Annex 6 ✓

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# Does Nurse Case Management Improve the Health Care Outcomes of Patients with Non-Communicable Diseases (NCDs)! - A Narrative Review

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## Abstract

**Purpose:** Nurses play a major role in providing support to individual patients with long term illnesses. However, it is notable that the effectiveness of nurses providing care in improving the health outcomes on patients with chronic diseases is scarce. The purpose of this review is to present the findings and appraisal of the evidences for Nurse case management in improving health outcomes in patients with Type 2 Diabetes Mellitus (DM), Coronary Heart Disease (CHD), Chronic Obstructive Pulmonary Diseases (COPD) or Cancer.

**Method:** A review of the literature published on Nurse case management was performed. A number of 20 literature articles were analyzed. It included studies conducted in different parts of the world between 1994 and 2014 in English. The findings of the researches were tabulated and the rates of effectiveness were analyzed.

**Results:** Significantly positive results were shown in the studies which evaluate the Nurse case management with regard to health outcomes in common non-communicable diseases such as successful self-management of disease, increased functional status, mental improvement and risk reducing behaviors.

**Conclusion:** Overall, this review shows that the Nurse case management provided for the population with Non-communicable diseases such as DM, CHD, COPD and cancer significantly enhances the quality of life of individuals.

**Keywords:** Nurse case management; Effectiveness; Diabetes mellitus; Chronic obstructive pulmonary diseases; Coronary heart disease; Cancer

## Introduction

The concept of Nurse case management has been in practice for over a decade. Case management has been defined as "a collaborative process and advocacy for the services to meet an individual's health needs through communication and available resources to promote quality cost-effective outcomes [1]. Watts et al. [2] in the year 2011 further defined it as "the assignment of authority to a professional (the case manager) who is not the provider of direct health care, but who overseas and is responsible for coordinating and implementing care".

A systematic review done by Norris et al. [3] stated that "case management is an important intervention for people at high risk for adverse outcomes and excessive healthcare utilization". Further, Shojania et al. [4] has stated that case managers were more effective in improvement of glycemic control among patient with Diabetes Mellitus (DM). Similar benefits have also been shown for the control of patient with hypertension. Nurse case management at the basic or patient care level should be coordinated by experienced clinicians [1]. It shows Nurse case management has a positive impact on outcomes of management.

A team of patient care is a group of varied clinicians who communicate regularly about the care of a category of patients and participate in their care. Often the team is more effective with the addition of other discipline such as Nurse case management [5]. In a Chronic Care Model (CCM), the use of nurse as case manager would improve the health outcomes among patients with poor glycemic control [2]. Most successful interventions in chronic disease management largely depends on handing over of responsibility by the clinician to team members including Nurse case manager for ensuring that patients attested clinical & self-management supportive care [6].

Incorporating the Nurse case manager in the management of chronic diseases such as hyperglycemia, hyperlipidemia, and hypertension improves the control of such diseases among individuals. It is also effective in controlling a number of cardiovascular risk factors [6]. It is noted that coronary heart disease is very common disease currently and one that is associated with significant morbidity, mortality and cost [7]. It shows that a Nurse case management is significantly more effective than usual care provided for modifications of number of risk factors after heart attack [8].

Cancer has become the leading cause of death and the prevalence of cancer increased dramatically between 1982 to 2008 [9]. In order to perform a holistic care for the patient with cancer, Nurse case manager places abundant importance on individualized care with developing interpersonal understanding with patients and also facilitate dialogue between patients on their illness and care. This type of model showed a significantly effective care provided for their patient associated with cost effectiveness.

Therefore, the aim of this review is to assess the findings of the researchers done in Nurse case management in order to present the findings and appraisal of the evidences for Nurse case management in improving health outcomes in patients with Type 2 Diabetes Mellitus (DM), Coronary Heart Disease (CHD), Chronic Obstructive Pulmonary Diseases (COPD) or Cancer.

## Methods

### Study design

A review of the published literature on Nurse case management was performed.

