Effectiveness of comprehensive geriatric assessment in elderly patients with coronary heart disease.

Aiping Liu[1#*], Ping Kang[2#], Jing Liu[3], Dongmei Li[4], Limei Zhang[5]

[1]Department of Cardiology, Zhangqiu People's Hospital, Jinan, Shandong, PR China

[2]Department of Rehabilitation, Zhangqiu People's Hospital, Jinan, Shandong, PR China

[3]Department of Community Care, Zhangqiu People's Hospital, Jinan, Shandong, PR China

[4]Department of Neurology, Zhangqiu People's Hospital, Jinan, Shandong, PR China

[5]Department of Nephrology, Zhangqiu People's Hospital, Jinan, Shandong, PR China

[#]These authors contributed equally to this work

Abstract

Background: Hospitalization has been widely accepted for elderly patients with acute or chronic disease. However, hospitalization is also thought to be a risk factor for delirium in hospitalized elderly patients The aim of this study is to assess the efficiency of Comprehensive Geriatric Assessment (CGA) nursing strategy for elderly patients with Coronary Heart Disease (CHD) during hospitalization.

Methods: A total number of 140 elderly CHD patients aged 60 y and above were included in this study, and they were divided into two groups, the CGA treatment group (subjected to CGA nursing strategy) and the control group (subjected to conventional nursing strategy of Cardiology Department). The patient's life quality and coping strategy were assessed with Chinese questionnaire of quality of life in patients with cardiovascular diseases (CQQC) and medical coping modes questionnaire (MCMQ) respectively. Besides, the degree of satisfaction, hospital days and costs were also compared between the two groups.

Results: The total CQQC scores were higher in CGA group (42.36 ± 9.58) than that of control group (25.97 ± 5.38, *P*<0.05) with significant difference. Patients in the CGA group tended to choose confrontational coping strategy than that of control. MCMQ suggested that patients in the CGA group were more satisfied with the treatment and caring. Also, patients in CGA group suffered from less hospital days and costs than control group.

Conclusion: The CGA is effective to evaluate the clinical, psychological and functional aspects in elderly CHD patients.

Introduction

Hospitalization has been widely accepted for elderly patients with acute or chronic disease. However, hospitalization is also thought to be a risk factor for delirium in hospitalized elderly patients [1]. The physiological changes during the aging process make the elderly patients more susceptible to adverse events, and many complications unrelated to the initial disease may occur. These complications will significantly reduce the life quality of older patients and even associate with death rate [2]. Besides, it has been reported that about 30% older patients lose their ability of Activities of Daily Living (ADLs), and more than 20% of them show mental distress during hospitalization [3]. Normally, older adults have an age-

associated increase in disability and comorbidity [4,5], and thus the health service provision for them is urgent and necessary for industrialized nations [6].

Though the morbidity and mortality of Coronary Heart Disease (CHD) in elderly patients have declined over the past years [7], CHD remains the leading cause of death in many countries. Both the psychological and physiological factors are associated with adverse cardiac events in CHD patients, such as cardiac failure, ventricular arrhythmias, acute myocardial infarction, and sudden cardiac death [8]. When patients were in hospital, they would suffer from a great psychological pressure for the reason that their daily life was disturbed [9]. CHD is also reported to be associated with the decreased life quality [10], mental distress [11], as well as social support [12]. Besides, the

unfamiliar environment and frequent treatments will also contribute to the adverse cardiac events of CHD patients [13]. The use of nitrates for CHD treatment increases the frequency of urination [14], which results in aggravation of stress responses for CHD patients.

Recently, the assessment tool "Comprehensive Geriatric Assessment" (CGA) has been widely used for the planning of interventions and determination of outcomes and prognoses in many countries [15]. It contains detailed information on clinical, cognitive and functional aspects of older patients. The CGA has been suggested to evaluate the elderly patients during the hospital stay [16]. For patients with heart failure, a poor CGA score is related to poor prognosis during hospitalization [17]. However, to our knowledge, there is little information about the relationship between CGA and CHD [11]. In this study, we used the outcomes of CGA assessment to develop a nursing care planning for older patients with CHD.

