Factors Predicting Hospital Readmission among Thais with Post Myocardial Infarction [version 1; peer review: 1 approved with reservations]

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Abstract

\textbf{Background:} Readmission after an acute myocardial infarction is not only common and costly but can also impact patients’ quality of life and mortality. This retrospective observational study was conducted to determine the impact of sociodemographic variables, clinical variables, and hospital readmission among post-myocardial infarction patients in Thailand. Few, if any, previous studies have investigated the factors predicting readmission rates over variable time periods. We aimed to provide such information to prevent readmission in the future.

\textbf{Methods:} Between October 1, 2014, to September 30, 2018 a total of 376 post-myocardial infarction patients of Roi-Et hospital were recruited for this study. The criteria of data collection concerned the rate of readmission, gender, comorbidities, anaemia, chronic kidney disease, complication, smoking, and type of myocardial infarction. A measurement period was seven-day, 30-day, six-month, and one-year of readmission. Data were analyzed using percentage, mean, standard deviation, and logistic regression analysis.

\textbf{Results:} The highest readmission rate at six-month, 30-day, seven-day, and one-year was 52.2%, 30.4%, 10.6%, and 6.8%, respectively. None of the predictors were significant for seven-day and one-year of readmissions. Meanwhile, hypertension comorbidity and anaemia were identified as the significant predictors for early 30-day readmission whereas atrial fibrillation complication, chronic kidney disease, and smoking were the significant predictors for late six-month readmission.

\textbf{Conclusions:} Multiple factors including HT comorbidity, anaemia, atrial fibrillation, chronic kidney disease, and smoking predict readmission among Thais with post myocardial infarction. This study...
demonstrated that rates and predictors of readmissions in short-term and long-term periods are different. Therefore, various screening tools and interventions are required.

**Keywords**
Readmission, Risk factor, Myocardial infarction

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Introduction
Acute myocardial infarction (AMI) has become a significant health problem with high morbidity and mortality rates. Despite dramatic improvement in outcomes with medical therapy, admission rates following AMI hospitalization remain high. Previous studies have found that early readmission rates within seven-day of post-AMI discharge ranged from 4.8% to 11%, while late readmissions rate of 30-day, six-month, and one-year readmissions ranged from 11% to 14%, 20.4% to 33.8%, and 21.3% to 49.9%, respectively. The highest incidences of readmissions not only increase healthcare costs by 60%, but also expose patients to long-term hospitalisation-associated complications. Readmissions for AMI are typically preceded by a recurrent AMI and related cardiovascular conditions in which are often assumed to indicate incomplete treatment in hospital, poor coordination of services or communication of discharge plans, or lack of healthcare access in early follow-up care. As a consequence, readmission is of high interest, and considered as a quality indicator for hospital care.

In order to reduce readmission rates in patients with AMI, the predictions on patients who are likely to be readmitted and the intervention should be taken into account. Nevertheless, due to inconsistency of risk-predictive models, and the performance of these models, the problem of readmission rate continues. Most existing models were developed in different settings and periods, thus may not be appropriate to be applied in other contexts. Previous studies have identified that clinical and laboratory parameters, including atrial fibrillation, severity of AMI, and hypertension, confer a higher risk for an early period of cardiovascular admission, whereas smoking and the burden of comorbid non-cardiac illness, including chronic kidney disease, diabetes mellitus, hypertension, anaemia, and pulmonary disease, raises the risk for AMI-related complications in late readmission. These factors may potentially modify the target for future interventions.

In Thailand, it is suggested that readmissions have negative impacts on both hospitals and patients. Also, it is a huge economic burden to the nation. A prior study in a Thai hospital revealed that the unplanned readmission rate at one year after hospital discharge was 13.5% and 7.8% in the group of patients with unstable angina and non-ST elevation MI (NSTEMI), respectively. Most patients had angina at presentation, with unstable angina and non-ST elevation MI (NSTEMI), designated time period, 161 were readmitted for MI and 215 were not readmitted (Figure 1).