### Data sources

This involved searching databases MEDLINE, CINHAL, Google scholar using the search terms Nurse case management, integrated care, disease management and coordination of care for non-communicable diseases such as of Diabetes Mellitus, Chronic Obstructive Pulmonary Disease, Coronary Heart Diseases and Cancer. Also the review was done based on the findings of the studies that evaluated Nurse case management with one or all of the four Non- communicable diseases. It included studies conducted in different parts of the world between 1994 and 2014 in English. A study was included if it was reported in a full-text, original article, and assess the effectiveness of Nurse case management in common non-communicable diseases.

### Data collection

A total number of 58 papers were initially reviewed and filtered. About 20 papers were finally included in the review based on the health outcomes evaluated in the studies. Only English language articles were included. An attempt was made to contact corresponding authors by emails for necessary clarification.

### Data analysis

The findings of the researches were tabulated and the rates of effectiveness were analyzed by the principal investigator and the other three investigators separately. At least two authors carried out independent data analysis resolving disagreements by discussion and when necessary unresolved differences were referred to a third and fourth author and agreement was reached.

### Ethical approval

This study was approved by Ethic Review Committee, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka (ERC approval number: 627/12).

## Results and Discussion

Non-communicable diseases are increasingly prevalent diseases with significant morbidity and mortality associated with substantial health care expenditures and costs. The studies included in our review assessed the outcomes of Nurse case management with regards to the management of non- communicable disease. We identified significant improvements of Nurse case management on patient outcomes: there is solid evidence for higher patient satisfaction, better functional capacity as well as significant improvement of disease control and compliance with treatment in patients with DM, CHD, COPD and cancer.

## Nurse case management for Diabetes Mellitus (DM)

Nurse case management is effective in improvement of glycemic control in patients with DM. A significant association is shown between algorithm-directed nurse interventions and improved glycemic control. Further, improved glycemic control as well as a positive impact on health and economic benefits is shown among patients with DM with the use of Nurse case management. Also the patients with Nurse case management had a mean decrease in $HbA_{1C}$ and fasting glucose levels compared with usual care patients ($p<0.050$) [10].

In addition to Nurse case management alone, multidisciplinary team approaches with Nurse case management has also benefited patients with poorly control DM. It was found in a study where $HbA_{1C}$ levels declined by 1.3% in the patients receiving outpatient multidisciplinary Nurse case management versus 0.2% in the usual care patients ($p<0.001$) [11]. Further, on the patients with DM, the involvement of Nurse case management is found to have significantly achieving target values for glycaemia control [6]. Moreover, combined nurse case manager and community health worker interventions improve glycemic control among patients with DM which was shown in a 2 years follow-up study [12]. The study shows that combined nurse case manager and community health worker interventions had a significant reduction in $HbA_{1C}$ compared with usual care patients ($p=0.013$).

Self-reported health status was found to be enhanced in patients with DM with Nurse case management ($p=0.020$) [10]. Also, it was observed that hospital ($p=0.040$) and out patients ($p=0.010$) utilization were significantly lower in multidisciplinary Nurse case management [11]. Further, the glycaemia and lipid were controlled modestly with Nurse case management and the positive biggest difference was observed in blood pressure management [6]. It shows that patients working with nurse case managers were more likely to achieve individual goals for glycemia as well as lipids, and BP compared with the usual care patients.

In a primary care setting, the level of satisfaction is found to be higher in case managed group of patients with DM than with the group on usual care ($p<0.040$). It was also noted that a great majority of the people expressed that they would join a Nurse case management program again. Further, a significant mental improvement was found among patients with DM being case managed compared with a control group ($p<0.023$). Also, the nurse case managed group stated reduced level of deterioration in pain and felt more comfortable [13].

In addition to quantitative study, qualitative descriptive studies also show positive outcome of self-management of DM in a nurse–led shared care setting. It was observed in a study done by Moser et al. [14] who explored that patients with DM use self-management processes such as daily self-management, off-course self-management and preventive self-management which was achieved by the support from diabetes specialist nurses. There was little difference in clinical outcome or processes of care between patients treated at practices with diabetes resources nurses (DRN) and those treated at practices without such nurses [15] (Table 1).

