
REVIEW ARTICLE

Developing an intervention for depressed, chronically medically ill elders: a model from COPD

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SUMMARY

Background Geriatric depression preferentially afflicts individuals with chronic medical illnesses. Disability, hopelessness, lack of acceptance of antidepressant treatment, and limited problem-solving skills contribute to poor treatment adherence, compromised outcomes, and chronically experienced adversity.

Methods This paper uses depression comorbid with chronic obstructive pulmonary disease (COPD) as a model entity to develop an approach for integrating treatment components essential for improving treatment adherence and outcomes.

Results The behavioral inertia of depression and its coexisting cognitive problems reduce adherence to the sustained and complex demands of the COPD rehabilitation regimen and antidepressant treatment. An intervention identifying reasons for poor treatment adherence and offering direct instructions for addressing them can be combined with problem-solving therapy to target treatment adherence, depressive symptoms, and disability.

Conclusions An intervention focusing on treatment adherence and problem-solving skills development may serve as the platform for administering specific treatments to address the interacting problems of depressed medically ill patients. Copyright © 2007 John Wiley & Sons, Ltd.

KEY WORDS — depression; COPD; treatment adherence

INTRODUCTION

Geriatric depression preferentially afflicts individuals with chronic medical illnesses. Major depression afflicts 1–2% of community residing elderly (NIH Consensus Development Panel on Depression in Late Life, 1992), while 6–8% of elderly primary care patients and 12–22.4% of long-term care residents suffer from major depression (Burrows *et al.*, 1995; Katz *et al.*, 1995). Safe and effective antidepressant treatments are available. Yet, their effects may be slow to occur and remission is often incomplete and unstable, necessitating a long-term treatment approach (Alexopoulos, 2005).

Several interacting factors compromise treatment effectiveness in depressed elderly patients with chronic medical illnesses. Physical disability originating from medical illness and exacerbated by depression is a barrier to treatment adherence. Demoralization resulting from the hopelessness of depression and the experience of disability and chronic adversity further contribute to resignation. Poor problem-solving skills resulting from inactivity, and cognitive problems co-existing with depression and medical illness add a disability component that extends from everyday life activities to treatment adherence.

The clinical complexity of depression in the chronically medically ill requires a treatment approach that addresses their interacting problems. This paper uses depression comorbid with chronic obstructive pulmonary disease (COPD) as a model to develop a treatment platform through which specific treatments can be administered. COPD lends itself for this

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purpose because of the chronic disability it confers, the demanding treatment it requires, and the high comorbidity with depression (Borson *et al.*, 1998; Yohannes *et al.*, 2000; Aydin and Ulusahin, 2001; Alexopoulos and Latoussakis, 2004; Wong *et al.*, 2006). At least 20% of COPD patients have one or more episodes of major depression, frequently of long duration (Yohannes *et al.*, 2003). Depression adds to the functional impairment of medical patients in general (Oxman and Hull, 2001) and COPD patients in particular (Leidy, 1995). Furthermore, depression is a stronger determinant of functional capacity than physiological indicators (Beck *et al.*, 1988; Weaver and Narsavage, 1992; Graydon and Ross, 1995). The combination of depression and disability can have an especially negative impact on patients' quality of life (Anderson, 1995).

NEED FOR A BEHAVIORAL APPROACH

Respiratory rehabilitation improves functional exercise capacity and health-related quality of life (Lacasse *et al.*, 1997). A comprehensive inpatient rehabilitation program (15-day median length of stay) led to decreases in depressive symptomatology and disability in patients suffering from severe COPD and major depression, although most did not achieve remission (Alexopoulos *et al.*, 2006). Behavioral activation (i.e. positively reinforced activity) and psychosocial support may have been the main contributors to the efficacy of the program in improving depression since exposure to antidepressants, in those who received them, was likely too brief to bring about an antidepressant response. Depression and disability did not further improve 6 and 14 weeks after discharge. Inadequate antidepressant treatment and difficulty adhering to demanding treatment regimens, including daily exercise, oxygen use, and attendance at multiple medical visits may each have contributed to lack of further improvement.

