

# Using electronic medical records to determine prevalence and treatment of mental disorders in primary care: a database study

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**Objectives.** With prevention and treatment of mental disorders a challenge for primary care and increasing capability of electronic medical records (EMRs) to facilitate research in practice, we aim to determine the prevalence and treatment of mental disorders by using routinely collected clinical data contained in EMRs.

**Methods.** We reviewed EMRs of patients randomly sampled from seven general practices, by piloting a study instrument and extracting data on mental disorders and their treatment.

**Results.** Data were collected on 690 patients (age range 18–95, 52% male, 52% GMS-eligible). A mental disorder (most commonly anxiety/stress, depression and problem alcohol use) was recorded in the clinical records of 139 (20%) during the 2-year study period. While most patients with the common disorders had been prescribed medication (i.e. antidepressants or benzodiazepines), a minority had been referred to other agencies or received psychological interventions. 'Free text' consultation notes and 'prescriptions' were how most patients with disorders were identified. Diagnostic coding alone would have failed to identify 92% of patients with a disorder.

**Conclusions.** Although mental disorders are common in general practice, this study suggests their formal diagnosis, disease coding and access to psychological treatments are priorities for future research efforts.

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**Key words:** General practice, health informatics, mental disorders, primary healthcare, substance use.

## Introduction

Mental disorders are a leading cause of morbidity and their prevention/treatment is a priority for population health and primary care (Leahy *et al.* 2013). Globally, they account for five of ten leading causes of disability and are associated with adverse health, social and economic outcomes (Murray & Lopez, 1996). Furthermore, this burden is growing due to their high prevalence (Toft *et al.* 2005; Serrano-Blanco *et al.* 2010), delayed diagnosis/treatment (Roca *et al.* 2009) and the high prevalence of associated chronic illness (Gunn *et al.* 2012).

With most mental disorders managed in this setting, primary care is well placed to address these issues. While ~50% of mental disorders are recognised in primary care, rates vary considerably. A meta-analysis

of detection of depressive illness in primary care found that GPs correctly identified depression in 45% of cases, with detection rates ranging from 6% to 78% across studies and under-detection linked to suboptimal treatment and outcomes (Mitchell *et al.* 2009).

In Ireland, mental disorders are a major challenge for primary care (Connolly *et al.* 2012; Healy *et al.* 2013; Power *et al.* 2013). Community-based studies consistently estimate that mental health problems occur in 21–27% of young adults (Lawlor & James, 2000; Sullivan *et al.* 2004; Martin *et al.* 2006; Cleary *et al.* 2007; National Youth Council of Ireland, 2009), 12% of adults aged 18 and over are at risk of psychological distress (Tedstone-Doherty *et al.* 2007) and ~25–33% of people attending primary care have mental health problems (Coptly & Whitford, 2005; Hughes & Byrne, 2010). Ireland's mental health service reforms and especially their intent to deliver 'more care in the community' (The Stationery Office, 2006), provide an ideal opportunity to develop services that are more accessible and responsive to the mental health needs of the

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population, with accurate information on prevalence, and care processes/outcomes a key enabler for reform (Health Information & Quality Authority, 2012).

Internationally, mental health services researchers have looked to electronic medical records (EMRs) to answer questions regarding diagnostic and prescribing patterns (Kramer *et al.* 2003; Seyfried *et al.* 2009) although the importance of first determining the accuracy of such data when using them for research purposes has been highlighted (Trinh *et al.* 2011). In Ireland, primary care-based health information systems have historically been poorly developed. Although clinical records have been computerised for some time (Meade *et al.* 2009), there is variable standardisation of data collected via diagnostic coding and the infrastructure required for collecting this data remains fragmented (Collins & Janssens, 2012). With a recognition among regulatory authorities that effective health care services are based on sound evidence and reliable information (Health Information & Quality Authority, 2012), the introduction of mandatory clinical audit as part of competence assurance procedures for GPs and the establishment of a national primary care research network ('Irish Primary Care Research Network; [www.ipcrn.ie](http://www.ipcrn.ie)'), the environment is now more conducive than ever to the establishment of electronic primary care-based health research information systems in Ireland. In view of their considerable associated health, social and economic costs, data on mental disorders in primary care should be a key component of these systems.

