Scandinavian Journal of Primary Health Care, 2011; 29: 80–84

informa
healthcare

ORIGINAL ARTICLE

Case-finding and risk-group screening for depression in primary care

KAJ SPARLE CHRISTENSEN, INETA SOKOLOWSKI & FREDE OLESEN

Research Unit for General Practice, Aarhus University, Denmark

Abstract

Objective. Central health organizations suggest routine screening for depression in high-risk categories of primary care patients. This study compares the effectiveness of high-risk screening versus case-finding in identifying depression in primary care. *Design.* Using an observational design, participating GPs included patients from 13 predefined risk groups and/or suspected of being depressed. Patients were assessed by the Major Depression Inventory (MDI) and ICD-10 criteria. *Setting.* Thirty-seven primary care practices in Mainland Denmark. *Main outcome measures.* Prevalence of depression, diagnostic agreement, effectiveness of screening methods, risk groups requiring special attention. *Results.* A total of 37 (8.4%) of 440 invited GP practices participated. We found high-risk prevalence of depression in 672 patients for the following traits: (1) previous history of depression, (2) familial predisposition to depression, (3) chronic pain, (4) other mental disorders, and (5) refugee or immigrant. In the total sample, GPs demonstrated a depression diagnostic sensitivity of 87% and a specificity of 67% using a case-finding strategy. GP diagnoses of depression agreed well with the MDI (AUC values of 0.91–0.99). The potential added value of high-risk screening was 4.6% (31/672). Patients with other mental disorders were at increased risk of having an unrecognized depression (PR 3.15, 95% CI 1.91–5.20). If patients with other mental disorders were routinely tested, then 42% more depressed patients (14/31) would be recognized. *Conclusions.* A broad case-finding approach including a short validation test can help GPs identify depressed patients, particularly by including patients with other mental disorders in this strategy. This exploratory study cannot support the screening strategy proposed by central health organizations.

Key Words: *Depression, Diagnosis, Primary Health Care, Psychiatric Status Rating Scales, Mass Screening*

In everyday clinical practice, recognition of depression by general practitioners (GPs) is prompted by their clinical suspicion and is typically followed by a diagnostic assessment using ICD-10 criteria, a strategy known as *case-finding* [1]. Several cross-sectional studies indicate, however, that GPs fail to diagnose about half of the depressed patients in their clinic [2,3]. A range of valid instruments for depression assessment exists [4], but studies on their use for *systematic screening* of depression in primary care have demonstrated only limited benefit [5,6].

In accordance with the NICE [7] and SBU [8] guidelines on depression, the Danish National Board of Health [9] suggests that the following 13 *risk groups* should be regularly screened for depression in primary care: (1) a previous history of depression, (2) a familial predisposition to depression, (3) heart disease, (4) stroke, (5) chronic pain conditions, (6) diabetes, (7) chronic obstructive lung diseases, (8) cancer, (9) Parkinson's disease, (10) epilepsy, (11) other mental disorders, (12) pregnancy or postpartum period, and (13) a refugee or immigrant background.

The Danish National Board of Health further recommends that GPs use the Major Depression Inventory (MDI) [10] for screening and diagnostic assessment. The MDI is a validated diagnostic instrument [11] widely used in Danish primary care. The MDI is criterion based and provides the GP with a potential depression diagnosis according to ICD-10 criteria, and a severity measure (0–50) for monitoring the condition.

The effectiveness of case-finding and risk screening for depression has to our knowledge not been compared in primary care settings. Therefore, we carried out this study to compare the effectiveness of case-finding versus risk screening for depression, to assess whether GPs take into account the MDI rating when

Correspondence: Kaj Sparle Christensen, Bartholins Allé 2, 8000 Aarhus C, Denmark. E-mail: kasc@mail.dk

(Received 17 June 2010; accepted 22 December 2010)

ISSN 0281-3432 print/ISSN 1502-7724 online
DOI: 10.3109/02813432.2011.554009

Central health organizations suggest routine screening for depression in high-risk categories of primary care patients. The evidence for this proposal is limited.

