

Psychological distress in primary care patients with heart failure: a longitudinal study

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ABSTRACT

Background

Psychological distress is a common phenomenon in patients with heart failure. Depressive symptoms are often under-diagnosed or inadequately treated in primary care.

Aim

To analyse anxiety and/or depression in primary care patients with heart failure according to psychosocial factors, and to identify protective factors for the resolution of psychological distress.

Design of study

Longitudinal observation study.

Setting

Primary care practices in lower Saxony, Germany.

Method

In 291 primary care patients with heart failure the following factors were measured using validated questionnaires at baseline and 9 months later: anxiety and depression (Hospital Anxiety and Depression Scale [HADS]), quality of life (Minnesota Living with Heart Failure Questionnaire), coping with illness (Freiburg questionnaire for coping with illness), and social support (social support questionnaire). Severity of heart failure (New York Heart Association [NYHA] classification and Goldman's Specific Activity Scale), and sociodemographic characteristics were documented using self-report instruments.

Results

Twenty-six (32.5%) of the 80 patients who were distressed at baseline had normal HADS scores 9 months later, while the remainder stayed distressed. In logistic regression, baseline distress (odds ratios [OR] 5.51; 95% confidence intervals [CI] = 2.56 to 11.62), emotional problems (OR = 1.08; 95% CI = 1.00 to 1.17), social support (OR = 0.54; 95% CI = 0.35 to 0.83), and NYHA classification (OR = 1.70; 95% CI = 1.05 to 2.77) independently predicted distress at follow up. High social support contributed to a resolution of anxiety or depression, while partnership and low levels of emotional problems protected patients who began the study in a good emotional state from psychological distress.

Conclusion

In everyday practice it is important to consider that a high NYHA classification and emotional problems may contribute to anxiety or depression, while high social support and living in a relationship may positively influence the psychological health of patients with heart failure.

Keywords

anxiety; depression; heart failure; primary health care.

INTRODUCTION

Depression and anxiety are common in patients with heart failure. Prevalence of depression in patients with heart failure has been reported as ranging from 15 to 36%, which is above the lifetime prevalence of 13% for major depression in the general population.¹⁻⁴ Anxiety has been found in 29⁵ to 45%⁶ of patients with heart failure.

In hospitalised patients with heart failure, depression is associated with the risk of hospital readmissions at 3 months and at 1 year, 1-year-mortality rate independent of age, New York Heart Association (NYHA) classification, baseline ejection fraction, and ischemic origin of heart failure.⁷ Vaccarino *et al*⁸ reported a graded association between the risk of functional decline or death and depressive symptoms in patients with heart failure.

Even in primary care, where family physicians usually have close contact with their patients due to long lasting relationships and mutual trust, psychological comorbidity in patients with heart failure is often neglected. Despite their association with adverse cardiac outcome in ischemic heart disease as well as in heart failure, depressive symptoms seem to be often under-diagnosed or inadequately treated by GPs.⁹⁻¹³ While an acute, temporary depressive, or anxious reaction to heart

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How this fits in

Chronic diseases are associated with a higher risk of anxiety and depression. This may easily be unrecognised when attention is focused on management of somatic symptoms. As a part of a holistic approach to patient care, GPs should be aware of psychosocial distress related to chronic diseases. This article may help to detect the development of anxiety or depression in patients with heart failure.

failure may be seen as a normal response, prolonged depressive or anxious symptoms should be examined more closely.¹⁴ Little attention is given to determining which predictive factors for psychological comorbidity of heart failure should be considered in a primary care setting. A 9-month follow-up observational study was conducted to analyse the course and psychosocial predictors of anxiety and/or depression in primary care patients with heart failure. Additionally, predictive factors for the resolution or absence of psychological distress were identified.