The overarching aims of this study were to examine identification, prevalence and management of mental disorders from EMRs. Specific objectives were

- to determine the prevalence of documented mental disorders among patients attending general practice and their management in practice;
- to examine how mental disorders are documented in clinical records;
- to develop and pilot a study instrument that enables research on mental disorders in general practice.

## Method

### Overview

A retrospective cross-sectional study of patients attending seven general practices affiliated with the Graduate Entry Medical School at University of Limerick (UL-GEMS) involving clinical records review and extraction of practice level consultation data.

### Setting

All GPs who were affiliated with UL-GEMS at the time of the study ( $n = 84$ ) were invited to participate in the

study (Cullen *et al.* 2012). Practices were eligible to participate if

- GP principal volunteered to participate in the study;
- The practice had been using the same practice EMR system consistently for at least the previous 6 months.

Seven practices indicated their interest in participating and met the eligibility criteria. These participating practices were reflective of those invited and of all GPs in Ireland in terms of practice size, other practice staff, rurality and choice of GP software system (see Table 1; O'Dowd *et al.* 2005). Participating practices differed to those invited and GPs nationally in that they were more likely to have a special interest in mental health, to have a patient profile that was mostly GMS-eligible and to use electronic clinical records. We decided to base this study at small number of practices because of their interest in the topic and our experience would indicate it is better to base exploratory work at practices that are conducive to research and that can thus inform methodology (Smith *et al.* 2008; Cullen *et al.* 2009).

### Study population

We searched each practice's EMR system (database) to identify 'active' patients aged 18 years or over and randomly sampled 100 patients from the list using data analysis tools in Microsoft Excel. The EMR of each individual identified by this search was reviewed to exclude those who had not attended the practice in the preceding 24 months.

### Data collection

Clinical records were retrospectively reviewed for a 2-year time period from the date of data collection. The study instrument was based on one previously used in morbidity surveys in primary care in Ireland (Cullen *et al.* 2009) and mental disorders among young adults (Connolly *et al.* 2012) and included:

- Documented mental disorders prevalence and treatment (i.e. referrals, psychological interventions and prescribing) in respect of
  - Depression, including major depression, low mood, postnatal depression, seasonal affective disorder.
  - Psychosis, including psychosis, mania, bipolar disorder, schizophrenia, schizoaffective disorder.
  - Problem alcohol use, including harmful or dependant drinking.
  - Problem substance use, including drug addiction and use of illicit substances.
  - Stress/anxiety, including anxiety attacks, generalised anxiety disorder, post-traumatic stress

**Table 1.** Characteristics of participating practices and comparison with all practices affiliated with medical school and national sample

Practice characteristic	Participating practices	All practices affiliated with medical school	National survey of GPs (27)
Number of doctors in practice			
Two or less	4/7 (57%)	43/78 (55%)	58%
Three or more	3/7 (43%)	35/78 (45%)	42%
Other staff in practice			
Practise nurse	7/7 (100%)	74/79 (94%)	76%
Administrator(s)/clerical	7/7 (100%)	77/77 (100%)	N.A.
Practice type			
Mostly GMS	3/7 (43%)	22/77 (29%)	96%
Mixed	4/7 (57%)	54/77 (70%)	
Mostly private	0	1/77 (1%)	4%
Practice area			
Mostly urban	2/7 (29%)	15/76 (20%)	43%
Mostly rural	2/7 (29%)	20/76 (26%)	21%
Mixed	3/7 (43%)	41/76 (54%)	35%
Clinical records			
Hard copy	0/7	5/78 (6%)	
Electronic	7/7 (100%)	62/78 (80%)	89% <sup>a</sup>
Both	0/7	11/78 (14%)	
Practice management system			
'Socrates' <sup>TM</sup>	2/7 (29%)	27/73 (37%)	N.A.
'HealthOne' <sup>TM</sup>	2/7 (29%)	33/73 (45%)	N.A.
Other	3/7 (43%)	7/73 (10%)	N.A.
Areas of special clinical interest			
Mental health	7/7 (100%)	45/78 (43%)	N.A.
Youth and adolescent health	7/7 (100%)	46/78 (44%)	N.A.

<sup>a</sup> A total of 89% 'used computers in their practice'.

disorder, stress, acute stress reaction, social phobia, obsessive compulsive disorder, panic attacks.

