Nursing role to improve care to infarct patients and patients undergoing heart surgery: 10 years' experience

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Abstract

Background The nurse practitioner may be the ideal health-care worker to create a new environment and may facilitate in the process of expediting discharge and improving patient safety. They can play an intermediary role between the consultants, nurses and patients, thereby combining the aspects of care (nursing) and cure (physicians).

Method We describe the contribution and role of the nurse practitioner in a teaching hospital and provide an overview of the changes in care and cure that were facilitated by two nurse practitioners in the treatment of cardiac surgery patients or non-complicated acute coronary syndrome patients.

Results The nurse-led clinic for postoperative patients has registered 1967 patients in the past 10 years. These patients were transferred at a mean of 5.5 days after their bypass operation. All patients had an uneventful clinical course in our hospital and were discharged alive. The period between discharge and outpatient clinic visit could be set at 4 weeks. The post-acute coronary syndrome (ACS) group included 1236 patients. Mortality in this patient cohort was 4% while 0.4% of these patients experienced a re-myocardial infarction. Additional surgery was needed in only 2% of these stable post-infarction patients. The mean length of stay was 5.9 ± 14.5 days.

Conclusion This observational study confirms that a nurse-led postoperative care unit and post-ACS care unit is feasible and effective for the treatment of patients returning from cardiac surgery or transferred after uncomplicated ACS to a general cardiology ward.

Keywords Nurse practitioner · Acute coronary syndrome · Coronary surgery

Introduction

Cardiovascular disease remains a major healthcare problem and consumer of the public health resources [1]. Over the past decades, cardiologists have developed better treatment options and strategies for cardiac patients, thereby improving their patients future perspectives and prolonging survival [2–7]. Together with the increasing life expectancy of the general population, the better prognosis of cardiac patients calls for more and expedient attention from cardiac healthcare workers.

The treatment options for coronary artery diseases have changed over time. In the past, patients with an acute myocardial infarction were treated with thrombolysis. Primary percutaneous intervention is the appropriate treatment nowadays. With this change of treatment, numerous studies have shown reduced infarct sizes, a reduced length of stay, and a better long-term survival in patients with an acute myocardial infarction.

Similarly, improved operation techniques and skills have led to quicker convalescence after bypass surgery. And therefore, also in patients with heart surgery, the length of stay has been reduced in the last 10 years.

Thus nowadays, the medical situation of the hospitalised cardiac patient is stable at a much earlier point of time and may lead to earlier discharge. However, an earlier discharge may only be of value if appropriate measures are taken to prevent complications or rehospitalisation. These measures should include clear instructions for the immediate rehabilitation period at home as well as clear information about diagnosis, lifestyle guidelines, medication

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and alarm symptoms. Intensive collaboration with patients, spouse, and nursing and medical staff during the hospital stay and discharge is needed to reach a safe environment at home and thus achieve patient safety.

In this changing world, the nurse practitioner may be the ideal healthcare worker to create such new environment and may facilitate in this process of expediting discharge and improving patient safety at discharge. Nurse practitioners can play an intermediary role between the attending consultants, nurses and patients. With this intermediary role, they will be able to combine the two aspects of care (nursing) and cure (physicians).

In this article we will describe the contribution and role of the nurse practitioner in the Medical Centre Alkmaar. In particular, we will provide an overview of the changes of care and cure that have been facilitated by two nurse practitioners who are involved in the treatment of patients who have undergone cardiac surgery or a non-complicated acute coronary syndrome.

Methods

The Medical Center Alkmaar is a (non-cardiac surgery) regional hospital with 625 beds, serving a population of 450,000 in the North West region of the Netherlands. The cardiology department is equipped to perform interventional cardiology as well as ICD implantations. The department has 12 CCU and 60 ward beds, two catheterisation laboratories and is staffed by 12 cardiologists, two fellow-cardiologists, 10 residents, and 60 nurses, two of whom are registered nurse practitioners and one in training.

Training program for nurse practitioners

In 1997, the Hanze Hogeschool in Groningen was the first Dutch HBO institute to start an Advanced Nursing Practice program. Now each regional HBO institute has its own program. This program is open for HBO-graduated nurses who have at least 2 years experience as a nurse and who are registered under the Dutch Individual Healthcare Professions Act (BIG-wet). The course consists of two parts: a theoretical part which is taught 1 day every 2 weeks at the Hogeschool and a training-on-the-job part which is performed in the hospital under the supervision of the cardiologist. An estimated 20 hours of study per week are required. The course is given as a modular program including epidemiology, research, quality assessment, skills lab, clinical decision making and education in patient information and disease management. After a 2-year course, the students gain their Master of Arts in Advanced Nursing Practice.