## Nurse case management for Coronary Heart Disease (CHD)

Nurse case management as an essential part of intensive therapy has been recognized as an effective measure in reduction of smoking and cholesterol level in cases of myocardial infarction. A study carried out in San Francisco Bay area, among a number of men and women aged 70 years on coronary risk factor modification on the basis of a physician-directed, nurse-managed, home-based case management system revealed that nurse case management influenced in reducing smoking cessation rate and plasma LDL cholesterol level compared with usual care patients. It shows that 70.0% success was achieved in smoking cessation among the nurse case managed patients with heart failure compared with 53.0% in usual care group ($p<0.030$). The proportion of the case managed group consuming healthy diet containing low cholesterol, low salt and low fat diets increased after 90 days interventions ($p<0.001$) [16].

| Authors | Objectives | Designs | Outcome Measured | Results |
|---|---|---|---|---|
| Ishani et al. [6] Diabetic care 34: 1689-1694. | To determine the effectiveness of nurse case management with a therapeutic for the control of hypertension, hyperglycemia, and hyperlipidemia among patient with DM | Randomized controlled trial | HbA1c, Blood pressure, Low Density Lipoprotein(LDL) | About 22.0% of patients had better outcomes in the care group compared with (10.0%) in the usual care group [p<0.010] |
| Aubert et al. [10] Ann Intern Med 129(8): 605-612. | To compare diabetes control in nurse care management patients and usual care patients. | Randomized controlled trial | HbA1c, Fasting Blood Sugar(FBS), Health Status | Nurse case management group had more mean decreases in HbA1c values and fasting glucose levels than the usual care group (p<0.010). Self-reported health status improved in the nurse case management group (p=0.020). |
| Sadur et al. [11] Diabetic care 22: 2011-2017. | To evaluate the effectiveness of a cluster visit model led by a diabetes nurse educator for patients with poorly controlled diabetes. | Randomized controlled trial | HbA1c, self-care practices, self-efficacy and satisfaction. | A significant decline in HbA1c levels has been found among intervention patients than control (p<0.000). Several self-care practices and measures of self-efficacy improved significantly in the intervention group. Both hospital and outpatient utilization were significantly lower for intervention group (p<0.000). |
| Gary et al. [12] Preventive medicine 37(1): 23-32. | Assess the effects of nurse case manager (NCM) and community health worker (CHW) interventions on risk factors for diabetes-related complications. | Randomized controlled trial | HbA1c, triglycerides, diastolic blood pressure | The NCM group and the CHW group had modest declines in HbA1c over 2 years (0.3% and 0.3%, respectively), and the combined NCM/CHW group had a greater decline in HbA1c (p=0.137), triglycerides (p=0.041) and diastolic blood pressure (p=0.042) compared with usual care group. |
| Krein et al. [13] American journal of medicine 116: 732-739. | To evaluate the effects of a collaborative case management intervention for patients with poorly controlled type 2 DM | Randomized controlled trial | HbA1c | There was little difference between groups in mean exit HbA1c level (9.3% vs. 9.2%; difference=0.1%; 95.0% confidence interval: -0.4% to 0.7%; p=0.650). Intervention patients expressed more satisfaction about their diabetes care than the control group (p=0.040). |
| Moser et al. [14] BMC Public Health 8. | To report an empirically grounded conceptualization of self-management in the context of autonomy of people with type 2 diabetes. | Qualitative descriptive and exploratory design | Perception of patients | The ways for daily self-management are adhering, adapting, and acting routinely. The off-course self-management are done by becoming aware, reasoning, deciding, acting, and evaluating. The steps for preventive self-management are experiencing, learning, being cautious, and putting into practice. |
| Herrin et al. [15] Baylor UMC proceeding 19: 95-102. | To assess the advantages of using a Diabetes Resource Nurse (DRN) over physician feedback (claims) and feedback on clinical measures from medical records (MR) | Cluster randomized trail | HbA1c, Blood pressure, Low Density Lipoprotein (LDL) | The number of patients with HbA1c <9.0% increased by 4 (0.9%) in the Claims group; 9 (2.1%) in the Claims + MR group (comparison with Claims: P=0.970); and 16 (3.8%) in the DRN group (comparison with Claims: P=0.310). |

**Table 1:** Summary of papers included in DM management

Allen et al. [17] found that the nurse case management improves the control of cholesterol in the blood among patients who have undergone cardiac vascular intervention. It shows significantly more patients in the Nurse case management group than usual group, attained target LDL cholesterol level (p=0.000). Further, patients with Nurse case management have shown significant improvement in cholesterol level through healthy lifestyle changes such as diet and exercise patterns (p<0.001). At the same time, this result was supported by Barr-Taylor et al. [18] stated that mean reductions in total cholesterol and LDL cholesterol were significantly greater for Nurse case management group than usual care group.