- o Dementia and related problems, including agitation, behavioural difficulty.
- Socio-demographic characteristics (age, gender, GMS status).
- Primary/secondary care service utilisation.

A two-stage approach to data collection was adopted. In the first instance, senior medical students on clinical placement at three participating practices collected data in collaboration with the GP principal, supervised by two experienced researchers (A.H., W.C.). To ensure consistency in data collection, issues and problems were reviewed at regular meetings of the research team during this stage and resulted in further development of the study instrument (see Appendix 1). Subsequently, one senior medical student (M.G.) collected data from a further four practices, again in collaboration with the respective GP principal and supervised by two experienced researchers (A.H., W.C.).

Anonymised data were entered to an Excel database by the research team and imported to PASW 18 for statistical analyses. Descriptive analytics were carried out on the key study measures, specifically: psychological morbidity, its treatment, referral to secondary care and other agencies, health service utilisation and how mental and substance use diagnoses were recorded in clinical records. Further statistical analyses included Pearson's  $\chi^2$ -test to determine the significance of associations between categorical variables and Student's *t*-test to compare means of continuous variables.

#### *Ethical considerations*

All data were anonymous, with identifying patient details removed at time of data collection. Data were collected from clinical records by a member of the research team and entered to an electronic database and stored on a password protected computer at the host institution. The researcher involved in data collection was nominated as an agent of each practice and GPs were involved in data collection to ensure that any issues requiring clinical follow up were reviewed by the

GP with clinical responsibility for the patient's ongoing care and to minimise potential bias resulting from coding and interpretation of clinical problems. The study was reviewed and approved by the Irish College of General Practitioners Research Ethics Committee (9 August 2012).

## Results

### Population characteristics and prevalence of mental disorders

Data were collected on 690 patients attending general practice (mean age 47 years, range 18–95), of whom 355 (52%) were male, 357 (52%) were GMS-eligible (Ireland's means-tested free general practice system) and 443 (64%) had been referred to or attended secondary care in the past year.

A total of 139 people had a documented mental disorder in the previous 2 years (20% prevalence, 95% confidence interval 17–23%), with 37 (27%) of the 139 patients having two or more disorders, and 88 (63%) consulting more than once with a mental disorder. The most common disorder identified was stress/anxiety (73 cases), followed by depression (65 cases), problem alcohol use (17 cases), problem drug use (15 cases), psychosis (nine cases) and dementia/related problems (four cases).

### Treatment of mental disorders

There existed considerable variation in approaches to management for each of the six common disorders. Except in the case of psychosis, psychological interventions were accessed by a minority of patients, for example, 26/73 patients with anxiety, 26/65 patients with depression and 4/17 with problem alcohol use received a psychological intervention (see Fig. 1). In addition, referral rates to other services were low, for example, 25/73 patients with anxiety/stress, 30/65 with depression and 4/17 with problem alcohol use were referred to another agency.

There also existed considerable variation in prescribing practices between disorders (see Table 2). Antidepressants and benzodiazepine were the two categories of drug most commonly prescribed and for stress/anxiety, depression and problem alcohol use, more patients had been prescribed a medication than had received a psychological intervention.

### Health service utilisation and psychological morbidity

Patients with a mental disorder consulted significantly more frequently in the previous year (mean 7.3 compared with 3.9 consultations,  $t$ -statistic 5.8,  $p < 0.001$ ). While they also had significantly more GP consultations

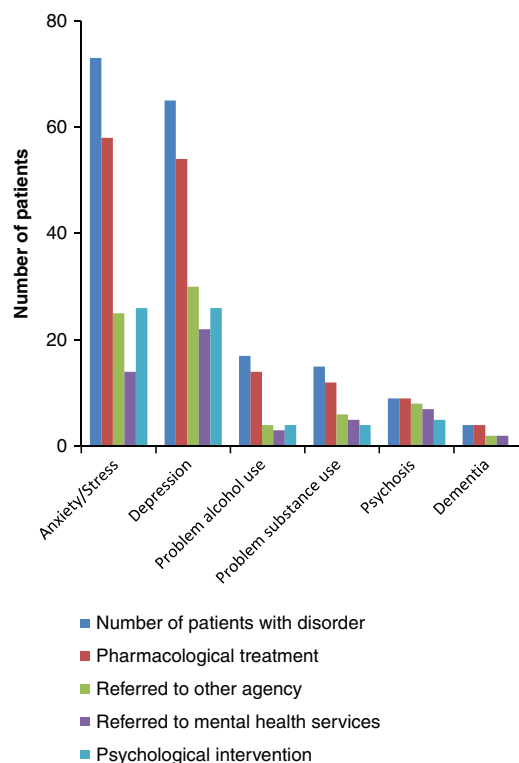


Fig. 1. Treatment of mental and substances use disorders.