The main constituents of the function of the nurse practitioner are the following:

- To perform the medical management of a well-described stable patient group under direct supervision of the cardiologist, both in the hospital and in the outpatient clinic. Also, the nurse practitioner integrates certain nursing aspects into her work
- To coordinate and continue the medical disease management for these patients as prescribed and supervised by the cardiologist and described in dedicated protocols. In addition she will align the medical and nursing program of care
- To run an outpatient clinic for the specified patient population
- To develop and implement new protocols and quality projects
- To be involved in the training of nurses-in-training.

Nurse practitioner-led clinical management

The nurse practitioner takes care of the post-ACS patients and the patients who have undergone heart surgery and returned to our hospital for clinical rehabilitation. The nurse practitioner is specialised in her own patient population, which should be characterised as a stable patient cohort with an uncomplicated clinical course after ACS or cardiac surgery. In case of high complexity or a (newly) complicated clinical course, the attending resident will take over the medical treatment of this patient.

Typically, the nurse practitioner develops specific protocols and transforms existing protocols for cardiac and non-cardiac medical postoperative care before she gets operational. These protocols include medical history taking, physical examination and interpretation of postoperative echocardiography and ergometry. Specific attention is also devoted to the logistics of anticipated problems after discharge at home. Following the operation or myocardial infarction, all patients are referred to the medical care of the nurse practitioner. Treatment is standardised and modelled in a clinical pathway, which is supervised by the cardiologist. Twice a week the cardiologist sees all the patients and on the other days supervision is provided through dialogue consultations between the nurse practitioner and the cardiologist. Initially only coronary bypass patients were referred to the nurse but since 2000 also valve replacement patients have been included in the protocol. The regular care by the resident was operative during the nurses holiday leave. Finally, the patients are routinely seen at the outpatient clinic after discharge.

The nurse practitioner participates in the medical team and in all clinical rounds and patient discussions; she is also involved in the education program of the residents. Therefore, the nurse practitioner will be educated in all parts of

cardiology, which contributes to a wider perspective than only her own patient population.

Postoperative care

The nurse practitioner takes care of the preoperative and postoperative surgery patients. From 1999 till June 2010 the nurse practitioner saw 1967 patients. Surgery is performed at the department of cardiac surgery at the VU Medical Centre in Amsterdam. Typically, the patients are admitted 1 day before the operation and transferred to our centre 4 days after the operation.

The nurse practitioner takes care of the clinical patients after acceptance for surgery. She visits the patients every day, evaluates the patient's situation and gives them information. In addition, the nurse practitioner chairs a group meeting in a class-room setting for hospitalised and non-hospitalised patients and spouses to prepare them for their operation. A group of 10–15 patients and family members are assembled and informed about the diagnosis, the operation, risk factors, normal symptoms and alarm symptoms, lifestyle advice and what they can expect in the preoperative and postoperative period. The postoperative care is also provided by the nurse practitioner. At admission, the nurse practitioner assesses the medical situation of the patient and determines the treatment in line with the clinical pathway and in consultation with and supervised by the cardiologist. She is responsible for the daily cure and care of the surgery patients and supports the patient and family until discharge. At the day of discharge there is a briefing with the patient, his family and the nurse practitioner about lifestyle advice, the medication and possible alarm symptoms. Patients receive the phone number of the nurse practitioner for questions or problems at home.

Four weeks after discharge the patients visit the nurse practitioner at the outpatients clinic for follow-up. She evaluates the patient's situation and changes the treatment when necessary, also supervised by the attending cardiologist.

Post-ACS care

One nurse practitioner takes care for patients with acute coronary syndrome. For several years now, the nurse practitioner care at the Medical Centre Alkmaar has been embedded for non-high-risk post-myocardial infarction patients. The patients are treated with multidisciplinary evidence-based protocols.

The treatment of acute ST-elevation myocardial infarction (AMI) has been changing rapidly in the last years. The treatment already starts in the ambulance, the electrocardiography is sent to the cardiac care unit and the patient is transferred directly to the catheterisation laboratory to be treated immediately by primary percutaneous coronary

intervention (PCI). In the absence of complications, most post-PCI patients stay in hospital for about 2 or 3 days.

Our post-ACS nurse practitioner care program starts when the patient is transferred from the coronary care unit to the cardiology ward. On the ward, the nurse practitioner becomes responsible for the medical care under direct supervision of the attending cardiologist. This includes clinical rounds and order management, directing nurses and informing patients and families regarding their disease management. Typically, the nurse practitioner takes care of 6–8 post-ACS patients per day, which that enables her to provide expedient and personalised care. Within this limited timeframe, patients need to be educated on all issues of a myocardial infarction including its treatment, appropriate prescriptions and lifestyle changes (drugs, diet, exercise). Also they need to be taught in self-monitoring and management in case of recurrence of symptoms. Because of the acute situation and the short length of stay patients may become overwhelmed by such a vast amount of information.

