Can Nursing Information System increase providers’ adherence to the Guideline of AMI risk factor Management?: A Retrospective Study

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Abstract
Background: Risk management for acute myocardial infarction (AMI) patients is suboptimal even the clinical guidelines force nurses to manage patients at high risk. The effect of a nursing information system used to support nurses implement risk management is understudied.

Objective: To evaluate nursing care provider adherence to the guideline of risk management on AMI patients which nursing process was assisted by a nursing information system.

Methods: The risk factors of AMI patients care data were obtained from retrospective review of patient records that received nursing care assisted by the NIS during hospitalized period from January 2006 to December 2007.

Results: The guideline adherence rates of assessment with education intervention for all AMI risk factor as follows: (1) hyperlipidemia 73.7% (81.2%); (2) hypertension 60.1% (60.1%); (3) diabetes 85.12%(37%); (4) physical activity 87% (92.6%); (5) obesity 90.2% (90.4) (6)smoke 90.4% (49%).

Conclusion: There are some practical benefits for care provider to use the NIS in clinical settings. However, a small substantial potential to improve nursing workflow and system design is needed to increase guideline compliance on risk factor management. Those patient education and risk factors are essential components to achieve a personalized and patient-center care goal.

Keywords: guideline adherence, nursing information system, acute myocardial infarction

Introduction
Acute myocardial infarction (AMI), a kind of coronary heart disease, is one of those noncommunicable, preventable, curable, and life-style adjustable diseases. The etiology of AMI is multi-factorial within modifiable risk factors which could be managed by prevention strategies[1]. Hence, cardiac risk factor modifications are the primary goal of prevention/cardiac rehabilitation programs among high risk group[2]. Risk management includes the action of assessment and education on those risk factors in term of cigarette smoking, a diet rich in saturated fats, physical inactivity, hypercholesterolemia, hypertension, and obesity. Control of cardiac risk factors is known to be suboptimal even it can effectively reduce cardiac event and prompt health[3-5]. Mostly, patient with AMI may not aware or low conception about their risk factor and disease progress. Furthermore, AMI patients are neglected to warn of managing risk factors and receive insufficient risk management. Healthcare providers may pay more attention on treating patient acute condition than controlling their risk factors[4].

Nurses are one of the most important roles which are responsible for patient education, but their performance on managing AMI risk factors has not yet fully studied. The guideline adherence of care providers in AMI patient risk factors assessment is low that performance range 14% to 23% from Scholte op Reimer et al.[3] study. Risk reduction program lead by nurses may be one of the most effect methods to improve cardiovascular disease management[5, 6]. There are a lot of established clinical guidelines and evidence also force nurses to manage patients at high risk[2]. However, the management goal is not achieved. Partial reasons maybe from a lot of barriers including staff shortage, lack of knowledge and complex mechanism of disease management. A study of reviewed medical record reported that risk factor recorded incomplete and suggested to develop strategies to over barriers of risk management[4]. Traditional methods may be an effective way to enhance patient motivation and their awareness. However, it is difficult to implement in routine workflow in acute care units when the care condition is time limited and staff shortages. The embarrassing condition not only found in cardiac care units but also in other disease care setting.

Studies of healthcare provider using information system and technology to provide ongoing care for patient have significant improvement in clinical workflow, disease management, patient outcome and communication with patient[7-10]. The nursing information system (NIS) is extensively used within healthcare settings to support nursing process. The benefit of risk management from a NIS is still understudied[11].

This paper focus on the guideline adherence AMI risk management for nurses to implement risk management under a nursing information system assisted.

Methods
NIS system
The NIS system is implemented in some medical centers in Taiwan that can assist nurses to complete nursing process. Figure 1 present the feature of NIS. The feature contained admission and discharge nursing
record, care plan, care quality monitoring and nursing administration. The system was developed with standard nursing language NANDA and linked to Gorden’s 11 functional health patterns. Physical examination function was built in this system to reminder nurses systematic check patients’ health status. Nurses use this system to assess patient personal disease history with risk factors, select nursing diagnosis from a set of cardiac nursing diagnosis, make individual care plans, provide patient educations, and evaluate care outcome. The nursing process is recorded in nursing documents through NIS system and stored in electronic patient record.

Data collection
Based on the national coronary guidelines, the variable of risk factors consisted of six: hyperlipidemia, hypertension, diabetes, physical activity, obesity, and smoke. The data was obtained from nursing documents of AMI patients’ records and was scrutinized through retrospective review from Jan 2006 to Dec 2007.

Results
The sample was consisted of 307 hospitalized AMI patients, among which 78.2% were male. Their age ranged from 19 to 99 years with a mean age of 64.6 (S.D.=13.5). The guideline adherence rates of assessment for all AMI risk factor were various but overall were greater than 70% (Table 1). The highest rate of guideline adherence was obesity risk factor assessment compared other factors (n=288, 93.8%). All other risk factors were as follows: (1) smoke 90.3%; (2) physical activity 86.7%; (3) diabetes 85.1%; (4) hypertension 85.1%; (5) hyperlipidemia 73.7%.

The guideline adherence rates of patient education were presented (Table 2). Among these patient educations list, physical activity obtained highest adherence rate (92.8%); others are hyperlipidemia 90.2%, obesity 69.1%, hypertension 59.9%, smoke 48.9%, and diabetes 36.8%. Physical activity obtained 80% up performance on assessment and patient education (Fig. 2).

Discussion
Overall, the adherence of risk management have been explored and the results shown moderate to high level performance. This study show the guideline adherence of nurses in AMI patient risk factors under NIS system support is more intensive than that in the Scholte op Reimer et al.[3] study (which found 14% to 23% proportion of patient informed by nurses). Compared with patient education, guideline adherence of risk factor assessment has better outcome. Among those risk factors management, physical activity has highest level performance.

Patient educations need to be improved to achieve the ideal goal of behavior modification. Development strategies to overcome management barriers need to incorporate into routine nursing workflow and not increase overburden on healthcare providers[11]. Reminder function such a lightweight tool may able to enhance care provider follow guideline and increase the completeness.

Limitation
Although this study examined how NIS system help nurse to manage AMI related risk factors, here we focused on nursing guideline adherence not on patients

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Fig. 1. Screen shot of NIS feature

Fig. 2. Difference between assessment and educate
lifestyle change. The effect of patient education has been proven in other study that blood pressure, cholesterol and number of smoker had decreased[3]. The NIS system has direct or indirect effect on risk management can not be verified due to lack of non-NIS system user group. Retrospective study is one limitation of this study because lack of control group to demonstrate the difference without NIS system environments. Finally, other factors such as nursing staff and patient factors need to be considered in further studies. In future, it is possible that to explore how NIS does work to improve nursing workflow for all disease risk management.

**Conclusion**

Nursing information systems is a type of health care management system which has different features and benefits. It will be smarter to help nurses decision making and acquire knowledge within a health care environment.

**Acknowledgments**

This work was partially supported by a grant from the Chang-Gung Memorial Hospital (CMRPG370202).

**References**