Furthermore, telephone Nurse case management is also another approach that would promote the follow-up and decrease hospitalization rates in patients with heart failure. It was observed in a study done by Riegel et al. [8] found that hospitalization rates were lower among patient with heart failure in the standardized nurse case telephone intervention group compared with usual care group (P=0.010). Also hospital admission days (p=0.030), multiple readmission (p=0.030) and inpatient heart disease costs (p=0.040) were significantly reduced in intervention group. Meanwhile, the level of satisfaction with nurse managed care was verbalized higher in the intervention group.

In a pilot study conducted by Huggins & Phillips [19] among the congestive heart failure patients, found that Nurse case management intervention group has expressed much priority in control of risk factors, management of the diseases process as well as when and how to seek medications. In a another study, statistically significant results have been obtained in reducing rehospitalization rates, functional status and exercise capacity (p=0.010) among low-risk patients with heart failure over a 6-month period managed by a physician-supervised, nurse-mediated, home-based system conducted in a medical center [20].

Whereas, a study done by Krein et al. [13] evidenced negatively that the Nurse case management intervention has no any improvements in LDL cholesterol level or control of blood pressure or greater strengthening in medication therapy. Also, it was found that Nurse case management did not statistically reduce rehospitalizations for heart failure or for any other cause [21] (Table 2).

## Nurse case management for Chronic Obstructive Pulmonary Diseases (COPD)

In order to improve the quality of life of patients with Chronic Obstructive Pulmonary Diseases (COPD), nurse case managers play a crucial role in planning, coordinating and meeting the demands of individual patient's needs and reducing of fragmentation of care delivery with the collaboration of other multiple healthcare providers, both patient and care givers [22]. The application of nurse case management on patients with COPD based on economic and patients outcomes was assessed in few studies. A combined qualitative and quantitative, randomized control trial study done by Egan et al. [23] among patients with COPD stated that unplanned readmission, depression and wellbeing of patients were positively differ from nurse case managed group and usual care group. The results indicated that the Nurse case management enhanced access to resources and communication between health care team members which improved patient care. Furthermore, it was evidenced that days of hospital stay due to recurrent admission of patients with severe COPD was reduced while quality of life has been improved by the use of Nurse case management [24].

A study included General Physicians (GPs) as a "care coordinators" and nurse as "service coordinators" for the patients with chronic respiratory disease in a community. Positive results were revealed in reduction of mental aspects of quality of life, symptoms of pain and emotional aspects [25] (Table 3).