Efficacy and limitations of antidepressants in COPD patients

The efficacy of antidepressants in depressed COPD patients has been inadequately investigated. Two placebo-controlled studies noted that doxepin and desipramine had no advantage over placebo in improving mood among COPD patients (Gordon *et al.*, 1985; Light *et al.*, 1986). A 12-week study of COPD patients with major depression or dysthymia demonstrated that nortriptyline was superior to placebo in improving depressive symptoms, anxiety, respiratory

symptoms, physical comfort, and day-to-day function (Borson *et al.*, 1992). Similar results were obtained by a study comparing paroxetine with placebo, although the small sample and high drop-out rate (34.7%) limit its conclusions (Lacasse *et al.*, 2004).

There are reasons to expect that antidepressants have limited efficacy in depressed COPD patients. First, even among non-COPD depressed patients, only 35% achieve remission while another 20% derive partial benefit from antidepressants (Thase *et al.*, 2001). Second, antidepressant efficacy may be even lower in COPD patients experiencing continuous physical discomfort, and exposed to chronic psychosocial adversity (ACCP/AACVPR, 1997). Third, many COPD patients have cognitive impairments associated with limited response to antidepressants. Specifically, perceptual learning-problem solving, alertness-psychomotor speed and simple motor functions are impaired in COPD patients (Grant *et al.*, 1987). Many COPD patients have executive dysfunction resulting in inability to think flexibly, perform complex perceptual-motor maneuvers, and engage in perceptual discrimination (Fix *et al.*, 1982; Grant *et al.*, 1982; Incalzi *et al.*, 1993; ACCP/AACVPR, 1997; Favalli *et al.*, 2007). Impairment in some executive functions predicts poor or slow response to antidepressant treatment (Kalayam and Alexopoulos, 1999; Alexopoulos *et al.*, 2004; Potter *et al.*, 2004), as well as early relapse and recurrence of geriatric depression (Alexopoulos *et al.*, 2005). Furthermore, indices of fronto-striato-limbic dysfunction (microstructural abnormalities lateral to the anterior cingulate gyrus (Alexopoulos *et al.*, 2002) and high amplitude of the frontal error negative wave induced by probes of the anterior cingulate) were associated both with executive dysfunction and poor response to citalopram (Kalayam and Alexopoulos, 2003; Alexopoulos *et al.*, 2007). Approximately 54% of patients with major depression and severe COPD have abnormal Initiation/Perseveration scores (one standard deviation below the mean of normal elders), indicating executive dysfunction (Alexopoulos and Latoussakis, 2004). Depressive symptomatology interacts with executive dysfunction and contributes to disability in depressed elderly patients (Kiosses *et al.*, 2001).

Patient reluctance to receive antidepressants further reduces their impact. One study showed that 72% of depressed elderly COPD patients refused antidepressants, and only 50% of those agreeing to treatment completed a trial of fluoxetine (Yohannes *et al.*, 2001). Limited efficacy and poor acceptance of antidepressants suggests that psychosocial interventions may

play an important role in the treatment of these patients.

The role of psychosocial interventions in depressed COPD patients

Cognitive-behavioral interventions may reduce depression and anxiety in COPD patients (Kunik *et al.*, 2001; de Godoy and de Godoy, 2003). However, to our knowledge, there are no psychotherapy studies in COPD patients with major depression. Nonetheless, various psychotherapies are effective in elderly patients (Niederehe, 1994, 1996) and community-residing elders with major depression (Charney *et al.*, 2003). Reminiscence therapy (Goldwasser *et al.*, 1987), brief psychodynamic therapies (Steuer *et al.*, 1984; Thompson *et al.*, 1987), behavior therapy (Gallagher and Thompson, 1982), cognitive therapy (Thompson *et al.*, 1987), and social problem-solving therapy (Areán *et al.*, 1993) are effective in reducing depressive symptoms. Moreover, older adults, minority groups and primary care patients with depression prefer psychotherapy over pharmacotherapy (Areán *et al.*, 2005).