METHOD

Study design

In this longitudinal observation study, primary care patients with heart failure were recruited through electronic patient records to analyse which factors might influence the development of psychosocial distress in the future. In these patients, psychological distress, disease coping, social support, and severity of heart failure were assessed by validated questionnaires at baseline and 9 months later. Psychological distress defined as anxiety and/or depression at follow up was the main outcome of this study. The baseline characteristics of this sample have been reported elsewhere.¹⁵

Recruitment of patients

As part of a project on the quality of medical care in general practice,¹⁶ a GP network of 104 practices was established.¹⁷ All general practices in the network located within a radius of 30 km around Göttingen ($n = 44$), were selected for participation in this study. In these practices, electronic patient data (date of birth, sex, diagnosis) were exported via a defined interface and transferred to a database. This database was screened for patients with the documented diagnosis of heart failure using a specific search strategy based on structured standard query language. Of 44 general practices, 4120 patients with presumed heart failure could be identified. From April 2003 to July 2004, all GPs received lists with patient identification codes and dates of birth for re-identification of the patients in the electronic practice information system. GPs were

asked to exclude patients from the lists if they met the following exclusion criteria:

- heart failure diagnosis not valid;
- terminal illness or death;
- cancer;
- patients seen by locums only;
- moved to a region outside the study area;
- severe disability;
- lack of language competence; and
- inability to communicate (for example, dementia).

Instruments

Sociodemographic data were obtained by a standardised questionnaire. In addition, the following instruments were used:

Psychometric questionnaires. The Hospital Anxiety and Depression Scale (HADS)¹⁸⁻²¹ is a widely used short self-assessment questionnaire developed for patients with physical illness. Its items mainly investigate psychological manifestations of (generalised) anxiety and depressive mood. Each of the two subscales consists of seven items. Possible subscale scores range from 0 to 21. For statistical analysis, HADS scores at baseline and follow up were dichotomised (anxiety or depression positive). Patients with a depression score >8 were considered depressive, patients with an anxiety score >10 were considered anxious.²¹ In the analyses reported here, the HADS was used as a general measure of psychological distress, as suggested by previous research. Psychological distress was defined as an elevated score on either the anxiety or depression subscale, or both.

*Social support questionnaire (Fragebogen zur Sozialen Unterstützung; F-SozU).*²² The 14-item short form (five-point scale: from 'relevant' to 'not relevant') assesses perceived social support. The items refer to different aspects of experienced support (emotional support, instrumental support, and social integration), resulting in a global scale with higher scores indicating better social support.

*Freiburg questionnaire for coping with illness (Freiburger Fragebogen zur Krankheitsverarbeitung; FKV).*²³ The FKV is a questionnaire that takes into account five coping dimensions: depressive coping, active problem-focused coping, distraction and self-encouragement, religious faith and search for meaning, as well as minimisation and wishful thinking. Items can be answered on a five-point Likert-scale (from 1 = 'not relevant at all' to 5 = 'very relevant'), and are scored on five subscales corresponding to the dimensions mentioned above.

Higher scores represent more use of the particular coping style.

The German versions of all psychometric instruments have been validated previously and found suitable for research in physically ill patients.¹⁸⁻²³

Heart failure scale. A questionnaire for the self-assessment of heart failure severity was developed according to the classification of the New York Heart Association (NYHA). This is a non-validated modification of the NYHA classification that is used worldwide in everyday practice. According to the NYHA criteria, patients assessed the severity of their heart disease on a 4-point scale.

Goldman's Specific Activity Scale (SAS).²⁴⁻²⁶ Like the NYHA classification, impairment is measured on a four-point scale with higher scores indicating higher levels of impairment. However, in contrast to the NYHA-related scale, the SAS is a validated instrument that allows a functional classification of the severity of heart failure. It consists of five items measuring the ability to perform specific activities in daily life. Scoring is based on detailed algorithm and allows a grading of physical performance.

Minnesota Living with Heart Failure Questionnaire (MLHFQ).^{27,28} The MLHFQ measures subjective effects of heart failure and treatments for heart failure on an individual's quality of life. Each of the 26 items is scored on a six-point Likert scale, ranging from 1 to 5. Item scores are summed up to provide a MLHFQ total score and two subscores (physical and emotional problems) indicating disease-specific quality of life. Higher values indicate more severe impairment.

