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Journal article

How can we better support families living with cardiovascular disease and depression?

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How can we better support families living with cardiovascular disease and depression?

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Abstract

Purpose

The purpose of this paper is to discuss the role of psychosocial treatments to support families living with cardiovascular disease (CVD) and depression. The paper highlights that depression in people with CVD is a predictor of non-adherence to both medicines and cardiovascular rehabilitation programmes. The authors believe there is a clinical need to develop a programme of care to support the whole family to adhere to cardiovascular rehabilitation programmes.

Design/methodology/approach

A team of expert cardiovascular nurses, mental health nurses (MHN) and cardiologist clinical opinions and experiences. These opinions and experiences were supplemented by literature using MEDLINE as the primary database for papers published between December 2000 and December 2013.

Findings

People with CVD who become depressed are more likely to stop taking their medicine and stop working with their health care worker. Most people with heart and mood problems live with their families. Health workers could have a role in supporting families living with heart and mood problems to their care and treatment. The paper has highlighted the importance of working with families living with heart and mood problems to help them to stick with care and treatment.

Originality/value

Most people with heart and mood problems live with their families. The paper has highlighted the importance of working with families living with heart and mood problems to help them to persevere with care and treatment. MHN may have a role, though consideration should also be given to exploring the role of other health care workers and members of the community. As the population ages, clinicians and communities will need to consider the impact of depression on adherence when working with families living with CVD and depression.

Keywords

Adherence; Depression; Heart disease; Mental health nursing; Psychosocial interventions; Working with families

1. Introduction

Cardiovascular disease (CVD) and depression are significant global health issues. CVD is the leading cause of death worldwide, with 30 per cent of global deaths being attributed to CVD (World Health Organisation, 2013). CVD or coronary artery disease is a leading cause of death, whereby one Australian dies approximately every 12 minutes from an associated disease (Heart Foundation, 2013). CVD includes diseases such as angina, heart failure and hypertension, but also includes events such as a myocardial infarction (MI) (World Health Organisation, 2010).

Depression is the leading cause of disability, affecting approximately 350 million people worldwide (World Health Organisation, 2012). There is substantial evidence for identifying depressive symptoms in patients with CVD and MI (Colquhoun *et al.*, 2013). Approximately 15-20 per cent of post-MI patients become depressed in the year following the MI event (Colquhoun *et al.*, 2013; Lesperance *et al.*, 1996).

The two conditions appear to be interlinked (Lichtman *et al.*, 2008). The impact of major depressive disorder on CVD is similar to that of smoking and physical inactivity (Ye *et al.*, 2013).

Major depression is a well-established risk factor for developing CVD (Heart Foundation, 2014; Colquhoun *et al.*, 2013). Patients with major depression have been identified as having an increased risk of developing CVD (Carney *et al.*, 1988; Lichtman *et al.*, 2008). People living with depression and CVD will die earlier and have higher levels of disability than people with CVD who do not become depressed (Carney and Freedland, 2003; Frasure-Smith and Lesperance, 2008; Zellweger *et al.*, 2004). This results in greater use of health services with consequently increased costs (Heart Foundation, 2013; Frasure-Smith and Lesperance, 2008).

Our paper discusses the potential benefits of developing family-based treatments for families living with CVD and depression to aid adherence to care and treatment in which mental health nursing (MHN) may have a role.

2. Data sources and scoping review process

As a group of clinical academics in the field of MHN, Cardiac-Vascular Nursing and Cardiology we are interested as to how we can better support people living with CVD and depression. All of us believe that clinicians need to do better in helping people living with CVD and depression to adhere with treatment in particular cardiovascular rehabilitation programmes. As a team of experienced clinical academics we have observed the important role families have in providing ongoing support for people living with long-term conditions. We believe that families play a crucial role in helping people living with CVD and depression to adhere with cardiovascular rehabilitation programmes. We also believe that clinicians could be prepared to work more effectively with families living with CVD and depression to empower them to adhere with cardiovascular treatment regimes. Greater adherence to treatment may improve cardiovascular health, improve depression, increase quality of life and reduce mortality rates. In addition MJ believes MHN or suitably trained mental health clinicians could have a role in supporting other clinicians to practice this approach. These beliefs have informed our meetings, guided our search and helped us to understand the literature. In these meetings we have reflected upon the following:

1. the reasons for high prevalence of depression in people living with CVD;
2. non-adherence in people living with CVD and depression;
3. psychosocial approaches to supporting people living with CVD and depression;
4. working with families living with CVD and depression to adhere to care and treatment;
5. the potential role of MHN in operationalising family interventions for families living with CVD and depression; and
6. future research priorities.

Our beliefs were supplemented by a preliminary search of the literature to help us reflect on how we can support families living with CVD and depression to adhere to treatment.