ADHERENCE-ENHANCEMENT INTERVENTION IN DEPRESSED COPD PATIENTS

The ACCP/AACVPR Pulmonary Rehabilitation Evidence-Based Guidelines (1997) state: '... the most important behavioral aspect of pulmonary rehabilitation is the extent to which patients comply with the exercise program or with other medical therapies'. Despite its importance, treatment adherence remains a significant problem among COPD patients. Approximately 50% of COPD patients do not take their medications as prescribed (James *et al.*, 1985), and a similar percentage use oxygen below minimal levels of clinical efficacy or fail to pursue walking exercises (Kaplan *et al.*, 1990).

Depression further adds to treatment adherence problems. Compared to non-depressed patients, depressed medical patients are three times more likely to be noncompliant with prescribed medications, exercise, diet, health related behavior, vaccination, and appointments (DiMatteo *et al.*, 2000). Poor adherence to medical regimens has a consistently negative effect on treatment outcomes (DiMatteo *et al.*, 1993; Alexopoulos *et al.*, 2006). Thus effective interventions for depressed COPD patients must directly address adherence to medical

and rehabilitative care and also reduce depression, since this condition contributes to poor treatment adherence.

We developed a multi-level intervention to increase patient adherence to treatments for COPD and depression (Sirey *et al.*, 2007). The intervention used trained care managers to: (1) Evaluate reasons for poor treatment adherence in each patient; (2) offer education pertinent to each patient's barriers to treatment adherence, depression and disability; and (3) provide direct recommendations on ways to improve adherence to rehabilitation regimens and antidepressant treatment.

THE NEED FOR INTEGRATED TREATMENT

The above review suggests that pharmacotherapy, psychotherapy, and interventions aimed to increase treatment adherence can be helpful in depressed COPD patients. However, administered alone, each approach offers limited long-term benefits in reducing depression and disability.

The small impact of current treatment approaches is hardly surprising given the clinical context of patients with severe COPD and depression. First, these patients live with daily physical discomfort and are forced into a compromised lifestyle. Second, they are demoralized knowing that their disease has an inescapable deteriorating course. Third, depressive symptoms, including hopelessness and helplessness, lead to resignation. Fourth, executive dysfunction and other cognitive limitations often accompanying COPD reduce patients' ability to develop strategies to address their treatment needs and life problems. These problems are compounded by demanding COPD treatments that require active patient participation. The last thing that a depressed, demoralized, cognitively-compromised and physically weak patient wants to do is pursue a consistent exercise program, go to doctors and treatment centers, and reengineer social aspects of his/her life.

A TREATMENT MODEL FOR DEPRESSION, DISABILITY, AND TREATMENT ADHERENCE

The above literature suggests that depression, disability, and poor treatment adherence interact and contribute to behavioral and physical deterioration of COPD patients. Problem-solving therapy (PST) integrated with our adherence-enhancement approach may target the triad of depression, disability, and adherence to COPD treatment, interrupt the spiral of

deterioration, and improve quality of life. This assertion is based on findings documenting that: (1) PST reduces depressive symptoms and disability in various populations with major depression; (2) PST has been appropriately modified and found effective in reducing depression and disability in depressed elders with cognitive abnormalities similar to those of COPD patients; and (3) PST can be integrated with the adherence-enhancement intervention.

PST for depression and disability

PST targets depression by teaching patients skills for improving their ability to deal with everyday problems and major life events. PST reduces depressive symptoms and disability in major depression of younger patients (Nezu, 1986; Nezu and Perri, 1989), older adults (Areán *et al.*, 1993), and medical patients (Mynors-Wallis, 1996; Mynors-Wallis *et al.*, 1997; Mynors-Wallis *et al.*, 2000). While PST and antidepressants were of comparable effectiveness in primary care patients (Mynors-Wallis *et al.*, 2000), to our knowledge, no studies have compared these treatments in patients with chronic diseases. Depressed older adults, who improved from major depression after receiving PST, had increased problem-solving skills, less disability, and greater life satisfaction (Areán *et al.*, 1993; Alexopoulos *et al.*, 2003).