Statistical analysis

All data were coded and entered into an anonymised database on a personal computer. For the statistical analyses, SPSS (version 12.0) was used. To avoid an α inflation error, tests were restricted to statistical tests to logistic regression analyses differences, while descriptive analyses were not tested for (Table 1). The study aimed to identify significant factors that predict distress at follow up for all patients (Table 2). It also aimed to find determinants for the improvement of psychological distress in initially distressed patients or for the persistence of low distress levels in those with normal HADS scores at baseline, respectively (Table 3). Stepwise backward elimination was used to remove variables in logistic

Table 1. Characteristics of patients at baseline and follow up.

| Baseline variables | Distress ^a at baseline and follow up | Distress at baseline improvement at follow up | No distress at baseline deterioration at follow up | No distress at baseline and follow up |
|--------------------------------------------|-------------------------------------------------|-----------------------------------------------|----------------------------------------------------|---------------------------------------|
| Total, n (%) | 54 (18.6) | 26 (8.9) | 31 (10.7) | 180 (61.9) |
| Sociodemographic parameters | | | | |
| Age, mean (SD) | 71.7 (10.4) | 76.5 (8.6) | 71.6 (10.5) | 72.3 (8.5) |
| Female, n (%) | 33 (61.1) | 17 (65.4) | 16 (51.6) | 90 (50.0) |
| Social context | | | | |
| Living with a partner, n (%) | 29 (53.7) | 14 (53.8) | 18 (58.1) | 135 (75.0) |
| Number of persons per household; mean (SD) | 1.6 (0.7) | 1.6 (0.7) | 1.9 (1.0) | 1.9 (0.9) |
| Actual employment, n (%) | | | | |
| Retired | 41 (75.9) | 23 (88.5) | 23 (74.2) | 151 (83.9) |
| Employment | 9 (16.7) | 1 (3.8) | 6 (19.4) | 21 (11.7) |
| Severity of heart failure, mean (SD) | | | | |
| NYHA self-rating | 2.0 (0.7) | 1.7 (0.8) | 1.6 (0.8) | 1.4 (0.5) |
| Goldman's SAS | 2.3 (1.0) | 2.0 (0.9) | 1.7 (0.9) | 1.7 (0.9) |
| Quality of life (MLHFQ), mean (SD) | | | | |
| Physical problems | 23.9 (8.5) | 19.8 (9.0) | 15.7 (9.9) | 10.8 (9.0) |
| Emotional problems | 9.0 (6.4) | 7.4 (5.3) | 4.7 (4.1) | 2.1 (2.6) |
| Social support (F-SozU), mean (SD) | | | | |
| | 3.5 (0.9) | 4.0 (0.7) | 3.9 (0.6) | 4.2 (0.7) |
| Coping style (FKV), mean (SD) | | | | |
| Depressive coping | 13.4 (3.8) | 12.2 (3.7) | 10.3 (3.3) | 8.3 (3.1) |
| Active problem-focused coping | 13.5 (4.0) | 14.2 (5.4) | 15.1 (4.6) | 13.9 (4.6) |
| Distraction and self-encouragement | 14.1 (3.3) | 14.2 (5.2) | 14.8 (4.9) | 14.3 (4.4) |
| Religious faith/search for meaning | 15.2 (3.9) | 15.8 (4.2) | 14.0 (3.5) | 13.6 (4.2) |
| Minimisation and wishful thinking | 8.4 (2.6) | 7.5 (2.9) | 7.0 (2.9) | 6.1 (2.6) |

^aDistress = anxiety and/or depression according to the Hospital Anxiety and Depression Scale. NYHA = New York Heart Association. Goldman's SAS = Specific Activity Scale. MLHFQ = Minnesota Living with Heart failure Questionnaire. F-SozU = social support questionnaire. FKV = Freiburg questionnaire for coping with illness.