| Authors | Objectives | Designs | Outcome Measured | Results |
|---|---|---|---|---|
| DeBusk et al. [16] Ann Intern Med 120:721-729. | To evaluate the effectiveness of a physician-directed, nurse managed, home-based case management system for coronary risk factor modification | Randomized controlled trial | Smoking prevalence, LDL cholesterol | Smoking cessation rates (p=0.030) and plasma LDL cholesterol levels were reduced significantly among intervention group than usual care group (p<0.050) |
| Allen et al. [17] Am Heart J 144: 678 -686. | To assess the effectiveness of a nurse case management (NURS) programme to lower blood lipids in patients with coronary heart disease | Randomized controlled trial | LDL cholesterol level, Diet and exercise patterns, | Significantly more patients in the NURS group achieved LDL cholesterol level <2.59 mmol/dl (p=0.000). Favorable changes in lipids and lipoproteins were significantly improved in NURS group by dietary and exercise. |
| Barr-Taylor et al. [18] Diabetic care 26: 1058 -1063. | To evaluate the efficacy of a nurse –case management system to improve outcomes | Randomized Controlled Trial | Total cholesterol, LDL cholesterol | Total cholesterol and LDL cholesterol were significantly reduced in intervention group compared with the usual group at 1 year. |
| Riegel et al. [8] Arch Inter Med 162: 705-712. | To assess the effectiveness of a standardized telephonic case-management intervention in the patients with chronic heart failure | Randomized Controlled Trial | Hospitalization rates, Readmission rates, Hospital days, Days to first readmission, Multiple readmission, Emergency Department visits, Inpatient cost, Outpatient resource use, Patient satisfaction | Hospitalization rate, hospital days, multiple readmissions and inpatient heart failure costs were significantly lower in intervention group (p<0.050). were lower at 6 months. Patient satisfaction with care was higher in the intervention group. |
| Huggins & Phillips [19] Home health care nurse 16: 14-20. | To assess the impact of nurse case management among CHF patients | Randomized Controlled Trial (Pilot study) | Functional status, Health knowledge, Treatment and demonstration of self-care practice | Intervention group achieved higher scores in control of risk factors, management of disease process, knowledge of how and when to seek medical attention, mobility and energy conservation |
| West et al. [20] Am J Cardiol 79: 58-63. | To evaluate the feasibility and safety of a physician-supervised, nurse-mediated, home-based system for heart failure management | Randomized Controlled Trial | Pharmacological and dietary adherence, Clinical status | Significant association has been shown among intervention group patients in relation to reduction of daily dietary sodium intake (p=0.000); increased average daily medication doses (p=0.010), improved functional status and exercise capacity (p=0.010). Emergency room visits and hospitalization rates for heart failure and for all causes also was declined (p<0.001). |
| Krein et al. [13] Am J Med 116: 732-739. | To evaluate the effects of a collaborative nurse case management intervention for intermediate cardiovascular outcome | Randomized Controlled Trial | LDL cholesterol, BP | There was no evidence that the intervention resulted in improvements in LDL cholesterol level and blood pressure control in case managed patients. |
| DeBusk et al. [21] Ann Intern Med 141: 606-613 | To determine effect of telephone –mediated nurse care management programme for heart failure patient | Randomized Controlled Trial | Time to first rehospitalization, Time to a combined end point of first rehospitalization, Emergency department visit, Death | Half of the patients had been rehospitalized at least once and 11.0% had died. The rate of first rehospitalization for heart failure was similar in both groups. The rate of all causes rehospitalization was similar. |

Table 2: Summary of papers included in CHD management

| Authors | Objectives | Designs | Outcome Measured | Results |
|---|---|---|---|---|
| Egan et al. [23] Lippincott's case management 7: 170-179. | To compare the effect of a nursing based case intervention with that of normal care for the patients hospitalized with COPD | Randomized control trail | Respiratory distress, social support, anxiety, depression, subjective well – being. | Unplanned readmission was reduced in intervention group compared with usual care group. The case management facilitated access to resources and equipment to the patients. The staff- patient communication and the implementation of planned care were facilitated in intervention group. |
| Poole et al. [24] Respirology 6: 37-42. | To determine whether the case management of patients with recurrent hospital admissions for COPD can reduce hospital days without reducing quality of life. | Randomized control trail | FEV1, Admissions and hospital bed days, Quality of life | Reduction was noted in the length of stay & hospital bed days and significant improvement in their quality-of-life was observed among nurse cased managed group. |
| Smith et al. [25] Medical Journal of Australia 177: 481-485. | To evaluate the effectiveness of coordinated care for chronic respiratory disease. | Community-based geographical control study | Hospital admissions functionality (activities of daily living) and quality of life (SF-36 and Dartmouth COOP). | The intervention group had higher rates of hospitalization in the previous 12 months ($P<0.001$) and had worse self-reported quality of life ($P<0.001$). It was associated with an improvement in mental component of quality-of-life measures. |

**Table 3:** Summary of papers included in COPD management

### Nurse case management for cancer

The importance of Nurse case manager's role was demonstrated in a group of patients with cancer in two aspects. Timely treatment was promoted in a reliable medical institute and assisted in completion of treatment as well as follow-up as one of the aspect. At the same time, readmissions due to infection were reduced among vulnerable cancer patients as a result of Nurse case management [9].