One of the tasks of our group was to agree on the areas to search. We included studies which reported strategies aimed at improving the health and well-being of people living with CVD and depression. We were interested if papers reported clinically meaningful improvements in depression and cardiovascular health through working with the family living with CVD and depression. We also included papers which described models of care to support practitioners to work with people living

with depression and CVD. The purpose of this exercise was not to conduct a systematic review, but as senior clinicians to assist others to reflect upon new ways of working with a clinical problem which will increase in both severity and prevalence.

We identified studies through a search of the MEDLINE database for papers published between December 2000 and December 2013. The search strategy included a combination of key words and MeSH headings using variations of CVD, Depression, Family Support and Adherence. The initial search yielded 103 papers. MJ reviewed the titles, and then read the abstracts against the inclusion criteria, before selecting the final papers for presentation to the group. We identified 14, consisting of opinion articles, cohort studies, randomised controlled trials and meta-analyses.

See list below for search terms, Table I for inclusion and exclusion criteria and Table II for a list of included articles.

Used search strategies for MEDLINE:

- Families, Cardiac-Vascular Disease, Depression, Adherence; or
- Carers, CVD, Depression, Adherence; or
- Family Support; or
- Family Interventions; or
- Adherence Therapy.

3. Why do people with CVD become depressed?

3.1. Biological mechanisms

We have yet to fully understand the mechanisms that underpin the relationship between CVD and depression. In our practice we have observed that depression and CVD will continue to impact upon one another through the complex interaction between pathophysiological, psychological and psychosocial factors, as illustrated in Figure 1.

In our interpretation of the literature we have noted a number of biological factors associated with CVD appear to be linked with depression which supports our observations from clinical practice.

People with depression may have a lower response to stress (Taylor *et al.*, 2006). This can result in increased inflammation and sympathetic activity impacting upon cardiovascular health (Kunz-Ebrecht *et al.*, 2003). Increased sympathetic activity results in catecholamine release, ischaemic damage and oxidative stress (Adameova *et al.*, 2009). An increase in platelet activation (Musselman *et al.*, 1996), ventricular tachycardia (Carney *et al.*, 1993) and C-reactive protein and other inflammatory markers (Lesperance *et al.*, 2004) have all been associated with depression as a risk factor for CVD (Rugulies, 2002).

3.2. Psychosocial variables

Our experience of working with people with people living with CVD is that a diagnosis of any CVD is a significant life event, inevitably impacting upon patient psychological well-being (Stanton *et al.*, 2007). We have observed in our practice that grief and loss are experienced as the person adapts to living with a long-term condition. A CVD event may induce feelings of grief and loss. Pain is associated with depression and advancing illness may induce feelings of helplessness. Our clinical observations are that these experiences trigger anxiety and stress which may further impact upon the cardiovascular system (Hughes *et al.*, 2004; Taylor *et al.*, 2006). Our clinical observations are supported by the literature. Glozier *et al.* (2013) conducted a review of psychosocial stressors and CVD. The review identified that psychosocial stressors such as job strain, shift work and social isolation following a CVD event are associated with increased CVD events.

As clinicians, we have observed how chronic illness can interfere with a patient's familiar lifestyle through changes to family, work and social factors. We have seen how status is lost as illness restricts pleasurable activities the patient was once involved in. Through our experience of working with families we have observed that the dynamics within a family are altered as someone responsible for household tasks may become dependent on others for care. CVD and depression can have substantial economic impacts on families with costs associated with utilisation of emergency and hospital services as well as loss of productivity because of reduced employment prospects (Rodwin *et al.*, 2013). Such losses can affect a patient's functioning and could lead to the onset of depressive symptoms and subsequently poorer health outcomes among patients with CVD (Stanton *et al.*, 2007).

Patients who do not positively adapt to CVD have been shown to have an increased risk of CVD complications as well as developing depressive symptoms (McLaughlin *et al.*, 2005).

A psychosocial factor is a phenomenon involving the interaction of a person's social environment with their psychology and its effects on medical pathology (Hemingway and Marmot, 1999). Smoking and nicotine dependence, for example, has increased prevalence among depressed individuals (Fergusson *et al.*, 2003), which is a known independent risk factor for CVD (Heart Foundation, 2014). Lack of social support and an unmarried marital status have also been directly linked to depression and CVD (Compare *et al.*, 2013). Our interpretation of the literature and clinical experiences has helped us to reflect how health services are organised to support people living with CVD and depression. We have come to the view that the organisation of health services does not support the integration of treatment approaches to manage people suffering from CVD and depression. A psychiatrist who has an expertise in treating depression will not necessarily have the same expertise in treating CVD.