Table 2. Prediction of follow-up anxiety and/or depression for all patients (n = 291).

| Explanatory variable | Range | Odds ratio | 95% CI | P-value |
|-----------------------------------------------|-------------------|------------|-----------------|---------|
| Sociodemographic characteristics | | | | |
| Age | (36–95) | 0.98 | (0.94 to 1.01) | 0.23 |
| Sex, female/male | | 0.92 | (0.48 to 1.78) | 0.81 |
| Psychosocial distress | | | | |
| Anxiety and/or depression (HADS) baseline | Yes = 1 No = 0 | 5.51 | (2.56 to 11.62) | <0.001 |
| Emotional quality of life | | | | |
| MLHFQ emotional problems baseline | (0–25) | 1.08 | (1.00 to 1.17) | 0.004 |
| Social support | | | | |
| F-SozU baseline | (1–5) | 0.54 | (0.35 to 0.83) | <0.001 |
| Heart failure severity self assessment | | | | |
| NYHA classification baseline | (1–4) | 1.70 | (1.05 to 2.77) | 0.003 |

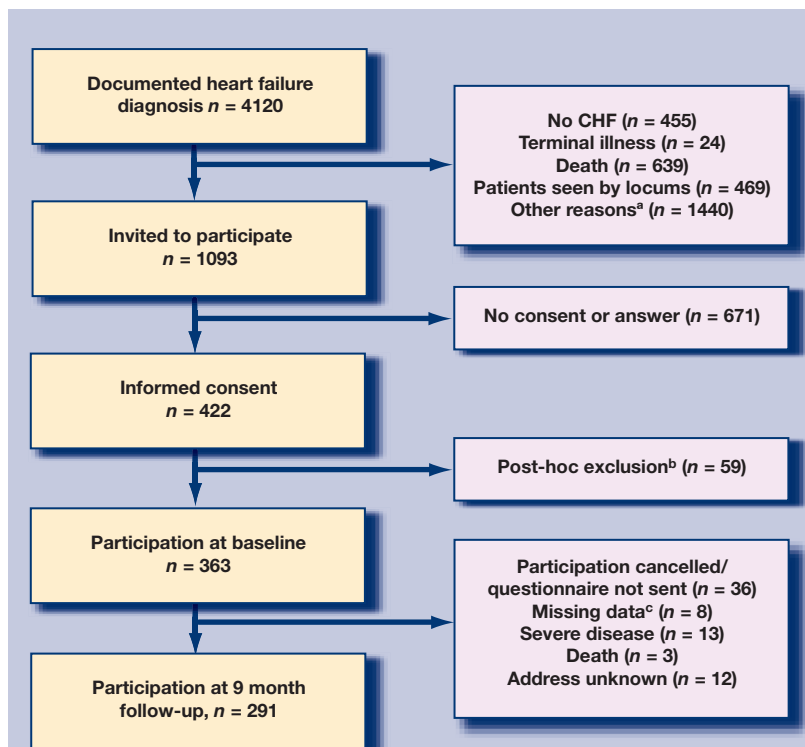
Overall P-value of the model: P<0.001. Backward selection of logistic regression was based on the following baseline variables: sex, age, psychological distress (anxiety and/or depression according to the Hospital Anxiety and Depression Scale [HADS]), coping style (Freiburg questionnaire for coping with illness), emotional and physical problems (Minnesota Living with Heart Failure Questionnaire [MLHFQ]), social support questionnaire (F-SozU), New York Heart Association (NYHA) classification, Goldman's Specific Activity Scale, living in a relationship, number of persons per household, actual employment.

regression analyses with P>0.05 as the level for removing effects.

RESULTS

In total, 291 patients participated in the study; the flow through the study is shown in Figure 1.

Figure 1. Study flow of participation.



