Total identified substance misuse		179 (47)		134 (29)	313 (37)
No substance misuse	200	200	326	326	526
Total index admissions		379		460	839

a. EtOH is the shorthand for alcohol

70/99 (8.3% of all admissions) the substance use disorder diagnosis was the primary diagnosis. A further 57 patients had a substance use disorder diagnosis recorded in either a prior or subsequent admission (none of whom, curiously, had a substance use disorder recorded during the index admission).

The most common site for identification of drug- or alcohol-related problems, (found using a restricted search for potential key words) was in free text (progress notes and correspondence). Most patients had a free-text mention of 'alcohol'. There was no mention in 64 files, a mention that was uninterpretable in 83 files and documentation signifying no misuse in 526 files. In free text, 146 patients were identified as having some problem in relation to alcohol. A further 35 patients had reference to 'EtOH misuse'. Completion of HoNOS ratings is considered mandatory, but although almost all patients, 833/839, had a HoNOS admission completed, in 90/833 records the field for 'problem alcohol or drug use' was left blank; in total, 743 had this field filled out, and 125 patients were rated three or four. Most of these individuals had a current or prior diagnosis of substance use disorder.

Only 98 people had a physical health assessment completed; 6/98 participants reported drinking in excess of 28 units per week. Of the 38 patients identified as being currently or previously on methadone, 33 had been identified independently of the free-text search.

Using these different approaches to identifying possible substance use disorders in psychiatric in-patients, 47% of males and 29% of females were classified as having possible substance use disorder. Characteristics of those with a potential substance use disorder, and those who probably did not, are shown in Table 2.

Males were significantly more likely to be identified with a substance use disorder ($\chi^2_{(1,n=839)} = 29.103, P < 0.001$).

The patients with substance use disorders tended to be younger. Among females, this difference was close to significant ($t = 1.963, d.f. = 244.713, P = 0.052$, two-tailed). Among males, the substance use disorders group was significantly younger ($t = 0.943, d.f. = 376.201, P = 0.346$, two-tailed). Patients with substance use disorders tended to have a shorter length of stay (Mann-Whitney $U = 68109.500, n_1 = 523, n_2 = 313, P < 0.001$, one-tailed). There was no significant difference in the likelihood of readmission between patients with substance use disorders and those without ($\chi^2_{(1,n=839)} = 0.766, P = 0.382$).

Homelessness and substance misuse were strongly associated ($\chi^2 = 13.778, d.f. = 1, P < 0.001$). There was no significant statistical relationship between homelessness and likelihood of readmission ($\chi^2_{(1,n=839)} = 0.13, P = 0.908$).

In Table 3, the primary diagnoses of the two groups are given. This table indicates that substance use disorders were identified in all diagnostic groups. In total, 44 of the 70 people admitted with a primary substance use disorder diagnosis had contact with addiction services.

Interview results

In total, 45 female and 30 male patients consented to be interviewed and to have their files reviewed. Results are shown in Table 4. Of the 75 interviewees, 12 females (27%) and 21 males (70%) either scored above the cut-off on the AUDIT or reported use of an illicit drug in the month prior to interview. Clinical notes documented drug use or an alcohol problem in 18/33 files. Interviews revealed 11 males and 4 females reported use of illicit drugs in the month prior to admission (mostly cannabis). In 35/75 files there was no mention located of alcohol or drug problems.

Table 2 Comparison of patients with substance use disorders with patients without substance use disorders

	Female		Male		Total
	Substance use disorder	No substance use disorder	Substance use disorder	No substance use disorder	
<i>n</i>	134	326	179	200	839
Age, years: mean	43	45	42	43	43
Contact with addiction services, <i>n</i> (%)	40 (30)	5 (1)	49 (27)	11 (6)	105
Length of stay, days: mean	41	49	65	87	60
Readmitted, %	6	14	6	7	
Homeless, <i>n</i>	39	51	59	54	203

Table 3 Primary diagnosis summary

Primary diagnosis	Substance use disorder, <i>n</i>	No substance use disorder, <i>n</i>	Total
Psychotic disorder	119	218	337
Mood disorder	65	124	189
Only substance use disorder	70	–	70
Personality disorder	21	56	77
Other	44	122	166
Total	319	520	839

Table 4 Results of interview using the Alcohol Use Disorders Identification Test

	n (%)		
	Females	Males	Total
n	45	30	75
Alcohol Use Disorders Identification Test score >7	8 (18)	15 (50)	23 (31)
Alcohol Use Disorders Identification Test score >15	6 (13)	6 (20)	12 (16)

Discussion

Main findings

Interviews and inspection of clinical notes replicated Barnaby *et al*'s findings that potential alcohol- or drug-related problems were common, but poorly documented.¹ The electronic scanning of files from 2008 suggests a slightly more complex picture. Psychiatric junior medical staff did identify a substantial number of patients with substance use disorders, but did not do so consistently, nor primarily by use of the structured tools now available to them. They favoured free text rather than using structured forms, even when forms were 'required' to be completed.