Results

Postoperative patient characteristics

Demographic and clinical data for the 1967 patients enrolled in the study are presented in Table 1. Three quarters of the patients were men. All patients had multivessel coronary artery disease, 68% had hypercholesterolaemia, and half had experienced a prior MI or PCI. The 1967 patients underwent a successful coronary artery bypass grafting operation. Almost all procedures were performed for native vessel disease (95% of patients) without prior cardiac surgery. By virtue of the study, all patients underwent a successful operation and returned alive to the cardiology ward of our hospital. During bypass surgery, a mean of 2.4 anastomoses were performed. The left internal mammary artery was used in 94% of the bypass patients. In the years after 2000, one third of the postoperative patients were seen following cardiac valve surgery with or without bypass grafting.

In-hospital clinical results and 30 days follow-up

The patients were discharged from our cardiology ward at a mean of 5.5 days after their bypass operation (Fig. 1). Subsequently, all these patients had an uneventful clinical course in our hospital and were discharged alive through all phases.

Only 5% of all 1967 patients experienced a severe adverse event during their in-hospital stay; 0.3% died and 4.8% suffered a postoperative myocardial infarction. There were no significant differences in major or minor in-hospital complications between the 2 groups.

Table 1 Demographic characteristics of the post-surgery population

Baselines	1999–2000	2001–2002	2003–2004	2005–2006	2007–2008	2009–2010 (till June)
Number	196	497	371	284	319	300
Age	64 (SD 10)	66 (SD 9)	67 (SD 10)	67 (SD 11)	67 (SD 10)	69 (SD 10)
Male	82.1%	76.5%	74.3%	77.1%	76.6%	
Operation						
CABG	100%	100%	100%	100%	77%	58%
Valve	0%	0%	0%	0%	13%	26%
CABG and valve	0%	0%	0%	0%	8%	10%
Other	0%	0%	0%	0%	2%	6%
History						
CABG	2%	6%	4%	5%	5%	2%
MI	42%	34%	34%	35%	25%	24%
PCI	22%	26%	18%	21%	15%	19%
Risk factors						
Hyperlipidaemia	66%	70%	67%	53%	41%	35%
Hypertension	45%	43%	55%	59%	50%	54%
Family history	36%	43%	52%	47%	33%	18%
Diabetes mellitus	18%	22%	21%	16%	24%	18%
Current smoker	42%	35%	28%	32%	27%	22%
Left ventricular function						
LVEF >40%		67%	76%	77%	73%	78%
LVEF 30 - 40%		27%	19%	16%	19%	16%
LVEF < 30%		7%	5%	8%	8%	6%
Extent of CAD						
1-vessel	6%	5%	6%	7%	6%	5%
Multi vessel	93%	94%	94%	95%	93%	95%
LIMA/(F)RIMA used						
LIMA	93%	92%	94%	92%	93%	97%
FRIMA	8%	7%	8%	9%	8%	10%

CABG coronary artery bypass grafting, *CAD* coronary artery disease, *MI* myocardial infarction, *PCI* percutaneous coronary intervention, *LIMA* left internal mammary artery, *FRIMA* free right internal mammary artery, *LVEF* left ventricular ejection fraction

Fig. 1 Length of stay following cardiac surgery

The period between discharge and the first outpatient clinic visit could be set at 4 weeks since they were seen by the nurse practitioner. There were no significant complications during the 30-day postoperative period.

Post-ACS patient characteristics

Demographic and clinical data for the 1236 patients enrolled in the study are presented in Table 2. Three quarters of the patients were men. All patients had positive troponin levels, 43% had hypercholesterolaemia, 36% had hypertension and 9% and 8% had experienced a prior MI or PCI, respectively. The majority of the infarctions were located in the inferior wall whereas 41% experienced an anterior infarction. Over 73% were STEMI infarctions. Those patients who underwent a primary PCI had a door-to-balloon time of 61 ± 10 min. The total sum of ECG

Table 2 Demographic and outcome characteristics of the ACS population

N	1236
Age	64±12
Male	75%
History	
CABG	3%
MI	9%
PCI	8%
Risk factors	
Hyperlipidaemia	43%
Hypertension	36%
Family history	37%
Diabetes mellitus	8%
Current smoker	49%
Type of infarct	
Anterior	41%
Inferior	48%
LBBB	1.2%
Other	10%
Killip class	
0	1%
1	92%
2	3%
3	1%
4	3%
Vessel disease	
0	1%
1	55%
2	25%
3	20%
STEMI	74%
NSTEMI	27%
Door to balloon time STEMI (min)	61
Prehospital time STEMI (min)	42
SUM ST (mm)	15±10
CK-MB mean (U/l)	182±168
In-hospital MACE	
None	91%
Death	4%
Re-MI	0.4%
CABG	2%
Re PCI	0.6%
Re PCI, other coronary event	2%
Median days in hospital	3.8

CABG coronary artery bypass grafting, *MI* myocardial infarction, *PCI* percutaneous coronary intervention, *LBBB* left bundle branch block, *STEMI* ST elevation myocardial infarction, *NSTEMI* non-ST-elevation myocardial infarction, *CK* creatinine kinase

deviations in these patients was 14.8 ± 10 mm and post-PCI mean CK-MB level was 182 ± 168 U/l.