^aExport of electronic patient record incorrect (n = 486), dementia (n = 377), severe psychiatric disease (n = 110). The remaining patients (n = 467) had changed place of residence, changed GP, had an urgent need of care, inability to communicate, had cancer. ^bConsent in the study was not given (n = 21), questionnaire not filled in (n = 34), heart failure diagnosis not valid (n = 2), communication problems (n = 2). ^cMissing data from the Hospital Anxiety and Depression Scale.

Of the participants, 156 (53.3%) were female; the mean age was 72.5 years (standard deviation = 9.2 years). Twenty-six (32.5%) of the 80 patients who were distressed at baseline had normal HADS scores 9 months later, while the remainder stayed distressed. In the group of the initially non-distressed patients (n = 211), 31 (14.7%) patients had clinically relevant levels of anxiety or depression at follow up. A state of low psychological distress was maintained by 180 patients over the whole study period. In descriptive group comparisons, these patients were more likely to live with a partner and to have low severity of heart failure as well as few physical and emotional problems (MLHFQ) at baseline (Table 1). The association between persistently low distress and living in a relationship was confirmed in multivariate analysis.

Including all patients, logistic regression indicated an association between distress, emotional problems, low social support, and NYHA classification at baseline, and distress (HADS) at follow up. Using backward elimination, living in a relationship, number of persons per household, actual employment, Goldman's SAS at baseline, and coping style were excluded from multivariate analysis based on the significance criterion (Table 2). For the subgroups of patients with and without anxiety or depression at baseline, protective factors were analysed that resolve high psychological distress or help maintain a state of low psychological distress (Table 3). High social support was the only independent predictor of resolution of anxiety or depression in initially distressed patients. Living with a partner and having fewer emotional problems at baseline protected patients who begun the study in a good mental state from developing psychological

Table 3. Factors predicting resolution of psychological distress or constantly low levels of distress.

| Explanatory variable | Group comparison | Odds ratio | 95% CI | P-value |
|----------------------------------------------------------------------------------|-------------------------------|------------|--------------|---------|
| Initially distressed patients (n = 80) | | | | 0.001 |
| High social support | Still distressed at follow up | 1.0 | | |
| | Improved at follow up | 2.2 | (1.1 to 4.3) | 0.00 |
| Initially not distressed patients (n = 211) | | | | <0.001 |
| Living with a partner | High distress at follow up | 1.0 | | |
| | Low distress at follow up | 2.8 | (1.1 to 7.6) | 0.004 |
| Fewer emotional problems (no strain, no insomnia, recreational activities) | High distress at follow up | 1.0 | | |
| | Low distress at follow up | 1.3 | (1.1 to 1.4) | <0.001 |

Backward selection of logistic regression was based on the following baseline variables: sex, age, coping style (Freiburg questionnaire for coping with illness), emotional and physical problems (Minnesota Living with Heart Failure Questionnaire), social support (F-SozU), New York Heart Association classification, Goldman's Specific Activity Scale (SAS), living with a partner, number of persons per household, actual employment.

distress. Interestingly, NYHA classification did not influence the resolution or absence of psychological distress in the subgroup analyses.

DISCUSSION

Summary of main findings

In this longitudinal study, distress at follow up, defined as depression and/or anxiety, was predicted by psychological distress, emotional problems (MLHQ), low social support, and NYHA classification at baseline. In patients who began the study distressed, high social support contributed to a resolution of anxiety or depression, while living with a partner and low levels of emotional problems (for example, no insomnia or loss of recreational activities) were associated with the absence of psychological distress over the whole study period. Although NYHA classification did not predict distress in subgroup analyses, it was still a relevant predictor of anxiety or depression when logistic regression was performed for the whole study population.

Strengths and limitations of the study

This is the first study to follow up psychological distress of patients with heart failure in relation to psychosocial attributes in a primary care setting. It was conducted in a relatively large group recruited by a defined algorithm from the whole patient population of various practices, and is therefore largely representative of typical older patients with heart failure seen in general practice. The somewhat large number of exclusions can be traced back to predefined reasons according to this algorithm (Figure 1), so it is unlikely that the sample was subject to an unintentional selection bias. The use of easily available and well-validated psychometric self-rating tools offers the primary care physician the opportunity to take direct advantage of this study's findings and to improve recognition of patients who

are at risk of experiencing prolonged distress.