4. Non-adherence in patients with comorbid depression

Our clinical experience of providing care and treatment to people who have struggled to adhere to care and treatment informs us that non-adherence results in poor health outcomes (DiMatteo *et al.*, 2000). Increasing severity of depression can be linked to non-adherence among individuals with the comorbid diseases (Rieckmann *et al.*, 2006; Gehi *et al.*, 2005). We are not surprised that depressed patients are approximately three times less likely than non-depressed patients to be treatment adherent, including medication, dietary advice and health behaviours (DiMatteo *et al.*, 2000; Rieckmann *et al.*, 2006). Depressed patients take medication on fewer days each week (Carney *et al.*, 1995), skip more doses, forget to take the medication or do not take it as prescribed (Gehi *et al.*, 2005). Depression has been linked to significantly reduced adherence to blood pressure lowering (Aggarwal and Mosca, 2010) and aspirin medication regimes in CVD patients (Rieckmann *et al.*, 2006). Treatment adherence can also impact on family dynamics, hopelessness and lack of social support (DiMatteo, 2004). Non-adherence with care and treatment may also exacerbate the effect of depression on CVD (Gehi *et al.*, 2005). We have taken the view that the cycle of treatment non-

adherence in CVD and depression could be addressed by working with underlying psychosocial and clinical factors (DiMatteo *et al.*, 2000).

5. Psychosocial approaches to supporting people living with CVD and depression

Our clinical observations are that when psychological care is provided to people living with CVD and depression, then the patients' health and well-being tends to improve. Reid *et al.*, (2013) in a systematic review of the effectiveness of psychosocial interventions for families living with CVD and depression identified a number of health-related areas such as improved quality of life, reduction in blood pressure and satisfaction with the care experience. However, there was no impact on mortality, morbidity or other cardiovascular risk factors.

Promising evidence has emerged regarding the application of psychosocial treatment approaches to supporting patients with CVD and depression. The Improving Mood Promoting Access to Collaborative Care Treatment (IMPACT) collaborative care model has been established as an effective means of delivering care for patients with depression (Hunkeler *et al.*, 2006). Collaborative care involves multiple components which monitor chronic disease and associated risk factors (Morgan *et al.*, 2009). This model involves a team of health professionals in the service delivery, including a depression care manager, the patient's primary general practitioner (GP), a consulting psychiatrist, as well as a consulting GP. This approach saw significant improvements for patients in treatment adherence, depressive symptoms, physical functioning and quality of life (Morgan *et al.*, 2013). The TrueBlue study built on IMPACT to apply the collaborative care model for patients with comorbid depression and chronic disease such as diabetes or heart disease (Morgan *et al.*, 2013). This study utilised practice nurses in general practice settings to assist in screening and monitoring physiological, mental health and lifestyle risks associated with these particular chronic diseases. This study provides an opportunity to modify the intervention for those living with depression and CVD. However, the research focused on the individual patient rather than working with the whole family and has not used approaches which have helped people to adhere to care and treatment.

We identified two randomised controlled trials which adopted a telephone coaching technique to help patients with CVD to take control of their care and treatment (Vale *et al.*, 2002, 2003). The aim of the

coaching intervention was to increase adherence to drug therapy and diet. The primary outcome measure was fasting serum total cholesterol (TC), serum triglyceride, high-density lipoprotein cholesterol and calculated low-density lipoprotein cholesterol (LDL-C). After six months, the patients in the coaching arm of the study had significantly lower mean TC and LDL-C levels.

Cognitive Behavioural Therapy (CBT) may be a successful intervention for helping people who live with a long-term condition to adhere to treatment and care. We identified a cohort study which improved treatment adherence in depressed patients with other chronic diseases using the principles of CBT (Cukor *et al.*, 2014).

6. Working with families living with CVD and depression

We would take the view that a programme of care should have a strong focus on enabling families to take control of their treatment. This should focus upon, supporting the family to develop their problem skills, reflect upon previous experiences and make active plans for the future in the area of their care and treatment. The inclusion of family members in helping patients to adhere to care and treatment for depression and CVD is in our clinical experience an area in which clinicians should consider developing. Helping patients cope with and adjust to the challenges of living with a long-term condition can have positive impacts on emotional and physical health (Karademas and Hondronikola, 2010). Reid *et al.*'s (2013) systematic review has argued that there is a need to conduct research which may demonstrate the effectiveness of working with families. Ski and Thompson (2011) add to this, outlining that psychosocial intervention should be integrated across the different care pathways.