(mean 6.7 compared with 2.9,  $t$ -statistic 7.7,  $p < 0.001$ ), there was no significant difference in practice nurse consultation rates (mean 1.2 compared with 0.9,  $t$ -statistic 1.0,  $p = 0.30$ ). Patients with a disorder were significantly more likely to be GMS-eligible and to have been referred to or attended secondary care in the past year (see Table 3).

### Diagnosis, coding and feasibility

Of the diagnoses ( $n = 119$ ) examined to determine how mental disorders were documented, 69 (58%) were identified from free text consultation notes in the electronic clinical records, 31 (26%) were identified from prescribing records, nine (8%) were identified from a diagnostic code, five (4%) were identified from a referral letter, three (3%) were identified from a hospital discharge letter and two were identified through other means (see Fig. 2).

## Discussion

### Key findings

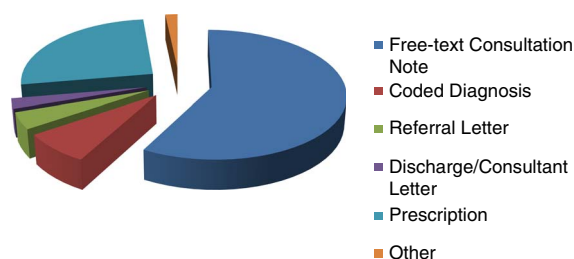
This first study to examine mental disorders and their management in routine general practice in Ireland highlights that documented mental disorders (especially stress/anxiety, depression and problem alcohol use) are common (20% prevalence) and associated with

**Table 2.** Pharmacological treatment of mental disorders

	Anxiety/stress (n = 73)	Depression (n = 65)	Problem alcohol use (n = 17)	Problem substance use (n = 15)	Psychosis (n = 9)	Dementia (n = 4)
Received pharmacological treatment	58 (79%)	54 (83%)	14 (82%)	12 (80%)	9 (100%)	4 (100%)
Anti-depressants	36	48	4	4	3	2
Benzodiazepines	28	23	9	7	4	1
Z drugs	14	8	3	2	2	1
Opiates	5	5	2	2	0	1
Anti-psychotics	2	8	3	2	7	3
Anti-convulsant	3	3	2	1	2	1
Alzheimer drug	0	0	0	0	0	3
Other	6	2	2	1	0	0

**Table 3.** Key population, general practice/health service utilisation and morbidity data and their association with a documented psychological issue

Variable	'Psychological problem' documented (n = 139)	'Psychological problem' not documented (n = 551)	$\chi^2$ -test statistic (p value)
GMS status			26.46 (<0.001)
GMS eligible	99 (71%)	258 (47%)	
Non-GMS eligible	40 (29%)	293 (53%)	
Gender			1.53 (0.22)
Male	65 (47%)	290 (53%)	
Female	74 (53%)	261 (47%)	
Has been referred to or attended secondary care in the past year	113 (81%)	330 (60%)	22.13 (<0.001)

**Fig. 2.** How were mental and substances use disorders identified in clinical records?

increased GP consultations, referrals to and attendance at secondary care. While the proportion referred to other agencies or who received psychological interventions for mental disorders was low, antidepressants and benzodiazepines were commonly prescribed. The research also highlights the limitations of EMRs (especially diagnostic coding) in identifying patients with psychological morbidity; reliance on diagnostic coding alone would have failed to identify 92% of cases.

### How this relates to other research

That 20% of patients had a documented mental disorder is consistent with other work involving administrative data, which estimated 19% of patients attending GPs in Canada did so for the care of mental health issues (Palin *et al.* 2012). However, our estimate is considerably lower than that reported in studies, which involved standardised screening measures. A review of such studies estimated 29% of patients attending general practice had a mental disorder (King *et al.* 2008). Depression and stress/anxiety were the most commonly identified issues in this study and these findings were consistent with work in other settings (Linzer *et al.* 1996; Ansseau *et al.* 2004; Broers *et al.* 2006).