For this study, a readmission was defined as the first admission to Roi- Et hospital within seven-day, 30-day, six-month, and one-year of being discharge. A readmission was only counted once as a readmission, relative to the prior index admission. All subsequent admissions then re-entered the cohort as a new index admission. All elective readmissions were excluded from the data set.

Patient and public involvement
This research did not involve any patients or public since its procedures included only retrospective data collection.

Potential predictors
Considered variables were retrieved from literature reviews and selected from the existing database, as well as some that could be derived. The potential predictors of readmission among patients with AMI were gender, diabetes and hypertension comorbidities, anemia with hematocrit < 33 vol%, stage-3 chronic kidney disease with serum creatinine ≥ 2 mg/dL, atrial fibrillation, smoking, and type of myocardial infarction.

Statistical analysis
Model assumptions and strategy for analysis. In order to measure the significance of the potential variables predicting the dichotomous response variable of readmission among the population in this study, the logistic regression statistic was employed. All variables studied were binary (yes/no response) and the observations were independent. We explored missing data for patterns of missingness and associations between missing and observed data; cases with missing data for
variables of interest were excluded from analyses involving those variables.

In the initial stage of analysis, all study variables were tested in a univariate regression (with a p-value<0.25) aimed at looking for statistically significant factors influencing rehospitalization. After these factors were identified and concluded, a multiple logistic regression procedure was employed by using a stepwise selection method. The IBM SPSS Statistics for Windows, Version 23 (IBM Corp., Armonk, NY, USA) was used to generate indicator variables for the levels of each categorical predictor. Moreover, reference groups were selected for each predictor as well. Then, firstly, all explanatory variables of interest were tested for finding possible interactions. The highest insignificant term of each predictor was eliminated until the significance level of all variables was at 0.05 as required. Parameter estimates and odds ratio probabilities that were not above 0.05 were considered to have statistical significance and were kept in the model. For individual parameter estimates, Wald statistics were applied. Goodness-of-fit and model assumptions, as well as multicollinearity among the predictor variables, linearity of the predictor variables and log odds, Hosmer and Lemeshow goodness-of-fit test, and likelihood ratio tests were examined as well.

Ethics approval and reporting
The study was approved by the Human Research Ethics Committee of the Roi-Et Hospital and Mahasarakham University Institutional Review Board for use of deidentified data from existing hospital database. The need for consent from the participants was waived by the ethics committee due to the retrospective nature of the analysis. This study is reported following Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (S1 Checklist)

Figure 1. Patients' flow diagram.
Results
Characteristics of the populations
The data of the total of 376 MI patients were extracted from a database of myocardial infarction patients. A slight majority of the patients were male (57.4%) and the mean age of all samples was 66.80 ±12.02 years. Most patients were married (81.9%) and had National Health Security support (71.3%). One-third (37.2%) were agriculturalists and a further third (35.4%) were unemployed. The majority of patients had primary school education (73.9%). For treatment types, more than half of the patients (63%) received only medication, whereas one third (30.6%) received percutaneous coronary intervention [PCI], and a small number (6.4%) received coronary artery bypass surgery [[CABG Table 1].