PST in Patients with Executive Dysfunction

Although PST has not been studied in depressed COPD patients, there is evidence that, when appropriately modified, PST can improve the function of populations with cognitive impairment similar to or greater than that of COPD patients. PST improves initiation and completion of tasks in schizophrenic patients, a population with significant executive dysfunction (TARRIER *et al.*, 1993; Heinssen *et al.*, 2000). Training in problem-solving improves social adjustment, lowers relapse rates and improves quality of life compared to programs that do not employ this type of skills-training (Lieberman and Corrigan, 1993; Lieberman, 1994; Lieberman *et al.*, 1998; Leclerc *et al.*, 2000). Problem-solving methods have been so successful in the rehabilitation of schizophrenics that they have become a staple of many social skills training programs (Lieberman *et al.*, 1998).

PST modified to address behavioral limitations resulting from cognitive impairment was found to be more effective than supportive therapy in decreasing depression and disability in non-demented depressed elders with executive dysfunction (Alexopoulos *et al.*,

2003). Improvement of depression and disability occurred even though executive dysfunction persisted throughout treatment. Thus, while executive dysfunction is associated with poor and unstable response to antidepressants drugs, it may not influence response to PST. While PST may not have altered executive dysfunction, it improved problem-solving ability and thus reduced depressive symptoms and disability.

PST Integrated with Adherence Enhancement Techniques

PST is well-suited for integration with adherence enhancement interventions in targeting the triad of depression, disability, and treatment adherence. PST focuses on identification and management of problems contributing to chronic life adversity. Critical among these problems are barriers to COPD treatment adherence. The adherence enhancement protocol can guide the care manager in problem identification as it provides a structured approach to evaluate areas of inadequate adherence and their underlying reasons. Some adherence problems may respond to simple interventions provided by the adherence enhancement protocol, including clarification, education, and direct instruction. Others may require development of behavioral skills through PST. As most depressed COPD patients have many reasons for poor treatment adherence, the two approaches act in synergy to address a broad range of adherence problems.

The intervention consists of ten weekly sessions followed by four monthly sessions. The first two sessions occur while participants are still hospitalized and introduce the rationale of treatment, assess participants' needs and potential barriers to adherence to treatment of depression and COPD, and form a treatment plan. The subsequent eight sessions are administered weekly at participants' homes or the care manager's office depending on ability to travel. Four additional sessions are administered monthly and are intended to reinforce skills and behaviors imparted during the first ten sessions.

Treatment adherence enhancement and PST are fully integrated. Since adherence to treatments for COPD and depression is central to the care of these patients, treatment starts by identifying treatment needs and barriers to adherence specific to the individual patient. Some of the barriers are addressed by clarification and education, while others require development of problem-solving skills. As a rule, a problem related to treatment adherence (e.g. adhering to a recommended exercise regimen or taking an antidepressant as prescribed) is the first target for

training patients in the problem-solving approach. While initial PST sessions target health-related behaviors, patients learn the PST approach and apply it to other life problems, including isolation, relationships with family and friends, etc. As patients become proficient in managing their illnesses, they develop a sense of empowerment. Mastering daily problems instills hope and increases the likelihood of managing problems as they arise, thus improving function. Since this intervention combines a targeted behavioral treatment with pharmacotherapy for depression (and even reinforces adherence to pharmacotherapy) it is consistent with practice guidelines (Alexopoulos *et al.*, 2001), which recommend combination therapies in both mild and severe geriatric depression.

A CASE EXAMPLE

RY is a 74-year-old retired construction worker who lives with his wife. He was diagnosed with COPD eight years earlier, and was recently hospitalized for an exacerbation of dyspnea. Five days later, his blood gases improved and he was referred for inpatient pulmonary rehabilitation. After 1-week he requested to be discharged from the Rehabilitation Center indicating that little could make him well. He reported feeling useless and that he would be better-off dead. He had psychomotor retardation and reported fatigue and concentration difficulties. His physician started him on an antidepressant, although the patient insisted that his feelings were a logical consequence of his predicament and no improvement could be anticipated. He agreed to attend an outpatient program as a condition for his discharge, but failed to follow through with this recommendation.