- This exploratory study cannot support systematic screening of high-risk categories of patients in primary care for depression.
- A broad case-finding strategy based on GPs' clinical suspicion of depression and a short validation procedure seem much more effective.
- Patients with other known mental disorders may also be depressed and therefore require special attention.

making their diagnosis of depression, and to identify depression risk groups in need of special attention.

Material and methods

Design

A cross-sectional exploratory study was performed. A total of 440 GP practices in the Central Region of Jutland, Denmark, were invited to participate in the study. Some 77 thereof (17.5%) volunteered to participate. Due to financial restrictions we included a random sample of 50 practices from the volunteers. The GPs in those practices carried out the study from 1 October to 1 December 2008. Patients able to read and write Danish were eligible. All GPs were free to do either (1) risk-group screening, (2) screening on clinical suspicion of depression, or (3) a combination of both approaches. Type of assessment (risk group and/or clinical suspicion) was recorded before the patient completed the MDI. After completion and interpretation of MDI results, GPs were asked to assess whether patients were depressed on a four-point scale, according to ICD-10 criteria (1 = not depressed, 2 = mildly depressed, 3 = moderately depressed, 4 = severely depressed).

Statistics

STATA version 10 was used for statistical analysis. Prevalence ratios (PRs) with 95% confidence intervals (CI 95%) were used as a measure of association. Due to the high prevalence of the outcome measure (more than 20% prevalence of depression), odds ratios would overestimate the association [12,13]. Therefore, we used generalized linear models (GLM) with log link for Bernoulli family in order to model the PRs in unadjusted analysis. However, due to the high prevalences, adjusted GLM analyses did not always converge using the Bernoulli family. In those situations, we used the Poisson regression [14]. Adjusted multivariate models were corrected for sex and age. We accounted for patient clustering by GPs by using robust standard errors in all analyses.

The MDI severity scores were generated by summing the patient responses according to MDI assessment guidelines, but only for patients who answered the first three questions and 50% or more of the items. In the situation where a patient failed to answer one or more of the questions that made up an MDI score, missing values were replaced with mean values for the non-missing answers of that patient. Diagnostic accuracy was calculated with receiver operating characteristic (ROC) curve analysis.

Results

Study population

A total of 37 (74%) general medical practices included patients (number of patients: mean 20, range 3–50) and 737 patients were included during the study. Some 59 patients (8.1%) had missing GP responses on depression diagnosis. Another six patients failed to respond sufficiently to the MDI, according to above-mentioned criteria. Thus, 672 (91%) patients were included for analysis (255 males, 417 females, sample mean age 52.5 (±18.2 SD), age range 13.8–90.0 years). Missing values were replaced with mean values for 20 patients; 17 had one missing value and three had two missing values.

Diagnosis of depression

Prevalence of depression

The overall prevalence of depression in the patient sample was 35% according to GP assessment (Table I). High-risk group prevalence was found in patients with (1) a previous history of depression, (2) familial presence of depression, (3) chronic pain condition, (4) other mental disorders, and (5) refugee/immigrant status. Altogether 342 of the patients (51%) were a priori suspected by the GP to have a depression, of whom 207 (61%) were actually diagnosed as depressed according to final GP assessment. GPs more readily identified patients with moderate or severe depression as being possibly depressed (Table II). A multivariate regression analysis was performed in order to determine whether certain risk groups may arouse GPs' suspicion of patients being depressed. Clinical suspicion was used as dependent variable and risk groups were independent variables. Results show that previous episodes of depression (PR 1.52, 95%

Table I. Prevalence of depression in risk groups (no clinical suspicion) and case finding (clinical suspicion) groups according to GP ICD-10 based diagnostic assessment.