Materials and Methods

Study design, patients and procedures

All consecutive elderly patients aged 60 y and above with CHD were recruited from Department of Cardiology in our hospital during March, 2014 and September, 2015. CHD was diagnosed according to the clinical diagnostic criteria proposed by International Society of Federation of Cardiology (ISFC) [18] and World Health Organization (WHO) [19]. Excluded criteria were as follows: (1) No caregivers; (2) severe dementia with language disorder and communication disorder; (3) patients were diagnosed with other severe complications or advanced disease; (4) patients with New York Heart Association Functional Class IV; (5) patients with acute coronary syndrome or acute myocardial infarction.

Finally, a total of 140 elderly patients with CHD were recruited for this study. According to CGA application, patients were randomly divided into two groups: control group (n=70) and treatment group (n=70).

The written informed consents were provided by all patients.

The CGA questionnaire and definitions

The CGA questionnaire was established in our study based on the characteristics of Department of Cardiology. The scale consists of 9 assessments, including: activities of daily living (ADL, dependency), affective status, cognitive status, nutritional status, mobility (fall risk and walking problems), polypharmacy, comorbidities, social environment, urinary incontinence and constipation assessment [20].

If a patient was in loss of self-sufficiency for one or more ADLs, he or she was regarded as dependency. Affective status was assessed using the 30-item Geriatric Depression Scale (GDS). Scores equal to or greater than 11 were considered as depressive disorder. The cognitive status was accessed by 30-item Mini-Mental State Examination (MMSE) [21] which consists of five cognitive domains, scores less than 24 were regarded as cognitive disorder. Nutritional status was evaluated

as recommended by the French National Authority of Health [22]. The Mini Nutritional Assessment (MNA) score less than 17 was defined as malnutrition. Mobility including fall risk and walking problems were recorded. Of which, fall risk was tested based on the one-legs standing balance test [23] and the timed get-up-and-go test [24]. The comorbidities of each patient were recorded, including hypertension ($\geq$ 140/90 mmHg), chronic heart failure (New York Heart Association classes III and IV), diabetes mellitus, and cardiac arrhythmia.

Urinary incontinence was evaluated by the International Consultation on Incontinence Questionnaire Short Form (ICIQ-SF) [25]. The severity of comorbidities was also assessed by the Cumulative Illness Rating Scale for Geriatrics (CIRS-G) [26]. Polypharmacy was defined as taking more than 5 oral medicines each day [27]. During CGA assessment, if the patient had a primary care giver, or had friends and family who are capable of meeting the patient's needs, he was considered to be in a good social environment, otherwise, the social environment was inappropriate.

The questionnaire of 9 domains was compiled into an easy-to-understand booklet. Then it was checked and revised by two experts from Department of Cardiology and Geriatrics.

Nursing procedure

For the control group, the patients were nursed according to the routine medical disease care of Cardiology Department on the first day of admission. They were conventionally treated with drugs to dilate the vessels, promote blood flow, inhibit the platelet aggregation, and reduce the myocardial oxygen consumption peros or intravenous injection. Patients in the control group were followed up by telephone interview once or twice within 6 months after hospital discharge.

For treatment group, the CGA evaluations were started within the first 5 days of admission by the geriatrics fellows under the supervision of primary nurses. Firstly, the different problems and characteristics of different patients were detected and recorded, such as patients' limitations, strengths, and need for services. Secondly, a specific inventory was drawn up for the individual problems of each patient according to the CGA results [28]. Then a specific nursing management was conducted based on the CGA results, nursing goals and personality education. The basic clinical data including age, gender, stage, as well as the disease history of each patient were also recorded. At the end of the hospital stay, patients were invited to enjoy reexamination for free within 6 months after hospital discharge. A telephone follow-up was also performed once a month for 6 times.

Data collection

(1) The life quality of patients in the two groups was evaluated by Chinese questionnaire of quality of life in patients with cardiovascular diseases (CQQC) [29] which was proposed by editorial board of Chinese medical journal of cardiovascular rehabilitation and Medical Coping Modes Questionnaire (MCMQ) [30].