The care manager first worked with Mr Y in the Rehabilitation Center to identify barriers to psychiatric, medical, and rehabilitative treatment. These included: (1) limited exercise and inconsistent oxygen use; (2) the view that depression is an expected reaction to disability; and (3) hopelessness about the efficacy of treatment for both depression and COPD ('Why bother with all of this?'). The care manager then offered education about the nature of depression and COPD, the role of antidepressant treatment, and how daily exercise could improve functioning. While validating that COPD is indeed a progressive illness that cannot be reversed, she emphasized that consistent exercise and oxygen use can improve symptoms and quality of life.

Following discharge, the care manager continued to reinforce treatment adherence and introduced PST. With her help, Mr Y generated a list of problems he

felt were contributing to his depression, i.e. difficulty with daily exercises, feeling 'nagged' by his wife to exercise, isolating himself from family and friends, and lack of pleasant activities. Mr Y prioritized these problems, and chose difficulty with exercising as the first problem to focus on. Together, they established the goal of exercising daily for at least 20 minutes, and they developed a plan of specific exercises at specific times. Another of Mr Y's goals was to limit his wife's reminders about exercising. With the care manager's help, he brainstormed different solutions, including asking his wife not to nag, yelling back at her, sending her on errands to avoid her, keeping her aware of his exercise schedule, and/or inviting her to do the exercises with him. Under the care manager's guidance, Mr Y chose a combined solution, namely, to inform his wife of his plan to exercise daily before lunch, mark it on their calendar, and invite her to join him. Ongoing PST work focused on monitored the effectiveness of each of his chosen solutions, and targeted additional problems related to social activities and engaging in hobbies he had abandoned. At the end of treatment, Mr Y's depression was in remission, he felt confident in taking care of himself, and he enjoyed activities in which he was able to participate.

CONCLUSION

Developing an intervention that identifies and directly addresses barriers to treatment adherence and also imparts skills necessary for problem-solving can offer the *behavioral platform* through which specific treatments can be administered. The principal innovation of this approach is that it integrates two interventions (adherence enhancement and PST) with different theoretical, clinical, and implementation traditions into a single treatment for elders with depression and chronic disabling medical illnesses. Such integration is synergistic and potentially efficacious because of the conceptual affinity of direct adherence enhancement with skill development and the ability of each approach to target interacting problems experienced by these patients. Targeting distinct treatment adherence barriers and enriching patients' behavioral repertoires with problem-solving strategies concurrently address factors that perpetuate inactivity, depression, and physical deterioration. Visiting nurse services and other organizations offering care to disabled and often homebound persons employ social workers and nurses with education and experience sufficient for learning such comprehensive interventions. As insurances reimburse services by these

professionals, training them may be feasible, and make such treatments available and affordable.

CONFLICT OF INTEREST

Conflict of interest was declared—Research grants were received from Cephalon and Forest. Consultants: Scientific Advisory Board of Forest, Sanofi-Aventis and Novartis. Speaker's bureau comprised Cephalon, Forest, Lilly, Bristol Meyers Squibb, Glaxo, Pfizer and Janssen.