That only 3% were identified to have problem alcohol use is a concern. Primary care is the first point of contact for patients with problem alcohol use and clinical encounters should involve routine discussion of alcohol use (Kaner *et al.* 2009). Problem alcohol use is also common among patients attending general practice.

**Table 4.** Summary of NICE/Royal College of Psychiatrists Clinical Guidelines in respect of common mental disorders

Condition	Guideline recommends
Depression (2009a)	Low intensity intervention: assess sleep; active monitoring; self-help education; cognitive behavioural therapy; group activity Pharmacological treatment: SSRI, then SNRI if unsuccessful or TCA if SSRI/SNRI contra-indicated High intensity intervention: cognitive behavioural therapy; interpersonal therapy; behavioural activation; counselling; psychodynamic therapy
Alcohol misuse (National Institute for Health and Care Excellence, 2011a)	Motivational interview and brief intervention Manage withdrawal – chlordiazepoxide Offer psychological interventions – single and group; cognitive behavioural therapy; behavioural therapy Pharmacological treatment – to maintain abstinence: acamprosate, naltrexone, disulfiram
Substance abuse (National Institute for Health and Care Excellence, 2007)	Psychosocial interventions: motivational interviewing; education around self-help groups, for example, narcotics anonymous; contingency management; couples behavioural therapy Pharmacological treatment: specific to drug of abuse, manage withdrawal
Psychosis (National Institute for Health and Care Excellence, 2009b)	Psychological interventions: cognitive behavioural therapy; family intervention Pharmacological therapy: short-term use of benzodiazepine in acute setting; oral anti-psychotic – specific anti-psychotic chosen based on previous therapy, patient preference; clozapine only after unsuccessful trial of two oral anti-psychotics, one to be second-generation
Mania (National Institute for Health and Care Excellence 2006)	Psychological intervention: education and advice on lifestyle and relapse prevention Pharmacological intervention: short-term use of benzodiazepine in acute setting; anti-psychotic, lithium or sodium valproate; stop any anti-depressant medication
Anxiety disorder (National Institute for Health and Care Excellence, 2011b)	Psychological interventions: education and monitoring; lone, guided or group self-help; cognitive behavioural therapy; applied relaxation Pharmacological therapy: short-term benzodiazepine with caution; SSRI or SNRI
BPSD (National Institute for Health and Care Excellence, 2012)	Consider: aromatherapy; multisensory stimulation; massage; animal-assisted therapy; dance/music therapy Pharmacological interventions: (with caution) benzodiazepines; anti-psychotics; acetylcholinesterase inhibitor; memantine, anti-depressants

SSRI, selective serotonin reuptake inhibitor; SNRI, serotonin-norepinephrine reuptake inhibitor; TCA, tricyclic antidepressants; BPSD, behavioural and psychological symptoms of dementia.

A recently published pragmatic trial of screening for problem alcohol use in primary care reported that 900/2991 (30%) screened positive for hazardous or harmful drinking, 10 times higher than we observed (Kaner *et al.* 2013).

The increased health service utilisation we observed among patients with a disorder is also consistent with other research, which may reflect an increased tendency towards undiagnosed coexisting somatoform disorders and chronic medical illnesses among patients with mental disorders (Gunn *et al.* 2012; Bener *et al.* 2013).

Especially for the more common problems, our findings suggest sub-optimal access to psychological interventions and over-reliance on pharmacotherapy, especially antidepressants and benzodiazepines; treatment approaches at odds with current treatment guidelines (see Table 4; National Institute for Health and Care Excellence, 2006, 2007, 2009a, 2009b, 2011a, 2011b, 2012). These findings concur with Rogers *et al.* whose review of referrals from primary care highlights ‘a gap between best

evidence and real world practice in the care of patients with depression [and suggests that] access to psychological services should be improved and made available in primary care networks’ (Rogers *et al.* 2013).

### Methodological considerations

Validity of the data reported in this paper is enhanced by the practices in which it was conducted (a special interest in the topic and with advanced practice information systems) and the method of data collection (data collected by a senior medical student working with the GP principal and a study instrument developed to minimise variation between researchers, which has been used previously in studies of psychological morbidity in Irish general practice). However, these practice features mean they are unlikely to be representative; thus, the possibility of ascertainment bias cannot be discounted. The study’s retrospective nature, dependency upon prior documentation of issues within



consultation notes and our interpretation of these records is likely to have underestimated true period prevalence.

