Validity of acute myocardial infarction inpatient process measures on the report card in Taiwan

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Objectives: To investigate the validity of acute myocardial infarction (AMI) process measures on the public report card in Taiwan. If the quality measure of report card is highly valid, then it can enhance confidence over the use of report cards by citizens, and physicians would be more willing to make improvements based on the results of performance. **Methods:** The study analyzes the associations between the 5 process measures reported and the negative outcome measures from 2011 to 2012. Subjects were selected from the National Health Insurance Association (NHIA) admission files and had a principal diagnosis of acute AMI (ICD-9-CM 410) during the study period. The main outcome measures include return to the emergency department (ED) within 3 days, unscheduled readmission within 14 days, and 30-day mortality at the patient and hospital levels. **Results:** Four process measures are all negatively associated with the outcomes at hospital level, except for the LDL examination. **Conclusions:** Regarding the requirement for validity transparency of a report card, our research suggests that these process measures currently used on the AMI report card in Taiwan are valid based on their associations with negative outcomes. In other words, a hospital that achieves high scores on process measures probably also realizes better outcome quality. (*Taiwan J Public Health*. *2019;**38**(**3**):289-300*)

Key Words: AMI, public disclosure, mortality, readmission, patient and hospital levels

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INTRODUCTIONS

A public report card is a quality improvement tool that is used to increase transparency and accountability in health care [1]. Recent report card guidelines require that the report card should not only contain valid measures, but also disclose the results clearly and transparently, e.g., how to verify the results of validity [2,3]. The validity is usually demonstrated by the associations between the process and outcome measures. The validity of public report card measures is an important issue because those measures can help patients to reliably distinguish between the best and the worst hospitals [4]. Moreover, when invalid process measures are adopted by the report card system (i.e., they are poorly linked with patient outcomes) [5], it is unfair to those hospitals ranked at the bottom of the list by these misleading measures, as it would result in reduced support from the users (e.g., providers), which may further lead to backlash against the report card policy and hinder progress towards improved quality [6].

Most research studies focus on the association between AMI process measures and mortality [7-11], while few studies pay attention to other health outcomes (e.g., unplanned readmissions or return to the emergency room), especially for research conducted in Taiwan. In fact, mortality is not the only indicator of care quality that should be the golden standard of validity. Some studies have demonstrated that rather than mortality, other measures such as readmission rate could also be a good quality indicator [12]. Moreover, other AMI quality improvement studies have given hints that improvement can be achieved in terms of mortality and not readmission, and thus, the improvement in the mortality rate does not mean the improvement also happens to the readmission rate, because the correlation between the two is only moderate [13,14]. Hence, using mortality as a single golden standard is not sufficient [15,16]. Thus, we should also investigate the validity of process measures with other useful health outcomes.

In this study, we aim to investigate the validity of AMI report cards in Taiwan in terms of multiple outcomes: return to the emergency department within 3 days, unscheduled readmission within 14 days, and 30-day mortality at both the patient and hospital levels.

MATERIALS AND METHODS

Our data are derived from the National Health Insurance Administration (NHIA)'s special-requested database released by the Taiwan National Health Research Institute (NHRI) and contain information collected from the regular NHIA claims data for the period between January 2011 and December 2012. The database contains CD, OO, DD, DO, ID, and HOSP datasheets. Subjects were selected from the NHIA admission files as having a principal diagnosis of acute AMI (ICD-9-CM 410) during the study period. Subjects were excluded if their diagnostic codes were 410.70, 410.71, or 410.72, because of non-STEMI diagnosis according to the case definition of a report card [17]. Finally, the sample size was reduced to 16,439 patients distributed among 244 hospitals (see the details in Figure 1).