| Data                        | Total (n=376) | Non-Readmission (n=215) | Readmission (n=161) |
|-----------------------------|--------------|-------------------------|---------------------|
|                             | seven-day    | 30-day                  | six-month           | one-year |
| Gender                      |              |                         |                     |
| Males (n[%])                | 216(57.4%)   | 133(61.9%)              | 9(5.6%)             | 23(14.3%) | 44(27.3%) | 7(4.3%) |
| Females (n[%])              | 160(42.6%)   | 82(38.1%)               | 8(4.9%)             | 26(16.2%) | 40(24.9%) | 4(2.5%) |
| Age (mean ±SD)              | 66.5(±11.67) | 66.8(±12.02)            |                     |
| Marital status              |              |                         |                     |
| Single                      | 15(3.9%)     | 5(2.3%)                 | 1(0.6%)             | 5(3.1%)  | 3(1.9%)  | 1(0.6%) |
| Married                     | 308(81.9%)   | 174(80.9%)              | 15(9.3%)            | 39(24.3%) | 70(43.5%) | 10(6.2%) |
| Widowed                     | 50(13.4%)    | 33(15.4%)               | 1(0.6%)             | 5(3.1%)  | 11(6.8%) | 0(0.0%) |
| Divorce                     | 3(0.8%)      | 3(1.4%)                 | 0(0.0%)             | 0(0.0%)  | 0(0.0%)  | 0(0.0%) |
| Education level             |              |                         |                     |
| Primary school              | 278(73.9%)   | 153(71.2%)              | 10(6.2%)            | 39(24.3%) | 69(42.8%) | 7(4.4%) |
| High school                 | 41(10.9%)    | 27(12.5%)               | 1(0.6%)             | 4(2.5%)  | 5(3.1%)  | 4(2.5%) |
| Higher education            | 57(15.2%)    | 35(16.3%)               | 6(3.7%)             | 6(3.7%)  | 10(6.2%) | 0(0.0%) |
| Occupation                  |              |                         |                     |
| Agriculturalists            | 140(37.2 %)  | 91(42.3%)               | 7(4.3%)             | 17(10.6%) | 20(12.5%) | 5(3.1%) |
| Unemployed                  | 133(35.4 %)  | 62(28.8%)               | 6(3.7%)             | 23(14.3%) | 39(24.3%) | 3(1.9%) |
| Government official         | 45(12.0%)    | 24(11.2%)               | 2(1.2%)             | 4(2.5%)  | 13(8.1%) | 2(1.2%) |
| Business                    | 26(6.9 %)    | 18(8.4%)                | 2(1.2%)             | 1(0.6%)  | 5(3.1%)  | 0(0.0%) |
| Employee                    | 21(5.6%)     | 16(7.4%)                | 0(0.0%)             | 2(1.2%)  | 3(1.9%)  | 0(0.0%) |
| State enterprise            | 11(2.9%)     | 4(1.9%)                 | 0(0.0%)             | 2(1.2%)  | 4(2.5%)  | 1(0.6%) |
| Type of healthcare coverage |              |                         |                     |
| Universal Coverage Scheme   | 268(71.3 %)  | 162(75.3 %)             | 14(8.7 %)           | 32(19.9%) | 53(32.9%) | 7(4.3%) |
| Social security             | 9(2.4 %)     | 1(0.5 %)                | 0(0.0 %)            | 2(1.2%)  | 6(3.7 %) | 0(0.0%) |
| Pay for themselves          | 0(0.0 %)     | 0(0.0 %)                | 0(0.0 %)            | 0(0.0 %) | 0(0.0 %) | 0(0.0 %) |
| Government coverage         | 99(26.3 %)   | 52(24.2 %)              | 3(1.9 %)            | 15(9.3 %) | 25(15.6 %) | 4(2.5 %) |
| Health insurance            | 0(0.0 %)     | 0(0.0 %)                | 0(0.0 %)            | 0(0.0 %) | 0(0.0 %) | 0(0.0 %) |
| History of diagnosis        |              |                         |                     |
| STEMI                       | 86(22.9%)    | 57(26.5 %)              | 3(1.9 %)            | 8(4.9 %) | 16(9.9 %) | 2(1.2%) |