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REFERENCES

- ACCP/AACVPR. 1997. Pulmonary rehabilitation: joint ACCP/AACVPR evidence-based guidelines. American College of Chest Physicians. American Association of Cardiovascular and Pulmonary Rehabilitation Pulmonary Rehabilitation Guidelines Panel. *Chest* **112**: 1363–1396.
- Alexopoulos GS. 2005. Depression in the elderly. *Lancet* **365**: 1961–1970.
- Alexopoulos GS, Katz IR, Reynolds CF, et al. 2001. Pharmacotherapy of depression in older patients: a summary of the Expert Consensus Guidelines. *J Psychiatr Practice* **7**: 361–376.
- Alexopoulos GS, Kiosses DN, Choi SJ, et al. 2002. Frontal white matter microstructure and treatment response of late-life depression: a preliminary study. *Am J Psychiatry* **159**: 1929–1932.
- Alexopoulos GS, Kiosses DN, Heo M, et al. 2005. Executive dysfunction and the course of geriatric depression. *Biol Psychiatry* **58**: 204–210.
- Alexopoulos GS, Kiosses DN, Murphy C, Heo M. 2004. Executive dysfunction, heart disease burden, and remission of geriatric depression. *Neuropsychopharmacology* **29**: 2278–2284.
- Alexopoulos GS, Latoussakis V. 2004. Depression comorbidity with COPD. *Psychiatr Ann* **34**: 289–295.
- Alexopoulos GS, Murphy CF, Gunning-Dixon FM, et al. 2007. Event-related potentials in an emotional go/no-go task and remission of geriatric depression. *Neuroreport* **18**: 217–221.
- Alexopoulos GS, Raue P, Areán P. 2003. Problem-solving therapy versus supportive therapy in geriatric major depression with executive dysfunction. *Am J Geriatr Psychiatry* **11**: 46–52.
- Alexopoulos GS, Sirey JA, Raue PJ, et al. 2006. Outcomes of depressed patients undergoing inpatient pulmonary rehabilitation. *Am J Geriatr Psychiatry* **14**: 466–475.
- Anderson KL. 1995. The effect of chronic obstructive pulmonary disease on quality of life. *Res Nurs Health* **18**: 547–556.
- Areán PA, Ayalon L, Hunkeler E, et al. 2005. Improving depression care for older, minority patients in primary care. *Med Care* **43**: 381–390.
- Areán PA, Perri MG, Nezu AM, et al. 1993. Comparative effectiveness of social problem-solving therapy and reminiscence therapy as treatments for depression in older adults. *J Consult Clin Psychol* **61**: 1003–1010.
- Aydin IO, Ulusahin A. 2001. Depression, anxiety comorbidity, and disability in tuberculosis and chronic obstructive pulmonary disease patients: applicability of GHQ-12. *Gen Hosp Psychiatry* **23**: 77–83.
- Beck JG, Scott SK, Teague RB, et al. 1988. Correlates of daily impairment in COPD. *Rehabil Psychol* **33**: 77–84.
- Borson S, Claypoole K, McDonald GJ. 1998. Depression and chronic obstructive pulmonary disease: treatment trials. *Semin Clin Neuropsychiatry* **3**: 115–130.
- Borson S, McDonald GJ, Gayle T, et al. 1992. Improvement in mood, physical symptoms, and function with nortriptyline for depression in patients with chronic obstructive pulmonary disease. *Psychosomatics* **33**: 190–201.
- Burrows AB, Satlin A, Salzman C, et al. 1995. Depression in a long-term care facility: clinical features and discordance between nursing assessment and patient interviews. *J Am Geriatr Soc* **43**: 1118–1122.
- Charney DS, Reynolds CF, 3rd, Lewis L, et al. 2003. Depression and bipolar support alliance consensus statement on the unmet needs in diagnosis and treatment of mood disorders in late life. *Arch Gen Psychiatry* **60**: 664–672.
- de Godoy DV, de Godoy RF. 2003. A randomized controlled trial of the effect of psychotherapy on anxiety and depression in chronic obstructive pulmonary disease. *Arch Phys Med Rehabil* **84**: 1154–1157.
- DiMatteo MR, Hays RD, Gritz ER, et al. 1993. Patient adherence to cancer control regimens: scale development and initial validation. *Psychol Assess* **5**: 102–112.
- DiMatteo MR, Lepper HS, Croghan TW. 2000. Depression is a risk factor for noncompliance with medical treatment: meta-analysis of the effects of anxiety and depression on patient adherence. *Arch Intern Med* **160**: 2101–2107.
- Favalli A, Miozzo A, Cossi S, Marengoni A. 2007. Differences in neuropsychological profile between healthy and COPD older persons. *Int J Geriatr Psychiatry* (in press).
- Fix AJ, Golden CJ, Daughton D, et al. 1982. Neuropsychological deficits among patients with chronic obstructive pulmonary disease. *Int J Neurosci* **16**: 99–105.
- Gallagher D, Thompson LW. 1982. Treatment of major depressive disorder in older adult outpatients with brief psychotherapies. *Psychother Theory Res Practice* **19**: 482–490.
- Goldwasser AN, Auerbach SM, Harkins SW. 1987. Cognitive, affective, and behavioral effects of reminiscence group therapy on demented elderly. *Int J Aging Hum Dev* **25**: 209–222.
- Gordon GH, Michiels TM, Mahutte CK, Light RW. 1985. Effect of desipramine on control of ventilation and depression scores in patients with severe chronic obstructive pulmonary disease. *Psychiatry Res* **15**: 25–32.
- Grant I, Heaton RK, McSweeney AJ, et al. 1982. Neuropsychologic findings in hypoxemic chronic obstructive pulmonary disease. *Arch Intern Med* **142**: 1470–1476.
- Grant I, Prigatano GP, Heaton RK, et al. 1987. Progressive neuropsychologic impairment and hypoxemia. Relationship in chronic obstructive pulmonary disease. *Arch Gen Psychiatry* **44**: 999–1006.
- Graydon GE, Ross E. 1995. Influence of symptoms, lung function, and social support on level of functioning of patients with COPD. *Res Nurs Health* **18**: 525–533.
- Heinssen RK, Liberman RP, Kopelowicz A. 2000. Psychosocial skills training for schizophrenia: lessons from the laboratory. *Schizophr Bull* **26**: 21–46.
- Incalzi RA, Gemma A, Marra C, et al. 1993. Chronic obstructive pulmonary disease. An original model of cognitive decline. *Am Rev Respir Dis* **148**: 418–424.