Pharaoh *et al.* (2012) in a meta-analysis identified that working with families living with schizophrenia may reduce the risk of relapse and help adherence with medication. The core principles of an effective family approach are ongoing contact with a health care professional, usually of three months to a year. The family is provided with an opportunity to have at least ten sessions with a suitably trained practitioner. Each session focuses upon information about the condition and treatment options, which includes developing problem solving skills and what to do in a crisis. In the UK guidelines for working with families living with serious mental illness (SMI) have been incorporated into national guidelines to inform mental health care services (National Institute of Clinical Excellence,

2014). We believe the principles underpinning family work with people with SMI could be applied to depressed individuals and families living with CVD. In a systematic review of the effectiveness of working with families living with stroke and depression, a number of commonalities with the schizophrenia literature were identified. The studies which adopted the principles of working with families living with schizophrenia demonstrated clinically meaningful improvements (Vallury *et al.*, 2015).

No research has evaluated the impact of working with families living with CVD and depression in supporting adherence to treatment.

7. Should MHN have a role in operationalising family interventions for families living with CVD and depression?

MHN in the UK has played a strong and purposeful role in preparing mental health professionals to work purposefully with families living with SMI (Brooker, 2001). Consequently large numbers of MHN in the UK have been prepared to work with families living with SMI. In addition, initiatives to implement evidence-based psychosocial interventions have demonstrated worthwhile improvements for both staff and patients (Brown *et al.*, 2013). It is for these reasons that one member of the team (MJ) believes MHN may have a role in developing short and concise training programmes in this area to support other health care professionals. These would prepare professionals to combine psychosocial interventions with physical health care into an integrated care pathway. In addition MHN could provide supervision and support and assist services regarding the required structures needed to sustain changes in clinical practice. MHN is arguably the professional group that has had the greatest exposure to adherence training programmes in conditions such as schizophrenia. They may have a role in helping families to adhere to complex treatment regimens. Other members of the team have expressed a degree of caution and believe that MHN may not necessarily be the best fit for this role. All of the team are of the view that further discussion is required as to whether other health care workers or people with lived experience or volunteers could have a role in supporting families living with CVD and depression.

8. Limitation of conceptual paper and future research priorities

We hold largely positive views about the benefits of working with families living with CVD and depression to help them to adhere with cardiovascular rehabilitation programmes. This may have introduced a degree of bias into our interpretation of the literature. In addition only a relatively small number of papers reported clinically meaningful in patients' health and well-being. Thus our conclusions for further research are based on our clinical opinions with limited support from the literature we searched. So where does this leave us regarding future research priorities in this area? We would argue that as a priority a systematic review is required to help us understand the impact of family interventions on the outcomes for people with CVD and depression, and their family. It would help us to understand which characteristics of the intervention are effective and their suitability for clinical practice, to understand future workforce training needs and to plan future research priorities. Ultimately any model which emerges will require a workforce able to implement it. High professional self-esteem and positive attitudes about therapeutic impact are generally recognised as a key ingredient in sustaining changes in the work environment (Jones *et al.*, 2008; Jones and Lancashire, 2009). Studies evaluating staff attitudes to recovery from CVD and depression may help health providers understand what strategies need to be put in place to prepare staff to practise in this area.

A programme of research would require extensive consultation both with families living with CVD and depression and the health care workers. This would help us to understand the experiences of families and how we could get better at working with the whole family. As experienced clinicians we would argue that research is required to help us understand the potential barriers to working with families and to find solutions to overcome the barriers in the practice settings. This may include the need to ensure that support structures are in place to reduce the potential negative impact of working with the family on workplace morale. We would then be able to evaluate the impact of enabling families living with depression and CVD to adhere to care and treatment and consequent improvements in both mental and physical health.

9. Conclusion

CVD and major depressive disorder are highly prevalent, with both mentioned in the top three leading causes of morbidity and mortality (Begg *et al.*, 2008). Depression is a risk factor for the development and exacerbation of CVD and vice versa (Heart Foundation, 2014; Lesperance *et al.*, 1996). The

association between the two diseases is complex. Living with a long-term condition and depression predicts non-adherence (DiMatteo *et al.*, 2000). A family-based intervention aimed at supporting the family could lead to increased adherence and ultimately more positive outcomes. MHN may have both a clinical leadership and research role in this process in supporting other health care professionals to better support families living with CVD and depression. Depression and CVD will become an increasingly common clinical problem as our population ages. Clinicians will need to increasingly focus on the impact of depression on adherence for people living with CVD. At the same time, there are exciting opportunities to develop models of care to support families that may alleviate the distress and disability associated with living with CVD and depression.

References

Adameova, A., Abdellatif, Y. and Dhalla, N.S. (2009), "Role of the excessive amounts of circulating catecholamines and glucocorticoids in stress-induced heart disease", *Canadian Journal of Physiology & Pharmacology*, Vol. 87 No. 7, pp. 493-514.