| NSTEMI                      | 290(77.1%)   | 158(73.5 %)             | 14(8.7 %)           | 41(25.6 %) | 68(42.2 %) | 9(5.6 %) |
| Treatment                   |              |                         |                     |
| Medication only             | 237(63.0 %)  | 147(68.4 %)             | 11(6.8 %)           | 30(18.6%) | 47(29.2%) | 2(1.2%) |
| PCI                         | 115(30.6 %)  | 63 (29.3%)              | 4(2.5%)             | 14(8.7 %) | 25(15.6 %) | 9(5.6%) |
| Data                      | Total (n=376) | Non-Readmission (n=215) | Readmission (n=161) |
|---------------------------|---------------|-------------------------|-------------------|
| CABG                      | 24 (6.4%)     | 5 (2.3%)                | 2 (1.2%)          |
| DM comorbidity            |               |                         |                   |
| DM                        | 175 (46.5%)   | 98 (45.6%)              | 8 (4.9%)          |
| Non-DM                    | 201 (53.5%)   | 117 (54.4%)             | 9 (5.6%)          |
| HT comorbidity            |               |                         |                   |
| HT                        | 222 (59.0%)   | 176 (81.8%)             | 5 (3.1%)          |
| Non-HT                    | 154 (41.0%)   | 39 (18.2%)              | 12 (7.5%)         |
| AF complication           |               |                         |                   |
| AF                        | 19 (5.1%)     | 6 (2.7%)                | 1 (0.6%)          |
| Non-AF                    | 357 (94.9%)   | 209 (97.3%)             | 16 (9.9%)         |
| Serum creatinine          |               |                         |                   |
| Creatinine ≥2.0           | 67 (17.8%)    | 27 (12.6%)              | 3 (1.9%)          |
| Creatinine <2.0           | 309 (82.2%)   | 188 (87.4%)             | 14 (8.7%)         |
| Smoking                   |               |                         |                   |
| Current smoking           | 47 (12.5%)    | 23 (10.7%)              | 1 (0.6%)          |
| Non smoking               | 329 (87.5%)   | 192 (89.3%)             | 16 (9.9%)         |
| Causes of readmission     |               |                         |                   |
| Heart failure             |               |                         |                   |
| NSTEMI                    | 2 (1.2%)      | 20 (12.5%)              | 25 (15.6%)        |
| Unstable angina           | 11 (6.9%)     | 8 (4.9%)                | 7 (4.4%)          |
| Stroke                    | 0 (0.0%)      | 0 (0.0%)                | 3 (1.9%)          |
| Arrhythmias               | 2 (1.2%)      | 2 (1.2%)                | 0 (0.0%)          |
| STEMI                     | 1 (0.6%)      | 1 (0.6%)                | 2 (1.2%)          |
| UGI bleeding              | 1 (0.6%)      | 1 (0.6%)                | 2 (1.2%)          |
| Depression                | 0 (0.0%)      | 0 (0.0%)                | 0 (0.0%)          |
| Symptomatic of readmission|               |                         |                   |
| Chest pain                | 14 (8.7%)     | 10 (6.2%)               | 31 (19.3%)        |
| Orthopnea                 | 0 (0.0%)      | 19 (11.9%)              | 24 (14.9%)        |
| Chest pain with Orthopnea | 0 (0.0%)      | 15 (9.4%)               | 23 (14.3%)        |
| Dizziness with Nausea     | 0 (0.0%)      | 2 (1.2%)                | 1 (0.6%)          |
| Spastic dysarthria with hemiparesis | 0 (0.0%) | 0 (0.0%) | 3 (1.9%) |
| Palpitation               | 2 (1.2%)      | 2 (1.2%)                | 0 (0.0%)          |
| Dyspepsia                 | 1 (0.6%)      | 1 (0.6%)                | 2 (1.2%)          |