However, this study has some limitations. As it was intended to examine predictors available in general practice, no objective data were collected on left ventricular dysfunction and underlying cardiac pathology. The predictive model could have been further improved by including objective cardiac measures such as ejection fraction or natriuretic peptides. However, there have been only inconsistent associations between ejection fraction and distress. Natriuretic peptides are only weakly related to depression and have no positive association with anxiety.²⁹ The validity of the self-rating scale to assess severity of heart failure according to NYHA classification may be questioned. Yet, in the predictive model this scale performed better than the validated SAS. Physician ratings of heart failure severity may have led to different results. However, ratings of heart failure severity by physicians are subjective and psychological variables such as depressive mood are bidirectionally related to physicians' severity ratings.³⁰ This means that more severe heart failure may cause increased distress but that high distress also leads to increased suffering and symptom reporting, which may in turn lead physicians to classify the clinical status as more severe.

Comparison with existing literature

Anxiety and/or depression was selected as the main outcome of the study because anxiety and depression are closely interrelated and indicate different manifestations of psychosocial distress, and HADS was used as a global indicator of distress. Although anxiety and depression might have somewhat different effects on cardiac prognosis, recent research has shown a clustering of negative affects to be more strongly related to cardiovascular disease outcomes than specific affects alone. For

example, Boyle *et al* analysed the unique and joint contributions of hostility, anxiety, depression, and anger to incident coronary heart disease in a sample of adult males, indicating that the shared variance among these four characteristics emerged as the strongest predictor of disease.³¹ At baseline, 13.1% of the patients in this study had increased levels of baseline, 23.7% had a clinically-relevant depression (follow up anxiety 13.4%; follow up depression 26.1%). Recent studies conducted in a primary care setting report a prevalence of 19.5%³² for anxiety disorders and 14.3%³³ for depressive episodes. Due to differences in sampling and diagnostic instruments, the comparison of the cited studies with these results may be problematic. However, the prevalence found for anxiety in this study appears unexpectedly low.

One of the prognostic factors which can, besides distress itself, easily be assessed in everyday consultation, is social support. Lack of social support is known to be associated with increased risk of mortality.^{34–36} The results suggest that a lack of social support is also an important predictor for psychosocial distress. However, only few studies have looked at the social relationships of patients with heart failure. Krumholz, *et al*³⁷ found that the absence of emotional support was a strong, independent predictor of fatal cardiac outcomes among older hospitalised patients with heart failure.

Results of a study by Murberg and Bru³⁸ in outpatients suffering from heart failure indicated that social isolation was a significant predictor of mortality, even after controlling for depressive symptoms, heart failure severity, functional status, and age. Supporting the theory of an adverse long-term effect on cardiac mortality in patients with heart failure, social isolation was found to be a significant predictor of mortality during a 6-year follow-up period, controlling for heart failure severity, functional status, sex, and age.³⁹ Furthermore, another study by Murberg *et al* found that a low level of social support unfavourably influences patients coping with psychological distress.⁴⁰

Implications for future research or clinical practice

Due to intercorrelations of psychosocial attributes, the clustering of negative affects may also lead to adverse outcomes in patients with documented heart disease, including reduced quality of life and increased mortality. Further research is needed to address the impact of covariation of psychosocial predictors on disease related outcomes of patients with heart failure especially in a primary care setting. In everyday practice, it should be remembered that NYHA classification and emotional problems may

contribute to anxiety or depression, while high levels of social support and living with a partner may positively influence the psychological health of patients with heart failure.

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Ethics committee

The study was approved by the local ethics commission of the University of Göttingen (30/7/02)

Competing interests

The authors have stated that there are none.