The AMI report card in Taiwan has 19 publicly disclosed measures, including 17 process measures and 2 outcome measures [17]. Five of the process measures are related to inpatient care, and 12 of them are related to discharge. In this study, we only account for inpatient process measures, because most studies only adopt medications prescribed for less than 6 months [18], and medications must be given to patients before any negative outcome (i.e., return to ED) has occurred (if any). These measures include low-density lipoprotein (LDL) check rate, aspirin prescribed during the admission, clopidogrel prescribed during the admission, beta-blockers prescribed during the admission, and ACE inhibitor or ARB prescribed during the admission. For those process measures, under a real situation, most of them need to occur within 24 hours of patient admission [17]. All the detailed definitions of AMI inpatient process measures in our study used by a report card in Taiwan can be seen in Online Appendix (http://bit.ly/2XZjB6f). Two outcome measures reported by a Taiwanese report card were adopted as golden standards herein: rate of return to ED within 3 days and unscheduled readmission rate within 14 days. These two outcomes were not reported as risk-adjusted

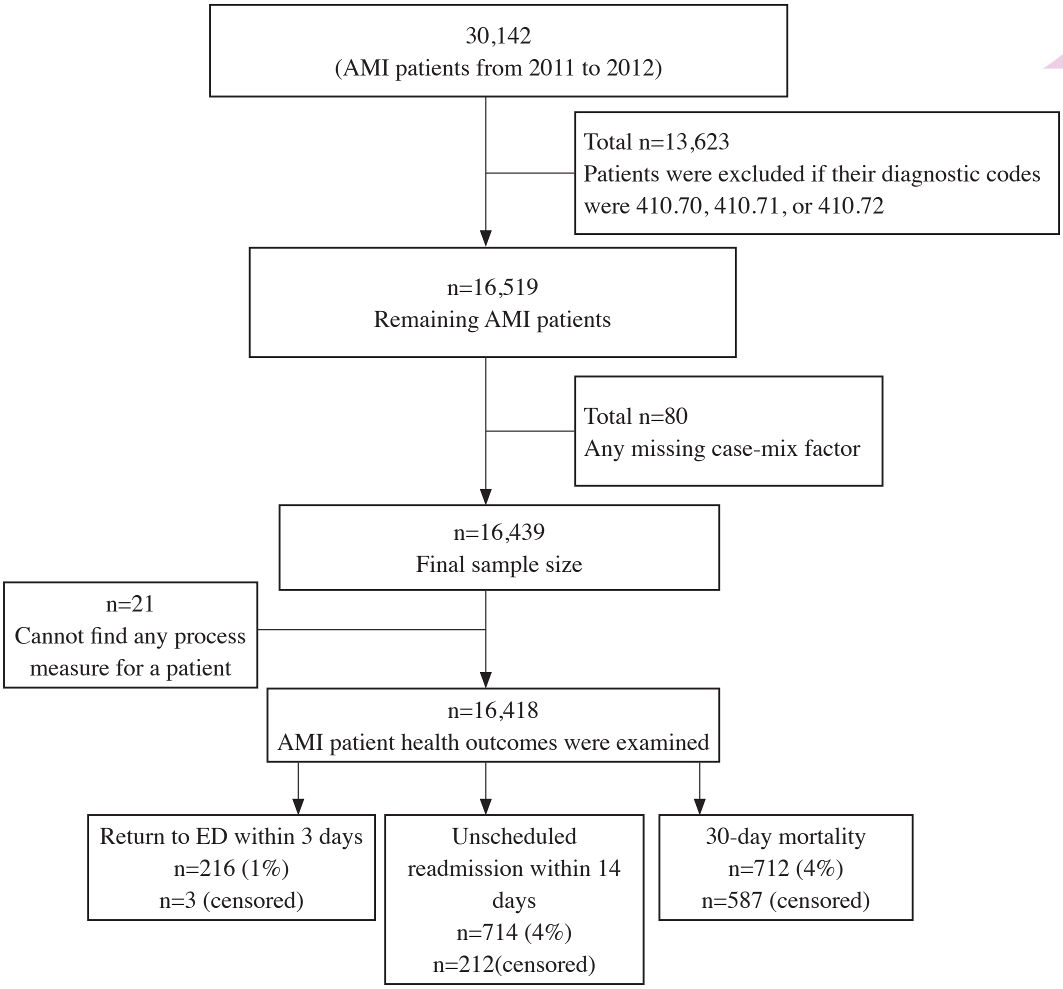

Figure 1. Flow chart for subject selection

rates on the report card website. We also include the 30-day mortality rate as the third golden standard; this parameter is not currently a reported outcome measure for AMI. However, we found it to be an important outcome to examine when assessing hospital care quality by many studies [7-11]. This research studied these patient health outcomes in terms of their progress in developing the events, such as return to ED within 3 days and unscheduled readmission within 14 days, as well as 30-day mortality after follow-up from the index date every year during the period. If an AMI case was not performed with any aforementioned drug or examination (process measures) on the index date, then we overlooked this observation (see the details in Figure 1). If an AMI case occurs in December 2012 and we do not have sufficient data provided while following up on the whole period that the outcome measures require (i.e. 30-day period for mortality), then we censor this observation at the end of 2012.

These three measures are calculated as risk-adjusted outcome rates, which are observed /expected * population average. The risk adjustors are patient level factors listed in the following paragraph. In addition, to avoid small sample-sizes that result in a lower or higher rate of measures [19], we exclude hospitals that treated fewer than 10 cases per year during 2011 and 2012.