The positive outcomes of Nurse case management have been shown in a quasi- experimental study in Taiwan among patients with cancer. It shows that Nurse case management would enhance the effectiveness of cancer care and concretely illustrates a complete model for patients with cancer [9]. The study by Goodwin et al. [26] adds to the proof of the effectiveness of Nurse case managements in improvement of medical care received by patient with breast cancer. It shows that women with breast cancer who were provided with Nurse case management care were significantly more likely to accept breast-conserving surgery, adjuvant radiation therapy and chemotherapy.

Further, Nurse case management would benefits more for poor social support women with cancer [26]. In another study among patients with breast cancer found that positive health outcomes such as acceptance of treatment regimen, reduction of infection and reduced admission rates were achieved by a role played with Nurse case managers [27].

The results of these studies supported positive effects of nurse case management in timeliness and frequency of treatment regimen. It reduced unplanned readmission due to complications, improved patients' reliance on the hospital, and further enhanced treatment continuity of cancer patients (Table 4).

## Conclusion

Nurse case management is widely practiced, in providing good quality care for the patients with non-communicable diseases. The review shows that the patients with Non-communicable diseases such as DM, Coronary heart disease, COPD and cancer receive a better form of care by applying this nurse case management model with the available resources for the patient care. There is a significant reduction in morbidity and mortality associated with the NCDs. Patients' satisfaction has significantly improved and also become cost effective. Further, this model paves way for integration of different level of health services that results in increasing competency of nurses involving in case management.

This review also emphasizes the need for further research on its effectiveness application in our nursing care settings for improved patient care.

This research has reviewed promising directions and research needs in the field of Nurse case management in the community. The promising directions that have been discussed highlight new research and thinking that holds great potential for furthering our understanding of effective management and the positive outcomes they can produce. The research needs highlight areas in which research to date has been inconclusive or contradictory, or areas in which there are gaps in the current literature. By highlighting both these promising directions and research needs, we hope to continue moving the field forward to build conclusive evidence about effective connections that produce positive outcomes.

Reform in the U.S educational system is both lively and messy but, as educators grapple with emerging demands, we found that leadership matters at all levels. Leaders in education provide direction for, and exercise influence over, policy and practice. Their contributions are crucial, our evidence shows, to initiatives aimed at improving student learning, and of course ultimately to the future in which we all share.

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| Authors | Objectives | Designs | Outcome Measured | Results |
|---|---|---|---|---|
| Chen et al. [9] BMC Health Services Research 13: 202-208. | To evaluate the effectiveness of care quality in cancer patients with nurse case management | Quasi-experimental design | Rates of patients continuing treatment, non-adherence to treatment, prolonged hospitalization, unplanned readmission, planed admission | A decreased the unplanned readmission rate caused by infection ($p=0.002$), the rate of patient continue treatment in the institution ($p<0.001$) and planed admission rate ($p<0.001$) also were significantly improved in nurse case managed cancer patients. The nurse case management provided better control and continuity of patient treatment. |
| Goodwin et al. [26] J Am Geriatr Soc 51: 1252–1259. | To evaluate the effect of nurse case management on the treatment of older women with breast cancer. | Randomized prospective trial | Type and use of cancer-specific therapies received in the first 6 months after diagnosis, Patient satisfaction, arm function | Significantly more women in the intervention group received breast-conserving surgery ($p=0.031$), radiation therapy ($p=0.003$) and chemotherapy ($p=0.050$) as the treatment choice for cancer management. Higher percentages of women in the case manager group had normal arm function ($p=0.037$) |
| Jennings-Sanders et al. [27] Oncol Nurs Forum 32: 625-632. | To describe how nurse case managers care for older women with breast cancer | A randomized, prospective trial | Nurse case management contact | A greater number of nurse case management contacts were made in the first quarter. Multivariate analysis revealed that age, income, living alone, and stage of cancer predicted more nurse case management contact. |

**Table 4:** Summary of papers included in cancer management

## Conflict of Interest Statement

No conflict of interest has been declared by the authors.

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