REFERENCES

1. Maricle RA, Hosenpud JD, Norman DJ, *et al*. Depression in patients being evaluated for heart transplantation. *Gen Hosp Psychiatry* 1989; **11**(6): 418–424.
2. Freedland KE, Carney RM, Rich MW, *et al*. Depression in elderly patients with congestive heart failure. *J Geriatr Psychiatry* 1991; **24**(1): 59–71.
3. Koenig HG. Depression in hospitalized older patients with congestive heart failure. *Gen Hosp Psychiatry* 1998; **20**(1): 29–43.
4. Havranek EP, Ware MG, Lowes BD. Prevalence of depression in congestive heart failure. *Am J Cardiol* 1999; **84**(3): 348–350.
5. Jiang W, Kuchibhatla M, Cuffe MS, *et al*. Prognostic value of anxiety and depression in patients with chronic heart failure. *Circulation* 2004; **110**(22): 3452–3456.
6. Friedmann E, Thomas SA, Liu F, *et al*. Relationship of depression, anxiety, and social isolation to chronic heart failure outpatient mortality. *Am Heart J* 2006; **152**(5): 940. e1–8.
7. Jiang JW, Alexander J, Christopher E, *et al*. Relationship of depression to increased risk of mortality and rehospitalization in patients with congestive heart failure. *Arch Intern Med* 2001; **161**(15): 1849–1856.
8. Vaccarino V, Kasl SV, Abramson J, *et al*. Depressive symptoms and risk of functional decline and death in patients with heart failure. *J Am Coll Cardiol* 2001; **38**(1): 199–205.
9. Simon GE, Goldberg D, Tiemens BG, *et al*. Outcomes of recognized and unrecognized depression in an international primary care study. *Gen Hosp Psychiatry* 1999; **21**(2): 97–105.
10. Eisenberg L. Treating depression and anxiety in primary care. Closing the gap between knowledge and practice. *N Engl J Med* 1992; **326**(16): 1080–1084.
11. Goldman LS, Nielsen NH, Champion HC. Awareness, diagnosis, and treatment of depression. *J Gen Intern Med* 1999; **14**(9): 569–580.
12. Hirschfeld R, Keller MB, Panico S, *et al*. The National Depressive and Manic-Depressive Association consensus statement on the undertreatment of depression. *JAMA* 1997; **277**(4): 333–340.
13. Schulberg HC, Block MR, Madonia MJ, *et al*. Treating major depression in primary care practice. Eight-month clinical outcomes. *Arch Gen Psychiatry* 1996; **53**(10): 913–919.
14. Clinical Guideline 5. Chronic heart failure. *Management of chronic heart failure in adults in primary and secondary care*. London: National Institute for Clinical Excellence, 2003.
15. Scherer M, Stanske B, Wetzel D, *et al*. Psychosocial co-symptoms in primary care patients with heart failure. *Herz* 2006; **31**(4): 347–354.
16. Wetzel D, Scheidt-Nave C, Rogausch A, *et al*. Quality of medical care in general practice: an assessment model for the improvement of health services research in general practice. *Z Allgemeinmed* 2003; **79**: 394–398.
17. Wetzel D, Himmel W, Heidenreich R, *et al*. Participation in a quality of care study and consequences for generalizability of general practice research. *Fam Pract* 2005; **22**(4): 458–464.
18. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983; **67**(6): 361–370.
19. Herrmann C. International experiences with the Hospital Anxiety and Depression Scale — a review of validation data and clinical results. *J Psychosom Res* 1997; **42**(1): 17–41.
20. Bjelland I, Dahl AA, Haug TT, *et al*. The validity of the Hospital