These outcomes were adjusted for case-mix factors, including age, gender, income (premium as a proxy, US$1 = NT$30), Elixhauser Comorbidity Measures [20], and the degree of urbanization of living area. The Elixhauser Comorbidity Measures have been found to be statistically slightly superior to the Charlson index in adjusting for comorbidity and are more suitable as comorbidity adjustors for AMI patients [21]. For the degree of urbanization, we stratify the living districts of patients into 7 urbanization categories according to the standard published by NHRI [22].

We investigate the association of each single process measure with three risk-adjusted outcomes at the patient and hospital levels. These single measures at the patient level are tested in a separate logistic regression model with stepwise selection. The single measures at the hospital level are then tested in a separate linear regression model.

We use a significance level of 0.05 for a two-sided test, and SAS (SAS Institute, Cary, NC) version 9.4 was used to assess the fit of the model. This study received ethics approval from the Institutional Review Board, Fu Jen Catholic University.

RESULTS

There are 16,439 AMI cases included in the analysis (see Table 1). Among those cases, more than three-quarters are male patients (77%), more than half live in an above medium-level urbanization area (55%), and approximately half have hypertension (48%). These AMI patients have an average age of 65 and annual income of US$10,632.

As shown in Table 2, for the 16,439 AMI patients, the rates (at the patient level) above the absolute performance level of 80% include aspirin prescribed at admission (89%) and clopidogrel prescribed at admission (88%). In addition, the rates for the three outcome measures are all below 5%, including return to ED within 3 days (1%), unscheduled readmission within 14 days (4%), and 30-day mortality (4%). The top 2 mean percentages (at the hospital level) for the process measures are similar to those at the patient level: aspirin prescribed at admission (83%, IQR: 82-93) and clopidogrel prescribed at admission (77%, IQR: 73-92). The rates for the three risk-adjusted (RA) outcome measures at the hospital level are also lower than the unadjusted outcome measures in the following: RA-return to ED within 3 days (2%, IQR: 0-3), RA-unscheduled readmission within 14 days (7%, IQR: 2-8), and RA 30-day mortality (5%, IQR: 1-7).

The results of hospital-level analysis

In Table 3, most of the single process measures are associated negatively with the outcomes of mortality, the return to ED within 3 days and unscheduled readmission within 14 days at hospital level, except for the LDL check. For example, the negative associations with mortality are -0.02 ([-0.05, 0.001], $p=0.05$) for LDL check, -0.04 ([-0.08,0.002], $p=0.04$) for aspirin prescribed at admission, -0.06 ([-0.08,-0.03], $p < 0.001$) for clopidogrel prescribed at admission, -0.07 ([-0.11,-0.04], $p < 0.001$) for beta-blockers prescribed at admission, and -0.05 ([-0.08,-0.01], $p = 0.006$) for ACE or ARB prescribed at admission.