The health evaluation tool CQQC consisted of physical strength (physical condition and rehabilitation exercise), illness state (stenocardia, palpitation, dyspnea, effect of sickness on quality life, awareness of the disease and worry about death), medical care (satisfaction of treatment, satisfaction to medical staff), life satisfaction (diet, sleep, perceived healthy status and amusement), social mentality (depression, anxiety, memory, intelligence, confidence, family relationship and conjugal relationship) and interpersonal relationship (working ability and interpersonal relationship), which was formulated according to the physical, psychological and social principles, as well as the Chinese national conditions. It took 5-10 min for the elderly to complete a CQQC questionnaire. The score ranges from 0 to 154, the higher score, the higher the life quality.

The behavior evaluation tool MCMQ consisted of 19 questionnaires, which was designed to assess three coping strategies: confrontation, avoidance and acceptance-resignation. To identification of reliability of the questionnaire, we used internal consistency. The higher scores in one coping strategy indicate that patients are more inclined to this strategy.

Patient's satisfaction for nursing was evaluated by a satisfaction questionnaire of Cardiology Department. The hospital stay and expenses during hospitalization were also analysed.

Statistical analysis

The statistical analysis was performed by SPSS 19.0. Data are presented as means ± SD. Categorical variables were compared between the two groups using Chi-squared test. Continuous variables were compared using the student t test. $P<0.05$ was regarded as significant difference.

Results

Population demography

Baseline characteristics are given in Table 1. The mean ages in the treatment and control groups were 73.85 ± 8.47 and 72.96 ± 7.74 respectively. There were slightly more females (55.71%) than males (44.29%), but no significance of the sex ratio was found between the two groups. Most of them were taken care of by their family during hospital stay (58 *vs.* 61, $P>0.05$).

Table 1. *Baseline characteristics of the patients (P>0.05).*

Measure	N	CGA group	Control group
Age	140	73.85 ± 8.47	72.96 ± 7.74
Course of CHD	140	7.54 ± 2.43	7.29 ± 2.26
Complications	140	2.84 ± 1.43	2.97 ± 1.46
Gender			
Male	62	33	29
Female	78	37	41

Marital status			
Unmarried	2	2	0
Married	103	47	56
Loss of spouse	35	19	16
Carer			
Family	119	58	61
Nurses	21	12	9

CGA: Comprehensive Geriatric Assessment

CGA assessment

The CGA assessment results showed that about twenty-four (34.29%) patients in the treatment group was loss of self-sufficiency in one or more ADLs. The social environment of fifteen (21.43%) CHD patients were considered as inappropriate. Twenty (28.57%) showed a high likelihood of depression (GDS 30-item>11), thirty-one (44.29%) presented cognitive impairment (MMSE ≤ 24/30), and forty (57.14%) were malnutrition. Walking disorders and falls were main damage of mobility, which account for 45.71% and 31.43% respectively. About 67.14% CHD patients took 5 or more oral medications each day. The urinary incontinence and constipation rates were 32.86% and 58.57% respectively in the treatment group. The most common comorbidities of 70 patients in treatment group were hypertension (62.86%), diabetes mellitus (22.86%), Cardiac arrhythmia (17.14%) and chronic heart failure (15.71%) (Table 2).

Table 2. *CGA assessment.*

Parameters	N (%)	Male (%)
Dependency for one or more ADLs	24 (34.29)	14 (20.00)
Inappropriate social environment	15 (21.43)	5 (7.14)
Depressive disorder	20 (28.57)	7 (10.00)
Cognitive impairment (MMSE ≤ 24/30)	31 (44.29)	17 (24.29)
Malnutrition	40 (57.14)	19 (27.14)
Mobility		
Walking problems	32 (45.71)	19 (27.14)
Falls in the past 6 months	22 (31.43)	13 (18.57)
Polypharmacy (≥ five drugs/d)	47 (67.14)	22 (31.43)
Urinary incontinence	23 (32.86)	3 (4.29)
Constipation	41 (58.57)	20 (28.57)
Comorbidities		
Chronic heart failure	11 (15.71)	4 (5.71)
Hypertension	44 (62.86)	21 (30.00)
Diabetes mellitus	16 (22.86)	9 (12.86)
Cardiac arrhythmia	12 (17.14)	6 (8.57)

CGA: Comprehensive Geriatric Assessment; ADL: Activities of Daily Living.