In-hospital clinical results

Mortality in this patient cohort treated by the nurse practitioner was 4% while 0.4% of these patients experienced a re-myocardial infarction. Additional surgery was needed in only 2% of these stable post-infarction patients. The mean length of stay of these patients was 5.9 ± 14.5 days, which included the waiting period for additional interventions such as PCI or CABG.

Discussion

This observational study confirms that a nurse-led postoperative care unit and post-ACS care unit is feasible and effective for the treatment of patients returning from cardiac surgery or transferred after uncomplicated ACS to a general cardiology ward. Patients could be discharged early with negligible complication rates, while being better informed regarding disease management at a personal level.

Medical quality

Our earlier results indicate that a nurse-led clinic achieves comparable clinical outcome when compared with conventional care [9]. Earlier we demonstrated the safety of patient management by a nurse practitioner for stable patients after a recent myocardial infarction [8, 9]. In the same study we found that nurse practitioners can deliver qualitatively equal care to non-high-risk patients with a recent myocardial infarction as compared with conventional care with a significant decrease in length of stay, and with a similar safety profile at 30-day follow up [9].

Fig. 2 Concept of care by nurse practitioners

The present data on consecutive patients support the role of involvement of nurse practitioners in the secondary and tertiary healthcare. Few randomised trials have been conducted to evaluate the role of nurses in healthcare. However, the majority of these trials were conducted in primary healthcare programs [10–14]. All these trials support the concept of nurse-led interventions with improved patient satisfaction and high quality of care. We were able to extend these results to daily clinical practice in a Dutch regional hospital. One of the most important contributors to this success is the clinical training of nurse practitioners and adequate patient selection. The training program in the Netherlands consists of a 2-year theoretical training at college and a clinical hands-on training on the cardiology ward. Only experienced registered nurses are allowed to participate in this training program. However, a nurse-led clinic should preferably be integrated into an existing training structure and program for fellows and residents. The nurses are involved in all medical conferences as well as the postgraduate medical courses.

Careful identification of a well-described patient population is a second important contributor to success. We selected the well-defined postoperative CABG and stable low-risk post-ACS patients for our initial experience with a nurse-led clinic. These patients are a relatively homogeneous group of otherwise healthy patients without any confusion regarding their diagnosis. In other words, all healthcare workers, nurses, consultants and residents are able to recognise these patients so that no mistakes are made while referring patients to the nurse-led clinic. Given these results in a relatively stable otherwise healthy patient population, further expansion of this experience may lead to improved clinical care for other cardiac patients. Indeed, initial experience with nurse-led thrombolysis in patients with an acute myocardial infarction and nurse-led heart failure clinics are reported [15, 16]. All evaluated programs indeed show a comparable clinical outcome with a greater patient satisfaction.

How to implement a nurse practitioner program in a community hospital

Initially, the nurse practitioner needs to get involved in protocol development. This should be tailored to the well-described patient group the nurse practitioner will be taking care of. This selection process is of imminent importance whereby the patient group should be clearly recognised by all involved professionals as belonging to the competence of the nurse practitioner. Subsequently, the introduction of the nurse practitioner care program will start on the cardiology ward, including participation in the clinical rounds and appraisal of the experiences with the protocols. Ultimately, the nurse practitioner will learn to do the medical rounds by

herself, a process that should be closely supervised by one or two dedicated cardiologists. The nurse practitioner learns to take notes, perform physical examinations, ask for specific (functional) tests and how to interpret the results in order to adjust the medical management if needed. The third phase is characterised by autonomy whereby the nurse practitioner indeed takes care of the clinical patients and will consistently evaluate the new care program and adjust it if needed. In the fourth phase, the nurse practitioner may implement the care for the outpatients clinic. Specific protocols need to be developed and the nurse practitioner will be instructed on how to perform these outpatient controls. When qualified, she will perform the first outpatient visit after discharge under the supervision of the cardiologist. This will conclude the introduction of a new concept of care for post-surgery or post-ACS patients (Fig. 2).

Conclusion

This observational study confirms that a nurse-led postoperative care unit and post-ACS care unit is feasible and effective for the treatment of patients returning from cardiac surgery or transferred after uncomplicated ACS to a general cardiology ward.

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