- James PN, Anderson JB, Prior JG, *et al.* 1985. Patterns of drug taking in patients with chronic airflow obstruction. *Postgrad Med J* **61**: 7–10.
- Kalayam B, Alexopoulos GS. 1999. Prefrontal dysfunction and treatment response in geriatric depression. *Arch Gen Psychiatry* **56**: 713–718.
- Kalayam B, Alexopoulos GS. 2003. A preliminary study of left frontal region error negativity and symptom improvement in geriatric depression. *Am J Psychiatry* **160**: 2054–2056.
- Kaplan RM, Toshima M, Atkins CJ, Ries AL. 1990. Adherence to prescribed regimens for patients with chronic obstructive pulmonary disease. In *The Handbook of Health Behavior and Change*, Shumaker SA, Schron EB, Ockene JK (eds). Springer Publishing Co: New York.
- Katz IR, Parmelee PA, Streim JE. 1995. Depression in older patients in residential care: significance of dysphoria and dimensional assessment. *Am J Geriatr Psychiatry* **3**: 161–169.
- Kiosses DN, Klimstra S, Murphy C, Alexopoulos GS. 2001. Executive dysfunction and disability in elderly patients with major depression. *Am J Geriatr Psychiatry* **9**: 269–274.
- Kunik ME, Braun U, Stanley MA, *et al.* 2001. One session cognitive behavioural therapy for elderly patients with chronic obstructive pulmonary disease. *Psychol Med* **31**: 717–723.
- Lacasse Y, Beaudoin L, Rousseau L, Maltais F. 2004. Randomized trial of paroxetine in end-stage COPD. *Monaldi Arch Chest Dis* **61**: 140–147.
- Lacasse Y, Guyatt GH, Goldstein RS. 1997. The components of a respiratory rehabilitation program: a systematic overview. *Chest* **111**: 1077–1088.
- Leclerc C, Lesage AD, Ricard N, *et al.* 2000. Assessment of a new rehabilitative coping skills module for persons with schizophrenia. *Am J Orthopsychiatry* **70**: 380–388.
- Leidy NK. 1995. Functional performance in people with chronic obstructive pulmonary disease. *Image J Nurs Sch* **27**: 23–34.
- Liberman RP. 1994. Psychosocial treatments for schizophrenia. *Psychiatry* **57**: 104–114.
- Liberman RP, Corrigan PW. 1993. Designing new psychosocial treatments for schizophrenia. *Psychiatry* **56**: 238–249; discussion 250–233.
- Liberman RP, Wallace CJ, Blackwell G, *et al.* 1998. Skills training versus psychosocial occupational therapy for persons with persistent schizophrenia. *Am J Psychiatry* **155**: 1087–1091.
- Light RW, Merrill EJ, Despars J, *et al.* 1986. Doxepin treatment of depressed patients with chronic obstructive pulmonary disease. *Arch Intern Med* **146**: 1377–1380.
- Mynors-Wallis L. 1996. Problem-solving treatment: evidence for effectiveness and feasibility in primary care. *Int J Psychiatry Med* **26**: 249–262.
- Mynors-Wallis L, Davies I, Gray A, *et al.* 1997. A randomised controlled trial and cost analysis of problem-solving treatment for emotional disorders given by community nurses in primary care. *Br J Psychiatry* **170**: 113–119.
- Mynors-Wallis LM, Gath DH, Day A, Baker F. 2000. Randomised controlled trial of problem solving treatment, antidepressant medication, and combined treatment for major depression in primary care. *BMJ* **320**: 26–30.