Comparison of CQQC scores

The comparison of CQQC scores between two groups were listed in Table 3. As a result, the scores of all the 6 items in the CGA group were much higher than those of control group (*P*<0.05). There was a statistical difference between them (42.36 ± 9.58 *vs.* 25.97 ± 5.38, *P*<0.05).

Table 3. The comparison of CQQC scores at the 6 months follow-up after hospital discharge.

Items	CGA group	Control group
Physical strength	11.25 ± 4.96**	8.32 ± 4.05
Illness state	8.82 ± 4.34**	4.65 ± 1.02
Medical care	5.96 ± 0.52**	4.81 ± 0.73
Life satisfaction	5.15 ± 1.87**	3.78 ± 1.38
Social mentality	8.56 ± 3.12**	3.97 ± 1.49
Interpersonal relationship	0.95 ± 0.58*	0.71 ± 0.64
Total	42.36 ± 9.58**	25.97 ± 5.38

CQQC: Chinese Questionnaire of Quality of Life in patients with cardiovascular diseases; CGA: Comprehensive Geriatric Assessment. *P*<0.05, **P*<0.01, compared with control group.

Comparison of MCMQ scores

The internal consistency reliabilities in the present study were 0.69, 0.60 and 0.76 for the three styles respectively. As shown in Table 4, in the treatment, patients tended to choose confrontation (18.38 ± 3.59) than avoidance (14.74 ± 2.65) and acceptance-resignation (14.74 ± 2.65), while in the control group, patients reported a greater propensity to avoidance (17.57 ± 3.14) and confrontation (16.26 ± 3.64) than acceptance-resignation (6.94 ± 3.46). There were significant differences for confrontation and avoidance between the two groups (*P*<0.05), while no significant difference was found for acceptance-resignation.

Table 4. The comparison of MCMQ scores between treatment group and control group.

Groups	Confrontation	Avoidance	Acceptance-resignation
Treatment group (n=70)	18.38 ± 3.59**	14.74 ± 2.65**	7.59 ± 3.62
Control group (n=70)	16.26 ± 3.64	17.57 ± 3.14	6.94 ± 3.46

MCMQ: Medical Coping Modes Questionnaire; CGA: Comprehensive Geriatric Assessment. **P*<0.01, compared with the control group.

Comparison of satisfaction

A conventional satisfaction questionnaire from our department was sent to our patients to show their satisfaction for treatment and caring. During hospital stay, the treatment satisfaction (84.29% *vs.* 70.00%) and caring satisfaction rates (97.14% *vs.*

81.43%) were much higher in the CGA group than those of control group respectively. As well, patients' treatment and caring satisfaction after hospital discharge were much higher in CGA group (*P*<0.05) (Table 5).

Table 5. Comparison of treatment satisfaction and caring satisfaction.

Group	Treatment satisfaction (n, %)		Caring satisfaction (n, %)	
	DHS	AHD	DHS	AHD
CGA group (n=70)	59(84.29)*	51 (72.86)*	68 (97.14)**	62 (88.57)**
Control group (n=70)	49 (70.00)	39 (55.71)	57 (81.43)	41 (58.57)

DHS: During Hospital Stay; AHD: After Hospital Discharge, CGA: Comprehensive Geriatric Assessment. *P*<0.05, **P*<0.01, compared to the control group.

Comparison of hospital stay and costs

The total hospital stay and hospital stay in the Coronary Care Unit (CCU) were less in the CGA group than those in the control group (*P*<0.05). Compared to patients in control group, the average cost was also much lower in CGA group (*P*<0.05) (Table 6).

Table 6. Comparison of hospital stay and costs.

Group	CCU (d)	Average total hospitalization (d)	Average hospital cost (Yuan)
CGA group (n=70)	2.69 ± 1.48*	11.65 ± 3.58**	4221.54 ± 235.79**
Control group (n=70)	3.42 ± 2.01	15.06 ± 5.12	4489.06 ± 252.28

CGA: Comprehensive Geriatric Assessment; CCU: Coronary Care Unit; *P*<0.05, **P*<0.01, compared to the control group.