Aggarwal, B. and Mosca, L. (2010), "Lifestyle and psychosocial risk factors predict non-adherence to medication", *Annals of Behavioral Medicine*, Vol. 40 No. 2, pp. 228-33.

Begg, S., Vos, T., Barker, B., Stanley, L. and Lopez, A. (2008), Burden of disease and injury in Australia in the new millennium: measuring health loss from diseases, injuries and risk factors", *Medical Journal of Australia*, Vol. 188 No. 1, pp. 36-40.

Brooker, C. (2001), "A decade of evidenced-based training for work with people with serious mental health problems: progress in the development of psychosocial interventions", *Journal of Mental Health*, Vol. 10 No. 1, pp. 17-31.

Brown, E., Gray, R., Jones, M. and Whitfield, S. (2013), "Effectiveness of adherence therapy in patients with early psychosis: a mirror image study", *International Journal of Mental Health Nursing*, Vol. 22 No. 1, pp. 24-34.

Carney, R.M. and Freedland, K.E. (2003), "Depression, mortality, and medical morbidity in patients with coronary heart disease", *Biological Psychiatry*, Vol. 54 No. 3, pp. 241-7.

Carney, R.M., Freedland, K.E., Rich, M.W., Smith, L.J. and Jaffe, A.S. (1993), "Ventricular tachycardia and psychiatric depression in patients with coronary artery disease", *American Journal of Medicine*, Vol. 95 No. 1, pp. 23-8.

Carney, R.M., Freedland, K.E., Eisen, S.A., Rich, M.W. and Jaffe, A.S. (1995), "Major depression and medication adherence in elderly patients with coronary artery disease", *Health Psychology*, Vol. 14 No. 1, pp. 88-90.

Carney, R.M., Rich, M.W., Freedland, K.E., Saini, J., teVelde, A., Simeone, C. and Clark, K. (1988), "Major depressive disorder predicts cardiac events in patients with coronary artery disease", *Psychosomatic Medicine*, Vol. 50 No. 6, pp. 627-33.

Colquhoun, D.M., Bunker, S.J., Clarke, D.M., Glozier, N., Hare, D.L., Hickie, I.B., Tatoulis, J., Thompson, D.R., Tofler, G.H., Wilson, A. and Branagan, M.G. (2013), "Screening, referral and treatment for depression in patients with coronary heart disease", *Medical Journal of Australia*, Vol. 198 No. 9, pp. 483-4.

Compare, A., Zarbo, C., Manzoni, G.M., Castelnuovo, G., Baldassari, E., Bonardi, A., Callus, E. and Romagnoni, C. (2013), "Social support, depression, and heart disease: a ten year literature review", *Frontiers in Psychology*, Vol. 4, July, p. 1.

Cukor, D., Ver Halen, N., Asher, D.R., Coplan, J.D., Weedon, J., Wyka, K.E., Saggi, S.J. and Kimmel, P.L. (2014), "Psychosocial intervention improves depression, quality of life, and fluid adherence in hemodialysis", *Journal of the American Society of Nephrology*, Vol. 25 No. 1, pp. 196-206.

DiMatteo, M.R. (2004), "Variations in patients' adherence to medical recommendations: a quantitative review of 50 years of research", *Medical Care*, Vol. 42 No. 3, pp. 200-9.

DiMatteo, M.R., Lepper, H.S. and Croghan, T.W. (2000), "Depression is a risk factor for noncompliance with medical treatment: meta-analysis of the effects of anxiety and depression on patient adherence", *Archives of Internal Medicine*, Vol. 160 No. 14, pp. 2101-7.

Fergusson, D.M., Goodwin, R.D. and Horwood, L.J. (2003), "Major depression and cigarette smoking: results of a 21-year longitudinal study", *Psychological Medicine*, Vol. 33 No. 8, pp. 1357-67.

Frasure-Smith, N. and Lesperance, F. (2008), "Depression and anxiety as predictors of 2-year cardiac events in patients with stable coronary artery disease", *Archives of General Psychiatry*, Vol. 651 No. 1, pp. 62-71.

Gehi, A., Haas, D., Pipkin, S. and Whooley, M.A. (2005), "Depression and medication adherence in outpatients with coronary heart disease: findings from the Heart and Soul Study", *Archives of Internal Medicine*, Vol. 165 No. 21, pp. 2508-13.

Glozier, N., Tofler, G.H., Colquhoun, D., Bunker, S.J., Clarke, D.M., Hare, D.L., Hickie, I.B., Tatoull, S., Thompson, D.R., Wilson, A. and Branagan, M.G. (2013), "Psychological risk factors for coronary heart disease: a consensus statement from the National Heart Foundation of Australia', clinical focus", *Medical Journal of Australia*, Vol. 199 No. 3, pp. 179-80.