- Anxiety and Depression Scale. An updated literature review. *J Psychosom Res* 2002; **52**: 69–77.
21. Herrmann Ch, Buss U, Snaith RP. *HADS-D—Hospital Anxiety and Depression Scale*. Bern: Verlag Hans Huber, 1995.
 22. Fydrich T, Sommer G, Brähler E: *F-SozU—Social support questionnaire* [in German]. In: Brähler E, Schumacher J, Strauß B (eds). *Diagnostic Instruments in Psychotherapy*. Göttingen: Hogrefe, 2002.
 23. Muthny FA. *Freiburg Disease Coping Questionnaire (FKV)* [in German]. Weinheim: Beltz Test, 1989.
 24. Goldman L, Hashimoto B, Cook EF, *et al*. Comparative reproducibility and validity of systems for assessing cardiovascular functional class: advantages of a new specific activity scale. *Circulation* 1981; **64**(6): 1227–1234.
 25. Goldman L, Cook EF, Mitchell N, *et al*. Pitfalls in the serial assessment of cardiac functional status. How a reduction in ‘ordinary’ activity may reduce the apparent degree of cardiac compromise and give a misleading impression of improvement. *J Chronic Dis* 1982; **35**(10): 763–771.
 26. Mangione CM, Marcantonio ER, Goldman L, *et al*. Influence of age on measurement of health status in patients undergoing elective surgery. *J Am Geriatr Soc* 1993; **41**(4): 377–383.
 27. Rector TS, Kubo SH, Cohn JN. Validity of the Minnesota living with heart failure questionnaire as a measure of therapeutic response to enalapril or placebo. *Am J Cardiol* 1993; **71**(12): 1106–1107.
 28. Hulsmann M, Berger R, Sturm B, *et al*. Prediction of outcome by neurohumoral activation, the six-minute walk test and the Minnesota living with heart failure questionnaire in an outpatient cohort with congestive heart failure. *Eur Heart J* 2002; **23**(11): 886–891.
 29. Herrmann-Lingen C, Binder L, Klinge M, *et al*. High plasma levels of N-Terminal pro-atrial natriuretic peptide associated with low anxiety in severe heart failure. *Psychosom Med* 2003; **65**(4): 517–522.
 30. Müller-Tasch T, Schellberg D, Holzapfel N, *et al*. Determinants of the quality of life in patients with chronic heart failure. *Psychother Psychosom Med Psychol* 2006; **56**: 99.
 31. Boyle SH, Michalek JE, Suarez EC. Covariation of psychological attributes and incident coronary heart disease in U.S. Air Force veterans of the Vietnam war. *Psychosom Med* 2006; **68**(6): 844–850.
 32. Kroenke K, Spitzer RL, Williams JB, *et al*. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Ann Intern Med* 2007; **146**(5): 317–325.
 33. Hauenstein EJ, Peddada SD. Prevalence of major depressive episodes in rural women using primary care. *J Health Care Poor Underserved* 2007; **18**(1): 185–202.
 34. Berkman LF, Leo-Summers L, Horwitz RI. Emotional support and survival after myocardial infarction. A prospective, population-based study of the elderly. *Ann Intern Med* 1992; **117**(12): 1003–1009.
 35. Gorkin L, Schron EB, Brooks MM, *et al*. Psychosocial predictors of mortality in the Cardiac Arrhythmia Suppression Trial-1 (CAST-1). *Am J Cardiol* 1993; **71**(4): 263–267.
 36. Williams R, Barefoot JC, Califf RM, *et al*. Prognostic importance of social and economic resources among medically treated patients with angiographically documented coronary artery disease. *JAMA* 1992; **267**(4): 520–524.
 37. Krumholz HM, Butler J, Miller J, *et al*. Prognostic importance of emotional support for elderly patients hospitalized with heart failure. *Circulation* 1998; **97**(10): 958–964.
 38. Murberg TA, Bru E. Social relationships and mortality in patients with congestive heart failure. *J Psychosom Res* 2001; **51**(3): 521–527.
 39. Murberg TA. Long-term effect of social relationships on mortality in patients with congestive heart failure. *Int J Psychiatry Med* 2004; **34**(3): 207–217.
 40. Murberg TA, Bru E, Aarsland T, *et al*. Social support, social disability and their role as predictors of depression among patients with congestive heart failure. *Scand J Soc Med* 1998; **26**(2): 87–95.