	Risk-group								
	Total Depressed		Screening Depressed		Case-finding Depressed				
Risk group*	*n*	(%)	*n*	(%)	*n*	(%)	RR	95% CI	*p*-value
Previous depression	213	103 (48.4)	64	6 (9.4)	149	97 (65.1)	6.94	(2.86–16.86)	<0.001
Familial predisposition for depression	89	53 (59.6)	26	8 (30.8)	63	45 (71.4)	2.32	(1.26–4.29)	0.007
Heart disease	105	17 (16.2)	76	3 (4.0)	29	14 (48.3)	12.23	(3.04–49.12)	<0.001
Stroke	18	6 (33.3)	11	1 (9.1)	7	5 (71.4)	7.86	(1.05–58.91)	0.045
Chronic pain condition	127	53 (41.7)	52	8 (15.4)	75	45 (60.0)	3.90	(2.25–6.77)	<0.001
Diabetes	75	14 (18.7)	52	3 (5.8)	23	11 (47.8)	8.29	(2.53–27.17)	<0.001
Chronic obstructive lung disease	34	9 (26.5)	19	1 (5.3)	15	8 (53.3)	10.13	(1.63–63.15)	0.013
Cancer	33	8 (24.2)	19	1 (5.3)	14	7 (50.0)	9.50	(1.72–52.56)	0.010
Parkinson's disease	4	0 (0.0)	2	0 (0.0)	2	0 (0.0)	1.00	(0.10–9.61)	1.000
Epilepsy	4	2 (50.0)	2	0 (0.0)	2	2 (100)	NA	NA	NA
Other mental disorders	91	47 (51.7)	42	13 (31.0)	49	34 (69.4)	2.24	(1.62–3.11)	<0.001
Pregnancy or postpartum	22	1 (4.6)	18	0 (0.0)	4	1 (25.0)	NA	NA	NA
Refugee/immigrant	34	17 (50.0)	16	3 (18.8)	18	14 (77.8)	4.15	(1.37–12.57)	0.012
Total	672	238 (35.4)	330	31 (9.4)	342	207 (60.5)	6.44	(3.54–11.71)	<0.001

Note:*Patients may belong to one or more risk groups: no risk group 11.7%, one risk group 60.3%, two or more risk groups 28.0%.

CI 1.28–1.80), familial presence of depression (PR 1.27, 95% CI 1.10–1.46), and chronic pain conditions (PR 1.19, 95% CI 1.01–1.41) contributed to GPs' suspicion of patients being depressed. This demonstrates that GPs' suspicion of depression is rarely affected by the knowledge that the patients belong to one or more of the specified risk groups.

Diagnostic agreement

GPs' clinical diagnosis of depression was generally in good accordance with scores on the MDI; area under curve (AUC) estimates were 0.91 for mild depression, 0.96 for moderate depression, and 0.99 for severe depression. Results indicate that GPs do take into account the MDI scoring when making their clinical diagnosis of depression.

Effectiveness of screening methods

The population included 342 patients clinically suspected of having depression and 330 patients with no a priori GP suspicion of being depressed (Table III). When the GPs performed case-finding, their overall sensitivity was 207/238 = 87.0% and their overall specificity was 299/434 = 68.9%, corresponding to a true positive rate of 207/342 = 60.5% and a false positive rate of 135/342 = 39.5%. The potential added value of additional routine-risk group screening was 31/672 = 4.6%.

Risk groups in need of special attention

In order to identify risk groups in need of special attention among false negative cases, we performed a Poisson regression analysis using non-suspected

Table II. General practitioner diagnosis of depression according to risk-group or case-finding strategies.

Diagnosis	Total (%)	Risk group (%)	Case finding (%)	*p*-value*
No depression	434 (64.6)	299 (90.6)	135 (39.5)	
Mild depression	67 (10.0)	14 (4.3)	53 (15.5)	
Moderate depression	100 (14.9)	11 (3.3)	89 (26.0)	<0.001
Severe depression	71 (10.5)	6 (1.8)	65 (19.0)	
Total	672 (100)	330 (100)	342 (100)	

Note: *Test for trend in proportion.

Table III. Effectiveness of case-finding strategy for diagnosing depression according to GP ICD-10 based diagnostic assessment.