STEMI = ST-elevation myocardial infarction; NSTEMI = Non ST-elevation myocardial infarction;
PCI = Percutaneous coronary intervention; CABG = Coronary Artery Bypass Grafting; DM = Diabetes Mellitus; HT = Hypertension; Hct = Hematocrit; AF = Atrial fibrillation; UGI bleeding = Upper gastrointestinal bleeding.
Description of predictive variables
Nearly half of the patients were female (42.6%). Nearly one-quarter of the patients had a STEMI diagnosis (22.9%). The highest proportion of comorbidity was hypertension comorbidity (59%), followed by diabetes (46.5%). More than half of the patients (30.1%) had anaemia with hematocrit < 33 vol%. About 17.8% of the patients had stage-3 chronic kidney disease with serum creatinine ≥ 2 mg/dL and 5.1% of the patients had atrial fibrillation complication. For risk behaviour, 12.5% of the patients were smokers [Table 1].

Predictors of readmission
The highest readmission rate at six-month, 30-day, seven-day, and one-year was 52.2%, 30.4%, 10.6%, and 6.8%, respectively. The causes of readmission were classified into two categories: (a) cardiovascular causes: cardiac causes including heart failure, non ST-elevation MI, ST-elevation MI, unstable angina, and arrhythmias are vitally important reasons associated with readmission, which accounted for 92.6% of all causes after AMI; (b) non-cardiovascular causes: the non-cardiac caused including stroke, upper gastrointestinal bleeding, and depression led to readmission after AMI, which accounted for 7.4% of all causes after AMI. Chest pain and other cardiovascular reasons were regarded as the principal symptomatic of readmission [Table 1].

Predictors of readmission
From univariate analysis of association between potential predictors and readmissions among all study populations, the results showed that statistically significant factors for readmission among post MI patients were AF complication (OR adj = 4.541, 95% CI = 1.608 to 12.827) and smoking (OR adj = 2.662, 95% CI = 1.326 to 5.344). Thus, they were significant predicting factors of readmission [Table 2].

A logistic model for predictors of readmission according to four time periods (seven-day, 30-day, six-month, and one-year) was carried out. After adjusted analysis, this found that none of the predictors were significant for seven-day and one-year readmissions. Meanwhile, two predictors were found to be significant for 30-day readmission, these were HT comorbidity (OR adj = 2.264; 95% CI = 1.098 to 4.668) and anemia with Hct < 33vol% (OR adj = 2.171; 95% CI = 1.160 to 4.064). For six-month readmission, AF complication, chronic kidney disease with serum creatinine ≥ 2 mg/dL, and smoking were the significant predictors (OR adj = 3.494; 95% CI = 1.315 to 9.284; OR adj = 2.026; 95% CI = 1.103 to 3.722; OR adj = 2.849; 95% CI = 1.366 to 5.944, respectively) [Table 3].

Discussion
The results of this study highlight the predictors of readmissions in early (seven-day) and late (30-day, six-month, and one-year) periods following hospital discharge in Thai healthcare settings. As with previous studies, we found that comorbidities, health, and illness were associated with readmission. For 30-day readmission, a significant finding is that HT comorbidity was identified as the significant predictor. This finding is congruent with previous study, revealing that HT is highly prevalent in Thailand. One out of four of Thai people had HT but less than one out of three had their blood pressure under control17.

| Characteristics                      | Non-readmission (N=215) | Readmission (N=161) | OR | 95%CI          | p-value |
|--------------------------------------|-------------------------|---------------------|----|----------------|---------|
| Females                              | 82                      | 78                  | 1.412 | .868-2.297 | .165    |
| Males                                | 133                     | 83                  | 1   |                |         |
| STEMI                                | 57                      | 29                  | .760 | .433-1.334 | .339    |
| NSTEMI                               | 158                     | 132                 | 1   |                |         |
| DM comorbidity                       | 85                      | 90                  | 1.622 | 1.008-2.609 | .46     |
| Non-DM comorbidity                  | 130                     | 71                  | 1   |                |         |
| HT comorbidity                       | 109                     | 113                 | 1.682 | 1.027-2.754 | .39     |
| Non-HT comorbidity                  | 106                     | 48                  | 1   |                |         |
| AF complication                      | 6                       | 13                  | 4.541 | 1.608-12.827 | .004    |
| Non-AF                               | 209                     | 148                 | 1   |                |         |
| Hct < 33vol%                         | 52                      | 61                  | 1.309 | .769-2.228 | .322    |
| Hct ≥ 33vol%                         | 163                     | 100                 | 1   |                |         |
| Creatinine ≥ 2 mg/dL                | 27                      | 40                  | 1.732 | .945-3.177 | .076    |
| Creatinine < 2 mg/dL                | 188                     | 121                 | 1   |                |         |
| Smoking                              | 23                      | 24                  | 2.662 | 1.326-5.344 | .006    |
| Non-smoking                          | 192                     | 137                 | 1   |                |         |
with the expanded use of antihypertensive medications. The HT is a well-known cardiovascular risk factor associated with increased cardiovascular events\textsuperscript{18}. An empirical study supports that 84.4\% of readmitted MI patients had additional hypertension comorbidity\textsuperscript{19}. Furthermore, we also found that another significant predictor for 30-day readmission was anaemia with hematocrit < 33 vol\%. Patients who were malnourished with anaemia during the index of hospitalisation had a high risk of being readmitted. Several studies revealed that malnutrition is associated with adverse health outcomes for patients and leads to increased healthcare costs\textsuperscript{20,21}. A recent study\textsuperscript{2} also supported the hypothesis that malnutrition status is a strong predictor of rehospitalisation.