Heart Foundation (2013), "Data and statistics", available at: www.heartfoundation.org.au/information-for-professionals/data-and-statistics/Pages/default.aspx (accessed January 20, 2014).

Heart Foundation (2014), "Know the risks", available at: www.heartfoundation.org.au/your-heart/know-the-risks/Pages/default.aspx (accessed January 23, 2014).

Hemingway, H. and Marmot, M. (1999), "Psychosocial factors in the etiology and prognosis of coronary heart disease: systematic review of prospective cohort studies", *Western Journal of Medicine*, Vol. 171 Nos 5/6, pp. 342-50.

Hughes, J.W., Watkins, L., Blumenthal, J.A., Kuhn, C. and Sherwood, A. (2004), "Depression and anxiety symptoms are related to increased 24-hour urinary norepinephrine excretion among healthy middle-aged women", *Journal of Psychosomatic Research*, Vol. 57 No. 4, pp. 353-8.

Hunkeler, E., Katon, W., Tang, L., Williams, J., Kroenke, K., Lin, E., Harpole, L., Arena, P., Levine, S., Grypma, L., Hargreaves, W. and Unützer, J. (2006), "Long term outcomes from the IMPACT randomised trial for depressed elderly patients in primary care", *British Medical Journal*, Vol. 332 No. 7536, pp. 259-63.

Jones, M. and Lancashire, S. (2009), "The side effects of evidence-based training", *Journal of Psychiatric and Mental Health Nursing*, Vol. 16 No. 7, pp. 593-8.

Jones, M., Tyrer, A., Kalekzi, T. and Lancashire, S. (2008), "Research summary: the effect of whole team training in evidence-based interventions on the knowledge, well-being and morale of inpatient mental health workers", *Journal of Psychiatric and Mental Health Nursing*, Vol. 15 No. 9, pp. 784-6.

Karademas, E.C. and Hondronikola, I. (2010), "The impact of illness acceptance and helplessness to subjective health, and their stability over time: a prospective study in a sample of cardiac patients", *Psychology Health & Medicine*, Vol. 15 No. 3, pp. 336-46.

Kunz-Ebrecht, S.R., Mohamed-Ali, V., Feldman, P.J., Kirschbaum, C. and Steptoe, A. (2003), "Cortisol responses to mild psychological stress are inversely associated with proinflammatory cytokines", *Brain, Behavior, and Immunity*, Vol. 17 No. 5, pp. 373-83.

Lichtman, J.H., Bigger, J.T. Jr., Blumenthal, J.A., Frasure-Smith, N., Kaufmann, P.G., Lesperance, F., Mark, D.B., Sheps, D.S., Taylor, C.B. and Froelicher, E.S. (2008), "Depression and coronary heart disease: recommendations for screening, referral, and treatment: a science advisory from the American Heart Association Prevention Committee of the Council on Cardiovascular Nursing, Council on Clinical Cardiology, Council on Epidemiology and Prevention, and Interdisciplinary Council on

Quality of Care and Outcomes Research: endorsed by the American Psychiatric Association”, *Circulation*, Vol. 118 No. 17, pp. 1768-75.

Lesperance, F., Frasura-Smith, N. and Talajic, M. (1996), "Major depression before and after myocardial infarction: its nature and consequences”, *Psychosomatic Medicine*, Vol. 58 No. 2, pp. 99-110.

Lesperance, F., Frasura-Smith, N., Theroux, P. and Irwin, M. (2004), “The association between major depression and levels of soluble intercellular adhesion molecule 1, interleukin-6, and C-reactive protein in patients with recent acute coronary syndromes”, *American Journal of Psychiatry*, Vol. 161 No. 2, pp. 271-7.

McLaughlin, T.J., Aupont, O., Bambauer, K.Z., Stone, P., Mullan, M.G., Colagiovanni, J., Polishuk, E., Johnstone, M. and Locke, S.E. (2005), “Improving psychologic adjustment to chronic illness in cardiac patients”, *Journal of General Internal Medicine*, Vol. 20 No. 12, pp. 1084-90.

Morgan, M., Dunbar, J., Reddy, P., Coates, M. and Leahy, R. (2009), “The TrueBlue study: is practice nurse-led collaborative care effective in the management of depression for patients with heart disease or diabetes?”, *BMC Family Practice*, Vol. 10 No. 1, p. 46. doi 10.1186/1471-2296-10-40

Morgan, M., Coates, M.J., Dunbar, J.A., Reddy, P., Schlicht, K. and Fuller, J. (2013), “The TrueBlue model of collaborative care using practice nurses as case managers for depression alongside diabetes or heart disease: a randomised trial”, *BMJ Open*, Vol. 3 No. 1. doi: 10.1136/bmjopen-2012-002171

Musselman, D.L., Tomer, A., Manatunga, A.K., Knight, B.T., Porter, M.R., Kasey, S., Marzec, U., Harker, L.A. and Nemeroff, C.B. (1996), “Exaggerated platelet reactivity in major depression”, *American Journal of Psychiatry*, Vol. 153 No. 10, pp. 1313-7.