	Depressed	Not depressed	Total (%)
GP suspicion	207	135	342 (51)
No GP suspicion	31	299	330 (49)
Total (%)	238 (35)	434 (65)	672 (100)

Notes: SE = 207/238 = 0.87; SP = 299/434 = 0.69; TPR = 207/342 = 0.61; FPR = 135/342 = 0.39; TNR = 299/330 = 0.91; FNR = 31/330 = 0.09.

cases of depression as dependent variable and risk groups as independent variable (Table IV). We found that patients with other mental disorders were at increased risk of having an unrecognized depression (PR 3.15, 95% CI 1.91–5.20). If patients with other mental disorders had been systematically screened, then an additional 13 patients with depression would have been recognized, with added valued of 13/31 = 42%.

Discussion

Routine screening for depression in 13 predefined risk groups seems of limited added value compared with a broad case-finding strategy, as only about 5% more cases were identified in this study. A case-finding strategy primarily based on GPs' clinical suspicion of depression and combined with a short validation test can benefit GPs and patients in primary care. Sensitivity rates of 87% may seem to be efficient, but further improved recognition rates can be obtained if GPs focus more on patients with other mental health problems (e.g. anxiety disorders) that may be comorbid with depression [15]. Such an approach may increase GP case-finding sensitivity to 92%. Our findings suggest that case-finding including a validation test strategy may increase GP awareness of depression and improve depression recognition rates in primary care. Additional systematic risk-group screening seems neither effective nor feasible in daily clinical practice, and may potentially be perceived by patients as stigmatizing.

Table IV. Association between ICD-10 based depression diagnosis and model variables (238 cases were included in the analyses).

Risk group	Prevalence ratio (95% CI)	*p*-value
Previous depression	0.39 (0.18–0.85)	0.018
Familial predisposition to depression	1.31 (0.68–2.51)	0.421
Heart disease	2.54 (0.56–11.45)	0.226
Stroke	2.18 (0.40–11.99)	0.369
Chronic pain condition	1.49 (0.72–3.05)	0.281
Diabetes	2.57 (0.73–9.05)	0.140
Chronic obstructive lung disease	0.80 (0.10–6.45)	0.835
Cancer	2.10 (0.23–18.88)	0.506
Parkinson's disease	NA	NA
Epilepsy	<0.001	<0.001
Other mental disorders	3.15 (1.91–5.20)	<0.001
Pregnancy or postpartum	<0.001	<0.001
Refugee/immigrant	1.33 (0.54–3.25)	0.533
Sex	1.64 (0.76–3.55)	0.211
Age	0.98 (0.96–1.00)	0.105

Our case-finding approach produced a specificity of 69% corresponding to a false positive rate of 39%. The present results resemble those of Simon and colleagues [15] in showing that moderate and severely depressed patients are more likely to be identified by their GPs as being depressed. The routine use of the MDI questionnaire therefore seems to help GPs avoid falsely diagnosing non-depressed patients as depressed. A recent meta-analysis by Mitchell and colleagues [3] demonstrates that routine diagnosis of depression by GPs is likely to produce more false-positive than true-positive diagnoses. A case-finding strategy using a criterion-based questionnaire for diagnostic validation is therefore likely to reduce misidentification rates in primary care.

Our study has several limitations. It was only exploratory and was carried out using an observational study design in which GPs were not required to include a certain number of patients. We obtained a self-selected sample of general medical practices (17.5% of invited) and only 74% of those randomly selected actually participated in the study. This procedure may have introduced selection bias with more motivated and skilled GPs being recruited. Further, the study setting may have increased GPs' awareness of depression. Findings may therefore be biased towards higher GP case-finding sensitivity at the cost of lower specificity. Although highly skilled GPs may have been recruited for this study, we do not think that such bias will markedly affect the main findings. In our view, a broad case-finding approach using a short validation test can increase GP awareness of depression and therefore be more effective than systematic screening of risk groups for depression.

The use of a questionnaire as a requisite for assessment of a diagnostic gold standard is controversial. Allocating a psychiatric diagnosis is ideally based on a diagnostic interview, e.g. the Schedules for Clinical Assesment in Neuropsychiatry (SCAN) [16] performed by trained psychiatrists. However, the diagnostic agreement between the MDI and the

SCAN is excellent with an AUC value of 0.97 [10]. In order to secure a valid diagnosis, we further recommended that GPs use ICD-10 criteria for final diagnostic assessment in accordance with current diagnostic guidelines.