The results of patient-level analysis

In Table 4, all single process measures at the patient level are associated with lower 30-

Table 1. Characteristics of study subjects (n=16,439)

Characteristics	N (%)	Characteristics	N (%)
Age (Mean, SD)	65 (15)	Diabetes, Uncomplicated	
Gender		No	12,339 (75)
Female	3,810 (23)	Diabetes, Complicated	
Income[&] (US$: Mean, SD)	886 (791)	No	14,494 (88)
Urbanization in living area		Hypothyroidism	
High-level	4,032 (25)	No	16,312 (99)
Medium-level	4,986 (30)	Renal failure	
Emerging	2,824 (17)	No	14,908 (91)
General	2,607 (16)	Liver disease	
Aged	419 (2)	No	15,615 (95)
Agriculture	813 (5)	Peptic ulcer disease excluding bleeding	
Remote	758 (5)	No	15,098 (92)
Congestive heart failure		Metastatic cancer	
No	16,345 (99)	No	16,349 (99)
Cardiac arrhythmia		Solid tumor without metastasis	
No	15,203 (92)	No	15,797 (96)
Valvular disease		Rheumatoid arthritis/collagen	
No	15,869 (97)	No	16,024 (97)
Hypertension Uncomplicated		Flu and electrolyte disorders	
No	8,610 (52)	No	15,802 (96)
Paralysis		Deficiency Anemia	
No	16,260 (99)	No	16,305 (99)
Other neurological disorders		Psychoses	
No	15,986 (97)	No	16,324 (99)
Chronic pulmonary disease		Depression	
No	14,310 (88)	No	16,026 (97)

Note: 1. Some of the percentages for specific diseases are zero, and those figures are omitted in this table.
2. [&]we used the premium category as a proxy.

day mortality. For example, the odds ratio for LDL check are 0.74 ([0.63, 0.86], p < 0.001), aspirin prescribed at admission 0.80 ([0.65, 0.98], p = 0.03), clopidogrel prescribed at admission 0.78 ([0.64, 0.94], p = 0.01), 0.76 ([0.65, 0.89], p < 0.001) for beta-blockers prescribed at admission, and 0.70 ([0.60, 0.82], p = 0.001) for ACE or ARB prescribed at admission. Different from the result of 30-day mortality, 2 of these single measures are negatively associated with return to ED within 3 days and unscheduled readmission within 14 days at the patient level: LDL check rate and clopidogrel prescribed at admission.

DISCUSSIONS

If the validity information on report card measures must be disclosed in detail, then our study finds that the validities of the 5 AMI process-based measures on a public report card vary by the different outcomes under patient and hospital levels. Depending on different outcomes as golden standards at different levels, the study demonstrates inconsistent validity results. Those process measures are all negatively associated with 30-day mortality; nonetheless, all of these 5 process measures are negatively associated with return to ED or

Table 2. Average scores for the process outcome measures for the patient population at the patient and hospital levels

	Patient level		Hospital level*	
	N	Mean Percentage %	N	Mean Percentage (IQR) %
Process measures				
LDL check	16,418	66	124	58 (39 - 79)
Aspirin prescribed at admission	15,812	89	120	83 (82 - 93)
Clopidogrel prescribed at admission	16,418	88	124	77 (73 - 92)
Beta-blockers prescribed at admission	15,668	59	119	50 (37 - 65)
ACE or ARB prescribed at admission	16,360	63	119	57 (42 - 73)
Outcome measures				
Return to ED within 3 days	16,418	1	124	4 (0 - 5)
RA - return to ED within 3 days			124	2 (0 - 3)
Unscheduled readmission within 14 days	16,418	4	124	9 (2 - 10)
RA - unscheduled readmission within 14 days			124	7 (2 - 8)
30-day mortality	16,418	4	124	7 (3 - 8)
RA-30-day mortality				5 (1 - 7)

Note: *Only the hospitals treating at least 10 patients are included; IQR: interquartile range. RA: risk-adjusted.