National Institute of Clinical Effectiveness (2014), "Psychosis and schizophrenia in adults: treatment and management", *NICE Clinical Guidelines*, London, p. 178.

Pharaoh, F., Mari, J.J., Rathbone, J. and Wong, W. (2012), "Family intervention for schizophrenia", The Cochrane Collaboration , No. 12 . doi: 10.1002/14651858.CD000088.pub2

Reid, J., Ski, C.F. and Thompson, D.R. (2013), "Psychological Interventions for patients with coronary heart disease and their partners: a systematic review", *PLOS ONE*, Vol. 8 No. 9, p. e73459. doi: 10.1371/journal.pone.00073459

Rieckmann, N., Gerin, W., Kronish, I.M., Burg, M.M., Chaplin, W.F., Kong, G., Lesperance, F. and Davidson, K.W. (2006), "Course of depressive symptoms and medication adherence after acute coronary syndromes: an electronic medication monitoring study", *Journal of the American College of Cardiology*, Vol. 48 No. 11, pp. 2218-22.

Rodwin, B.A., Spruill, T.M. and Ladapo, J.A. (2013), "Economics of psychosocial factors in patients with cardiovascular disease", *Progress in Cardiovascular Diseases*, Vol. 55 No. 6, pp. 563-73.

Rugulies, R. (2002), "Depression as a predictor for coronary heart disease: a review and meta-analysis", *American Journal of Preventive Medicine*, Vol. 23 No. 1, pp. 51-61.

Ski, F.C. and Thompson, D.R. (2011), "Beyond the blues: the need for integrated care pathways", *European Journal of Cardiovascular Prevention and Rehabilitation*, Vol. 18 No. 2, pp. 218-21.

Stanton, A.L., Revenson, T.A. and Tennen, H. (2007), "Health psychology: psychological adjustment to chronic disease", *Annual Review of Psychology*, Vol. 58, pp. 565-92.

Taylor, C.B., Conrad, A., Wilhelm, F.H., Neri, E., DeLorenzo, A., Kramer, M.A., Giese-Davis, J., Roth, W.T., Oka, R., Cooke, J.P., Kraemer, H. and Spiegel, D. (2006), "Psychophysiological and cortisol

responses to psychological stress in depressed and nondepressed older men and women with elevated cardiovascular disease risk”, *Psychosomatic Medicine*, Vol. 68 No. 4, pp. 538-546.

Vale, J.M., Jelinek, M.V., Best, J.D. and Santamaria, J.D. (2002), “Coaching patients with coronary heart disease to achieve the target cholesterol: a method to bridge the gap between evidence-based medicine and the 'real world' - randomized controlled trial”, *Journal of Clinical Epidemiology*, Vol. 55 No. 3, pp. 245-52.

Vale, M.J., Jelinek, M.V., Best, J.D., Dart, A.M., Grigg, L.E., Hare, D.L., Ho, B.P., Newman, R.W. and McNeil, J.J., COACH Study Group (2003), “Coaching patients on achieving cardiovascular health (COACH): a multicenter randomized trial in patients with coronary heart disease”, *Archives of International Medicine*, Vol. 163 No. 22, pp. 2775-83.

Vallury, K., Jones, M. and Gray, R. (2015), “Do family-orientated interventions reduce post stroke depression? A systematic review and recommendations for practice”, *Topics in Stroke Rehabilitation*, Vol. 22 No. 6, pp. 459-65. doi: 10.1179/1074935715Z00000000061

World Health Organisation (2010), *International Statistical Classification of Diseases and Related Health Problems*, 10th Revision ed., Geneva, available at:
<http://apps.who.int/classifications/icd10/browse/2010/en> (accessed January 20, 2014).

World Health Organisation (2012), "Depression", available at:
www.who.int/mediacentre/factsheets/fs369/en/index.html (accessed January 24, 2014).