The naturalistic setting of the study does not allow us to draw too firm conclusions on prevalence of depression in all risk groups. Certain risk groups, e.g. Parkinson's disease and epilepsy, were poorly represented in the sample. These estimates need elaboration in future studies. New studies may benefit from our results in calculating sufficient sample sizes.

This study indicates that routine screening of 13 risk groups for depression is of limited added value in primary care, whereas case-finding and screening of patients with other mental disorders can markedly improve identification of depressed patients. A recently published study by Ostergaard et al. [17] supports our findings by demonstrating that psychiatric "caseness" is a valid marker of major depressive episode in primary care patients.

A broad case-finding approach including a short validation test is, therefore, likely to be more effective and clinically feasible than any systematic screening for depression. A well-planned randomized controlled trial may tell whether the impression gained by the present study is correct.

Acknowledgements

The authors are very grateful to the patients and practices who agreed to participate.

Declaration

Funding: none.

Ethical approval

The study was approved by the Data Surveillance Authority (ref no. 2008-41-2314) and the Scientific Research Evaluation Committee of the Danish College of General Practitioners (ref no. MPU 17-2008).

***Conflicts of interest*:** none.

References

[1] The effectiveness of case-finding for mental health problems in primary care. Br J Gen Pract 2005;55:665–9.
[2] Ustun TB, Sartorius N. Mental illness in general health care, an international study. Chichester, New York, Brisbane, Toronto, Singapore: Wiley; 1995.
[3] Mitchell AJ, Vaze A, Rao S. Clinical diagnosis of depression in primary care: A meta-analysis. Lancet 2009;374:609–19.
[4] Mulrow CD, Williams JW, Jr., Gerety MB, Ramirez G, Montiel OM, Kerber C. Case-finding instruments for depression in primary care settings. Ann Intern Med 1995;122: 913–21.
[5] Gilbody S, Sheldon T, House A. Screening and case-finding instruments for depression: A meta-analysis. CMAJ 2008; 178:997–1003.
[6] Christensen KS, Toft T, Frostholm L, et al. The FIP study: A randomised, controlled trial of screening and recognition of psychiatric disorders. Br J Gen Pract 2003;53:758–63.
[7] NICE Technology Assessment Report. Depression: Management of depression in primary and secondary care – NICE guidance. London: National Institute of Clinical Excellence; 2004.
[8] SBU. http://www.sbu.se/sv/Publicerat/Gul/Behandling-av-depressionssjukdomar/ (2009).
[9] Reference programme for unipolar depression hos voksne. Copenhagen: Sundhedsstyrelsen; 2007. [Reference programme for unipolar depression in adults. Copenhagen: National Board of Health; 2007.]
[10] Bech P, Rasmussen NA, Olsen LR, Noerholm V, Abildgaard W. The sensitivity and specificity of the Major Depression Inventory, using the Present State Examination as the index of diagnostic validity. J Affect Disord 2001;66:159–64.
[11] Major Depression Inventory. www.gp-training.net/protocol/psychiatry/who/mdi.doc. 2009.
[12] Barros AJ, Hirakata VN. Alternatives for logistic regression in cross-sectional studies: An empirical comparison of models that directly estimate the prevalence ratio. BMC Med Res Methodol 2003;3:21.
[13] Thompson ML, Myers JE, Kriebel D. Prevalence odds ratio or prevalence ratio in the analysis of cross sectional data: What is to be done? Occup Environ Med 1998;55:272–7.
[14] Zou G. A modified Poisson regression approach to prospective studies with binary data. Am J Epidemiol 2004;159:702–6.
[15] Katon W, Roy Byrne PP. Mixed anxiety and depression. J Abnorm Psychol 1991;100:337–45.
[16] WHO. SCAN. Schedules for Clinical Assessment in Neuropsychiatry, version 2.1. Geneva: World Health Organization, Division of Mental Health; 1998.
[17] Ostergaard SD, Foldager L, Allgulander C, Dahl AA, Huuhtanen MT, Rasmussen I, et al. Psychiatric caseness is a marker of major depressive episode in general practice. Scand J Prim Health Care 2010;28:211–5.