Discussion

The CGA, an interdisciplinary, multidimensional diagnostic tool to evaluate the capacities of clinical, psychological and functional aspects of elderly patients, was used to establish an integrated and coordinated plan for disease treatment [31]. In our study, older patients in CGA group were cared according to the CGA results of each patient, they showed higher living quality and satisfaction degree, positive mental attitude as well as lower hospital days and costs than those cared by conventional nursing project in control group.

The CGA assessment used in our study consisted of 9 aspects, including ADL, affective status, cognitive status, nutritional status, mobility, polypharmacy, comorbidities, social environment, urinary incontinence and constipation assessment. It provided the background history and pharmacohistory for the CHD patients treatment. Furthermore, the CGA described the frailty or illness of each patient. Based on this information, we could draw up a specific and systematic caring plan, which is certainly associated with prognosis of each CHD patient.

The quality of life for elderly CHD patients were declined because of combined effect of several factors, such as the chronic disease and aging problem [32]. The elderly patients in our study also showed different senile cardio-cerebral syndromes. Their living quality was evaluated by CQQC questionnaire after different caring strategies. CQQC is a Chinese questionnaire with satisfying validity and reliability for cardiovascular diseases [33]. Patients treated with traditional nursing mode showed lower living quality than those treated with CGA. It might be explained that clinicians paid much attention on treatment, other than caring. Therefore, it is necessary to assess old patients and establish an effective method with CGA.

The application of CGA assessment during hospitalization significantly increased the ability of self-management [34]. Patients' self-management in our study was evaluated by MCMQ. Confrontation, avoidance and acceptance-resignation coping styles were analysed. As a result, more patients would like to choose confrontation with CHD after assessed by CGA. These patients preferred to adopt the suggestions proposed by healthcare professionals. This suggested that a behavioral mechanism caused by confrontation coping is directly or indirectly related to the healing [35,36], and reduce the adverse cardiac events. Thereby patients in CGA treated group left hospital earlier than those in the control group.

In this study the treatment and caring satisfaction were higher in CGA treated group than those in the control group, indicating that the CGA nursing model significantly improved the degree of satisfaction. Based on the information from CGA nursing questionnaire, cares and family provided more spiritual supports to CHD patients. A mutual trust relationship was established between nurses and patients. These behavioral mechanisms will help patients positively coping with this disease, and finally improve the patients' satisfaction.

The limitations of this study should be pointed out. First, patients were recruited only from normal ward, other healthcare settings such as acute geriatric unit should also be included. Second, the CGA scores were associated with social interactions; unfortunately, we lacked data to evaluate the role of social interactions in CGA scores. Even so, our results indicate that the CGA supplies information for the medical assessment by providing unmet needs and improving prognosis assessment.

In conclusion, the CGA adds substantial information to evaluate the clinical, psychological and functional aspects in elderly CHD patients and further improve living quality, positive mental attitude and satisfaction degree as well as reducing the hospital days and costs.

Acknowledgments

References

1. Feng C, Li F. Rediscussion on severe acute pancreatitis (SAP) infection and reasonable application of prophylactic antibiotics. J Hepatopancreatobil Surg 2011; 23: 77-83.

2. Guo ZH, Hao JY. Rational use of antibiotics in patients with severe acute pancreatitis. Chin J Diges 2012; 32: 585-587.

3. Wittau M, Mayer B, Scheele J, Henne-Bruns D, Dellinger EP, Isenmann R. Systematic review and meta-analysis of antibiotic prophylaxis in severe acute pancreatitis. Scand J Gastroenterol 2011; 46: 261-270.

4. Cid J, Aguinaco R, Sanchez R, Garcia-Pardo G, Llorente A. Neutrophil CD64 expression as marker of bacterial infection: a systematic review and meta-analysis. J Infect 2010; 60: 313-319.

5. Koeze J, Hendrix MG, van den Bergh FA, Brouwer RM, Zijlstra JG. In critically ill patients the procalcitonin level can be misleading. Crit Care 2011; 15: 422.

6. Wacker C, Prkno A, Brunkhorst FM, Schlattmann P. Procalcitonin as a diagnostic marker for sepsis: a systematic review and meta-analysis. Lancet Infect Dis 2013; 13: 426-435.