While our study instrument was informed by similar instruments used in previously conducted work in primary care in Ireland, it did not identify patients with some mental disorders, most notably somatoform disorders. Finally, as our data reflects all patients who were documented as 'active patients', it neither reported the proportion of patients on the practice databases who were 'inactive' nor the prevalence of mental disorders among this population.

While our findings highlight the value of EMRs for research purposes, some important limitations should be noted. In particular, reliance on diagnostic coding alone would have failed to identify 92% of patients with a disorder. The reasons why GPs do not code are complex and include inherent limitations of coding systems, the time/distraction involved in recording structured data in the consultation and the priority given to coding by a practice or health system (de Lusignan, 2005). Meanwhile, financial incentives and clinical audit as part of target-setting and quality/competence assurance may drive its adoption in practice (de Lusignan, 2005; Collins, 2012; de Jong *et al.* 2013). de Lusignan *et al.* (2006) highlight the importance of contextual issues such as these in interpreting the validity of findings based on routinely collected clinical data.

This is especially important in the case of mental disorders. In this study, EMRs did not use standardised diagnostic screening tools. Thus, it is difficult to say with certainty whether all of the recorded diagnoses would meet the respective ICD-10 or DSM-5 criteria. Many diagnoses were documented as part of a consultation that involved a number of issues, which inevitably makes the use of formal approaches to screening difficult, thereby impacting on identification. Making a psychological diagnosis in general practice tends to be a longitudinal process following a number of visits; while GPs recognise the possibility of psychiatric diagnosis early on, they are 'cautious about applying a definitive diagnosis', wishing first to rule out any physical co-morbidities (Lampe *et al.* 2012). Similarly, a systematic review into the diagnostic process regarding depression in general practice found that diagnostic strategies tended to rely on knowledge of patient history, the doctor-patient relationship and eliminating the possibility of physical disease rather than rigidly sticking to psychiatric diagnostic criteria (Schumann *et al.* 2012).

#### *Implications for clinical practice, research and education*

This study highlights a need for further research on the epidemiology and management of mental disorders in

general practice and the 'gap between best evidence and real world practice' especially access to psychological interventions (Rogers *et al.* 2013). Larger studies involving a more representative sample of practices would make for more generalisable findings, while longitudinal research would both determine the natural history of these common problems in practice and determine the effectiveness of Ireland's mental health service reforms and especially their intent to deliver 'more care in the community' (The Stationery Office, 2006; Health Forum Steering Group, 2008; Oireachtas, 2011; Health Service Executive, 2012b). This study highlights the potential importance of more formal approaches to diagnosis and disease coding within EMRs. Developing and evaluating interventions that systematically enable both, yet which do not impact on the interaction between doctor and patient, which is key to the psychological narrative (Lampe *et al.* 2012; Schumann *et al.* 2012), is a priority.

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## Appendix 1

### Study instrument used in data collection

1. Demography
  - 1.1. Gender    Male    Female
  - 1.2. Age last birthday    \_\_\_\_\_
  - 1.3. Health cover    GMS    Non-GMS
2. Psychological Morbidity
  - 2.1. Has a psychological problem been documented in the last two years?    Yes / No
  - 2.2. On how many occasions?    \_\_\_\_\_

2.3. Which psychological problems have been documented in this time?

<i>Documented problem</i>	<i>Referred to / attended other agency for this problem</i>	<i>Referred to / attended specialist mental health services for this problem</i>	<i>Has received a psychological intervention</i>

2.4. What pharmacological treatments have been prescribed in the last two years?

<i>Medication (class)</i>	<i>Current prescription</i>	<i>Acute prescription in the last two years</i>
Benzodiazepine		
Opiate		
Antidepressant		
Antipsychotic		
Other 1		
Other 2		

3. Primary / Secondary Care service utilisation

3.1. Number of consultations (including antenatal) with the practice (past year): \_\_\_\_\_

3.2. Has been referred to or attended secondary care (including emergency departments) in the last 2 years?

Yes No

3.3. How was diagnosis identified?

Free text in consultation note / diagnostic code in active problem / diagnostic code in past history / referral letter / other (specify)