Possible explanations for findings

The discrepancy between manual file reviews and results of electronic searching probably relates to the unsystematic documentation of substance misuse. The result of favouring free text is that the electronic record is less useful clinically as a result of data being less accessible. Clinicians have to search in many different folders and tabs to locate information, making the electronic record less useful in both clinical practice and research. The search engine proved to be a powerful tool to scan records, finding scattered (and often unclear) references to substance misuse. If NHS medical records are to be used for medical research,¹¹ clinicians will need to improve the quality of documentation. Reducing the number of alternative assessment documents available in the ePJS is one simple proposal for improving documentation and making the record more useful clinically.

Drug and alcohol misuse is stigmatised, and taking a drug and alcohol history may evoke defensiveness and evasive patient responses. This may explain why the documentation of drug and alcohol misuse was occasionally uninformative, and frequently inconsistent in different entries in the record. The National Institute for Health and Clinical Excellence has recommended the use of systematic screening tools, such as the AUDIT, in settings where substance use disorders are common, such as mental health services.¹² However, the current study indicates some of the limitations of the AUDIT questionnaire. Interviewing in-patients with the AUDIT identified a high proportion of possible alcohol problems, particularly among males, but of 23 respondents who screened positive on AUDIT, only 15 reported any alcohol or drug use in the 30 days prior to admission. This suggests that drinking problems were episodic. Longitudinal studies suggest that even individuals diagnosed as dependent on alcohol not infrequently return to either controlled drinking or abstinence, usually without

formal treatment.¹³ Screening tests are used to identify potential problems – and overestimate the proportion of people with active problems. Positive screening tests need to be followed up with clinical assessment.

In completing forms such as the HoNOS clinicians are asked to make clinical judgements summarising the individual's problems. However, we found the substance misuse rating in HoNOS was left blank in 11% of completed HoNOS forms, and many patients with free-text references to alcohol misuse did not receive a HoNOS rating denoting a problem with substance misuse. It appears that psychiatric junior medical staff were reluctant to commit to judgements regarding substance misuse.

Having fewer structured assessments to complete might make the electronic record more accessible. A detailed and comprehensive discharge summary, incorporating information from assessments conducted over the course of an admission, would be useful in bringing together clinical information. However, the problem is not simply one of documentation. Fluctuating levels of drug use, inaccurate self-report and diagnostic uncertainty probably contribute to the reluctance of mental health staff to commit to diagnoses of substance use disorders. The potential stigma implicit in recording a formal substance misuse diagnosis may also deter some staff.

Secondary analysis

There was, as expected, a strong association between homelessness and substance use disorder, but these conditions were not associated with longer bed stays or with a greater likelihood of readmission. However, the burden of substance misuse on psychiatric services is substantial. A substance misuse diagnosis was the sole primary diagnosis in 1 in 12 admissions.

Referral to specialist addiction services was rare. Barnaby and colleagues assumed that the low rate of referral to addiction services was an indication that clinicians were not addressing substance use disorders.¹ However, the assumption that referral to addiction services is the appropriate response to substance use disorders is difficult to justify. People frequently do not accept referral to addiction services. More importantly, the assumption that patients with substance use disorder should be referred may be counterproductive, fostering the belief that addressing drug problems is not the business of general psychiatry. There is a high prevalence of substance use disorder among patients of mental health services,¹⁴ and it would probably be a more effective intervention for all mental health staff to provide their patients with brief, personalised health advice regarding substance misuse

rather than to refer all identified patients to addiction services.¹² The growth of addiction psychiatry as a distinct, community-based specialty may have had the unintended consequence of diminishing role legitimacy and competence of generalist health staff in addressing substance misuse. One way to improve the response to alcohol and drugs is to reorient addiction psychiatry as a consultation-liaison specialty, supporting the health system in responding to the substantial burden of drug- and alcohol-related morbidity.

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