For six-month readmission, we also found that atrial fibrillation (AF) was a predictor that is widely known as a common complication of AMI and contributes to high rates of in-hospital adverse events\textsuperscript{22}. The overall incidence of AF complicating AMI was 10.8\%. Patients developing new-onset AF following AMI were at higher risk for in-hospital stroke\textsuperscript{22}. In this study, there was a new-onset AF following AMI in up to 5 cases. In addition, we also found that patients who had chronic kidney disease with creatinine serum level $\geq$ 2 mg/dL admission were likely to have late readmissions at six-month after discharge. The relevant finding is that the mildly elevated admission serum creatinine markedly increased one year mortality in patients with AMI\textsuperscript{23}.

A significant and interesting finding of this study is that smoking predicts six-month readmission after hospital discharge. This study validates the findings of a previous study which found that smoking increases the risk of readmissions among CAD patients across all specialties. The relevant finding showed that only 33.2\% of the patients underwent smoking cessation counseling during hospital admission, which highlights that a significant proportion of patients missed smoking cessation counseling. Studies indicated that smoking cessation intervention has a beneficial effect in improving clinical outcomes and preventing complications and readmission. Tan and et al.\textsuperscript{24} conducted a meta-analysis involving 1,607 patients and found that readmission rate was significantly reduced in patients who received smoking cessation counseling, and that the prolonged abstinence rate of the gradual cessation was significantly lower than that of the abrupt cessation (relative risk, RR=0.77). However, intervention effects of smoking cessation were not significant at long term follow-up\textsuperscript{25} and need to further examination, especially in primary care setting\textsuperscript{26}. Therefore, this is a window of opportunity to target smoking cessation among hospitalised patients and continue the intervention in patients after discharge to help reduce readmissions.

In conclusion, multiple factors including HT comorbidity, anaemia, atrial fibrillation, chronic kidney disease, and smoking predict readmission among Thais with post myocardial infarction. Moreover, this study demonstrates that rates and predictors of readmissions in short-term and long-term periods are different. Therefore, various screening tools and interventions are required.

**Limitations**

The results of this study were interpreted in the context of the existing data using medical record reviews. Information about other important factors such as social support, functional status, and psychiatric illnesses, which is considered critically important and may lead to adverse events after discharge, was not discussed. Lastly, the data in this study was gathered from only one hospital, which could limit generalisability. For further research, the inclusion of larger sample sizes, investigation of causality for selected predictors, and different hospitals’ readmission data are suggested in order to produce more robust and clinically meaningful outcomes.

### Table 3. Multivariate logistic model of association between potential predictors and 30-day and 6-month (n=376).

| Data             | Readmission 30-day | Readmission six-month |
|------------------|--------------------|-----------------------|
|                  | OR     | 95\%CI | p-value | OR     | 95\%CI | p-value |
| HT               | 2.264  | 1.098-4.668 | .027    |         |         |         |
| Non-HT           | 1      |         |         |         |         |         |
| AF               | 3.494  | 1.315-9.284 | .012    |         |         |         |
| Non-AF           | 1      |         |         |         |         |         |
| Hct <33vol\%     | 2.171  | 1.160-4.064 | .015    |         |         |         |
| Hct $\geq$33vol\% | 1    |         |         |         |         |         |
| Cr $\geq$2 mg/dL | 2.026  | 1.103-3.722 | .023    |         |         |         |
| Cr $<2$ mg/dL    | 1      |         |         |         |         |         |
| Smoking          | 2.849  | 1.366-5.944 | .005    |         |         |         |
| Non smoking      | 1      |         |         |         |         |         |
Conclusions