- Nezu AM. 1986. Efficacy of a social problem-solving therapy approach for unipolar depression. *J Consult Clin Psychol* **54**: 196–202.
- Nezu AM, Perri MG. 1989. Social problem-solving therapy for unipolar depression: an initial dismantling investigation. *J Consult Clin Psychol* **57**: 408–413.
- Niederehe G. 1996. Psychosocial treatments with depressed older adults: a research update. *Am J Geriatr Psychiatry* **4** (4, Suppl 1): S66–S78.
- Niederehe GT. 1994. Psychosocial therapies with depressed older adults. In *Diagnosis and Treatment of Depression in Late Life*, Schneider LS, Reynolds CF, Lebowitz BD, Friedhoff AJ (eds). American Psychiatric Press: Washington, DC; 293–315.
- NIH Consensus Development Panel on Depression in Late Life. 1992. NIH Consensus Conference. Diagnosis and treatment of depression in late life. *JAMA* **268**: 1018–1024.
- Oxman TE, Hull JG. 2001. Social support and treatment response in older depressed primary care patients. *J Gerontol B Psychol Soc Sci* **56**: 35–45.
- Potter GG, Kittinger JD, Wagner HR, *et al.* 2004. Prefrontal neuropsychological predictors of treatment remission in late-life depression. *Neuropsychopharmacology* **29**: 2266–2271.
- Sirey JA, Raue PJ, Alexopoulos GS. 2007. An intervention to improve depression care in older adults with COPD. *Int J Geriatr Psychiatry* **22**: 154–159.
- Steuer JL, Mintz J, Hammen CL, *et al.* 1984. Cognitive-behavioral and psychodynamic group psychotherapy in treatment of geriatric depression. *J Consult Clin Psychol* **52**: 180–189.
- Tarrier N, Sharpe L, Beckett R, *et al.* 1993. A trial of two cognitive behavioural methods of treating drug-resistant residual psychotic symptoms in schizophrenic patients. II. Treatment-specific changes in coping and problem-solving skills. *Soc Psychiatry Psychiatr Epidemiol* **28**: 5–10.
- Thase ME, Entsuah AR, Rudolph RL. 2001. Remission rates during treatment with venlafaxine or selective serotonin reuptake inhibitors. *Br J Psychiatry* **178**: 234–241.
- Thompson LW, Gallagher D, Breckenridge JS. 1987. Comparative effectiveness of psychotherapies for depressed elders. *J Consult Clin Psychol* **55**: 385–390.
- Weaver TE, Narsavage GL. 1992. Physiological and psychological variables related to functional status in chronic obstructive pulmonary disease. *Nurs Res* **41**: 286–291.
- Wong SY, Woo J, Lynn HS, *et al.* 2006. Risk of depression in patients with chronic respiratory diseases: results from two large cohort studies in Chinese elderly from Hong Kong. *Int J Geriatr Psychiatry* **21**: 233–238.
- Yohannes AM, Baldwin RC, Connolly MJ. 2000. Depression and anxiety in elderly outpatients with chronic obstructive pulmonary disease: prevalence, and validation of the BASDEC screening questionnaire. *Int J Geriatr Psychiatry* **15**: 1090–1096.
- Yohannes AM, Baldwin RC, Connolly MJ. 2003. Prevalence of sub-threshold depression in elderly patients with chronic obstructive pulmonary disease. *Int J Geriatr Psychiatry* **18**: 412–416.
- Yohannes AM, Connolly MJ, Baldwin RC. 2001. A feasibility study of antidepressant drug therapy in depressed elderly patients with chronic obstructive pulmonary disease. *Int J Geriatr Psychiatry* **16**: 451–454.