7. Wan DP, Liu DY. The value of spiral CT scan in the diagnosis of severe acute pancreatitis complicated with infection. J Clin Med Test 2014; 11: 2000-2001.

8. Oppegaard O, Skodvin B, Halse AK, Langeland N. CD64 as a potential biomarker in septic arthritis. BMC Infect Dis 2013; 13: 278.

9. Yu QQ, Wang HP, Zhai ZM, Zhao YM. Clinical significance of determination of neutrophil CD64 mean fluorescence intensity index using flow cytometry in diagnosis of infection diseases. Clin Focus 2011; 26: 383-387.

10. Yin T, Wang CY. Key points and difficulties of multidisciplinary comprehensive treatment for severe acute pancreatitis. Chin J Gen Surg 2015; 30: 1-3.

11. De Waele JJ. Rational use of antimicrobials in patients with severe acute pancreatitis. Semin Respir Crit Care Med 2011; 32: 174-180.

12. Jiang K, Huang W, Yang XN, Xia Q. Present and future of prophylactic antibiotics for severe acute pancreatitis. World J Gastroenterol 2012; 18: 279-284.

13. Ding KH, Ban FZ, Huang CL, Li RN, Huang HH. Clinical significance and changes on serum levels of PCT, hs-CRP, IL-6 in patients with acute pancreatitis. Int J Lab Med 2013; 34: 2241-2242.

14. Lai XR, Tong HS, Lin HJ, Fu YJ, He MR. Detection and significance of serum calcitonin level in patients with acute pancreatitis. Guangdong Med J 2013; 34: 2224-2226.

15. El Shimi MS, Abou Shady NM, Hamed GM, Shedeed NS. Significance of neutrophilic CD64 as an early marker for detection of neonatal sepsis and prediction of disease outcome. J Matern Fetal Neonatal Med 2017; 30: 1709-1714.

16. van der Meer W, Pickkers P, Scott CS, van der Hoeven JG, Gunnewiek JK. Hematological indices, inflammatory markers and neutrophil CD64 expression: comparative trends during experimental human endotoxemia. J Endotoxin Res 2007; 13: 94-100.

17. Groselj-Grenc M, Ihan A, Pavcnik-Arnol M, Kopitar AN, Gmeiner-Stopar T, Derganc M. Neutrophil and monocyte CD64 indexes, lipopolysaccharide-binding protein, procalcitonin and C-reactive protein in sepsis of critically ill neonates and children. Intensive Care Med 2009; 35: 1950-1958.

18. Mokuda S, Doi O, Takasugi K. Simultaneous quantitative analysis of the expression of CD64 and CD35 on neutrophils as markers to differentiate between bacterial and viral infections in patients with rheumatoid arthritis. Mod Rheumatol 2012; 22: 750-757.

19. Gibot S, Bene MC, Noel R, Massin F, Guy J, Cravoisy A, Barraud D, De Carvalho Bittencourt M, Quenot JP, Bollaert PE, Faure G, Charles PE. Combination biomarkers to diagnose sepsis in the critically ill patient. Am J Respir Crit Care Med 2012; 186: 65-71.

20. Hsu KH, Chan MC, Wang JM, Lin LY, Wu CL. Comparison of Fcgamma receptor expression on neutrophils with procalcitonin for the diagnosis of sepsis in critically ill patients. Respirology 2011; 16: 152-160.

21. Dilli D, Oguz SS, Dilmen U, Koker MY, Kizilgun M. Predictive values of neutrophil CD64 expression compared with interleukin-6 and C-reactive protein in early diagnosis of neonatal sepsis. J Clin Lab Anal 2010; 24: 363-370.

22. Nuutila J. The novel applications of the quantitative analysis of neutrophil cell surface FcgammaRI (CD64) to the diagnosis of infectious and inflammatory diseases. Curr Opin Infect Dis 2010; 23: 268-274.

23. Gros A, Roussel M, Sauvadet E, Gacouin A, Marqué S. The sensitivity of neutrophil CD64 expression as a biomarker of bacterial infection is low in critically ill patients. Intensive Care Med 2012; 38: 445-452.

*Correspondence to

Aiping Liu

Department of Cardiology

Zhangqiu People's Hosiptal

PR China