This study developed potential factors to identify seven-day, 30-day, six-month, and one-year readmissions in Roi-Et hospital. Among patients discharged, multiple factors predicting readmission in short-term and long-term periods are different. Therefore, various screening tools and appropriate preventive interventions are required.

Data availability

Underlying data

Figshare: Dataset factors predicting hospital readmission. https://doi.org/10.6084/m9.figshare.14406596.v4

• Dataset characteristic of subjects.xlsx. (All underlying data gathered in this study.)

Extended data

Figshare: Data Dictionary. https://doi.org/10.6084/m9.figshare.14406995.v3

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This project contains the following data:

• Data Dictionary Factors Predicting Readmission.docx

Reporting guidelines

Figshare: S1 STROBE Checklist. https://doi.org/10.6084/m9.figshare.14573532.v1

This project contains the following reporting checklist:

• S1 STROBE Checklist.pdf

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Page 9 of 13
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I think this paper is good and is an important addition to the literature.

Abstract

1. The abstract is not clear about comorbidity and kidney disease.

2. Please change the aim of the study to match the study design. It does not match with the aim stated in the Introduction.

Introduction

1. Need references for the two sentences at the beginning of the first paragraph.

2. The authors should conduct a comprehensive literature review related to readmission in this group to fulfill the gap of knowledge.

3. For this study, the authors collected data from just only one province in the north-eastern part of Thailand and used secondary sources. Thailand has 77 provinces. I suggest the title of the study should be: “Factors Predicting Hospital Readmission among Post Myocardial Infarction: A retrospective study.”

4. Please restate the gap of knowledge.

5. Factors were selected, based on literature reviews, please clarify comorbidity and kidney disease. Why did the authors separate kidney disease from comorbidity? To the best of my knowledge, comorbidity refers to the presence of additional conditions co-occurring with acute myocardial infarction which means kidney disease is comorbidity.

6. Please use MI or post-AMI or AMI consistently - which one is correct.
Method
1. In Ethics approval and reporting, do you need to add an approval number? If yes, please add the approval number.

2. In Patient and public involvement, if the authors add the process to retrieve data after approval from the ethics committees, it will be better and clearer for data collection.

Results
1. Please check the results in Characteristics of the populations. “National Health Security support” does not appear in Table 1. Symptomatic of readmission does not appear in Table 1. It will be better if the authors report each datum such as nearly one-third of the causes of readmission at six-month (27.9%) is heart failure.

2. In Predictors of readmission, the authors stated that “the causes of readmission were classified into two categories”, so when reporting in Table 1 it should be divided into two categories too.

3. Please check the results in a table and those described in the Results section are the same thing.

Discussion
1. Please revise the Discussion into four sections: seven-day, 30-day, 6-month, and one-year. Then describe the strongest predictor readmission in each period of time, seven-day, 30-day, 6-month, and one-year, with rationale, and if the result is consistent with previous studies or contrasts with previous studies.

Conclusion
1. This part is the same as the last paragraph of the Discussion. Please revise.

2. The conclusion should report the result of the strongest predictor readmission on seven-day, 30-day, 6-month, and one-year.

3. The authors conclude that various screening tools and appropriate preventive interventions are required. What is a screening tool? Can the authors give an example? What is the kind of intervention? The answer to this question should be based on the results.

Is the work clearly and accurately presented and does it cite the current literature?
Partly

Is the study design appropriate and is the work technically sound?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes
Are all the source data underlying the results available to ensure full reproducibility?
Partly

Are the conclusions drawn adequately supported by the results?
Partly

**Competing Interests:** No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

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