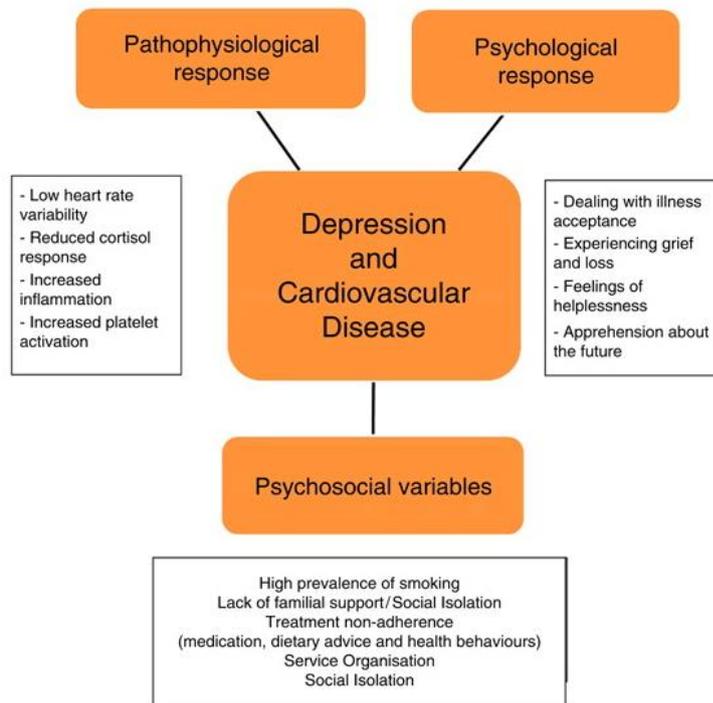
World Health Organisation (2013), "Cardiovascular diseases", available at:
www.who.int/mediacentre/factsheets/fs317/en/index.html (accessed January 24, 2014).

Ye, S., Muntner, P., Shimbo, D., Judd, S.E., Richman, J., Davidson, K.W. and Safford, M.M. (2013), “Behavioural mechanisms, elevated depressive symptoms and the risk for myocardial infarction or

death in individuals with coronary heart disease”, *Journal of the American College of Cardiology*, Vol. 61 No. 6, pp. 622-30.

Zellweger, M.J., Osterwalder, R.H., Langewitz, W. and Pfisterer, M.E. (2004), “Coronary artery disease and depression”, *European Heart Journal*, Vol. 25 No. 1, pp. 3-9.

Figure 1 The vicious cycle of depression and cardiovascular disease



Sources: DiMatteo *et al.* (2000), Fergusson *et al.* (2003), Kunz-Ebrecht *et al.* (2003), Musselman *et al.* (1996), Stanton *et al.* (2007), Taylor *et al.* (2006)

Table I Inclusion and exclusion criteria

<i>Inclusion criteria</i>	<i>Exclusion Criteria</i>
Peer-reviewed papers related to families living with CVD and depression and interventions to help families living with a long-term physical condition and depression to adhere to treatment	Peer-reviewed papers that did not focus on the role of services in supporting the family living with CVD and depression

Table II Summary

<i>Author</i>	<i>Study</i>	<i>Outcome</i>
1. Rieckmann <i>et al.</i> (2006)	Medication monitoring used to measure adherence to aspirin with the primary aim to assess whether depression severity impacts upon adherence	Depression severity is associated with increased non-adherence
2. Gehi <i>et al.</i> (2005)	Cohort study examining the association between major depression and self-reported medication adherence	Twice as many depressed participants as non-depressed participants reported forgetting to take their medication
3. DiMatteo (2004)	Meta-analysis	Risk of non-adherences increases in people with long-term condition
4. DiMatteo <i>et al.</i> (2000)	Meta-analysis	Depressed patients three times more likely to be non-adherent than non-depressed patients
5. Morgan <i>et al.</i> (2013)	Two-arm open randomised controlled trial to assess the effect of preparing practice nurses to be case managers for people with depression and long-term conditions	Improvement in depression and increased adherence to treatment guidelines
6. Vale <i>et al.</i> (2002)	RCT to test the effectiveness of coaching to assist patients with CVD to take control of their treatment	Reduction in serum cholesterol levels in the coaching arm of the study
7. Vale <i>et al.</i> (2003)	Multi-centre RCT to test the effectiveness of coaching in reducing cholesterol	Reductions in patient cholesterol level
8. Karademas and Hondronikola (2010)	Prospective study in sample of cardiac patients	Adjustment support aids health and well-being
9. Reid <i>et al.</i> (2013)	Systematic review	Psychological interventions may improve health-related quality of life
10. Ski and Thompson (2011)	Review paper	Primary care teams need to integrate both physical health and psychosocial interventions into a single pathway
11. Cukor <i>et al.</i> (2014)	Cohort study assessing the efficacy of CBT in haemodialysis patients	Improvements in prescription adherence
12. Hunkeler <i>et al.</i> (2006)	Two-arm randomised controlled trial assessing the long-term effects of case management	Patients in the treatment arm are more likely to adhere to treatment
13. Aggarwal and Mosca (2010)	Cross-sectional study to determine the prevalence and predictors of non-adherence to anti-hypertensives and statins	Depression is significant determinant of non-adherence