Table 3. Correlations between individual measures and risk-adjusted outcomes at the hospital level (parameters)

	30-day mortality			Return to ED within 3 days			Unscheduled readmission within 14 days		
	Parameter (95% CI)	p	R-Squared	Parameter (95% CI)	p	R-Squared	Parameter (95% CI)	p	R-Squared
Process measures									
LDL check rate	-0.02 (-0.05, 0.001)	0.05	0.03	-0.07 (-0.09, -0.05)	<0.001	0.23	-0.11 (-0.16,-0.05)	<0.001	0.11
Aspirin prescribed at admission	-0.04 (-0.08, -0.002)	0.04	0.03	-0.09 (-0.12, -0.06)	<0.001	0.22	-0.12 (-0.20,-0.03)	0.011	0.05
Clopidogrel prescribed at admission	-0.06 (-0.08, -0.03)	<0.001	0.12	-0.07 (-0.09, -0.04)	<0.001	0.17	-0.09 (-0.16,-0.03)	0.004	0.07
Beta-blockers prescribed at admission	-0.07 (-0.11, -0.04)	<0.001	0.14	-0.10 (-0.13, -0.07)	<0.001	0.28	-0.15 (-0.23,-0.07)	<0.001	0.11
ACE or ARB prescribed at admission	-0.05 (-0.08, -0.01)	0.006	0.06	-0.07 (-0.10, -0.04)	<0.001	0.16	-0.12 (-0.19,-0.05)	0.002	0.08

Note: CI: Confidence Interval.

unscheduled readmission at the hospital level, but only 2 of them are valid at the patient level. This demonstrates inconsistent results when using different outcomes at different levels.

We comprehensively compare the validity by different outcomes at different levels, especially for the hospital level, which is important for use in the report card. Some results are new, and some of our results can be verified by different individual studies. Many studies have investigated only the association between process measures and patient

Table 4. Correlations between individual measures and outcomes at the patient level (adjusted ORs)

	30-day mortality			Return to ED within 3 days			Unscheduled readmission within 14 days		
	aOR (95% CI)	p	c-index	aOR (95% CI)	p	c-index	aOR (95% CI)	p	c-index
Process measures									
LDL check rate	0.74 (0.63, 0.86)	<0.001	0.74	0.38 (0.29, 0.50)	<0.001	0.66	0.75 (0.65, 0.88)	<0.001	0.60
Aspirin prescribed at admission	0.80 (0.65, 0.98)	0.03	0.74	1.00 (1.00, 1.00)	0.25	0.62	1.00 (1.00, 1.00)	0.27	0.60
Clopidogrel prescribed at admission	0.78 (0.64, 0.94)	0.01	0.74	0.27 (0.20, 0.36)	<0.001	0.66	0.65 (0.53, 0.79)	<0.001	0.61
Beta-blockers prescribed at admission	0.76 (0.65, 0.89)	<0.001	0.74	1.00 (1.00, 1.00)	0.48	0.62	1.00 (1.00, 1.00)	0.51	0.59
ACE or ARB prescribed at admission	0.70 (0.60, 0.82)	<0.001	0.74	1.00 (1.00, 1.00)	0.85	0.61	1.00 (1.00, 1.00)	0.30	0.59

Note: aOR: adjusted OR means the variables, including age, gender, income, the degree of urbanization in living area, and Elixhauser index, are controlled in the model; CI: Confidence Interval.

outcome at the patient level using multilevel or logistic regression [7,8,23-26]. The first type of patient-level research may explore the association between hospital-level process measures and patient-level patient outcomes using a multilevel model. Most of these studies show insignificant associations with mortality outcomes [23-25]. Parast et al. found that the link between hospital-level process measures and patient-level outcomes usually does not exist [27]. A recent article stated that this kind of result is not sufficient for describing the lack of validity for the measures, because evidence-based individual-level relationships between process-based services and outcomes derived from clinical trials or guidelines cannot be inferred from the relationships found with the aggregated process-based measures; otherwise, the so-called ecological fallacy will result [27]. Hence, in this study we did not adopt this type of multilevel analysis.

The second type of patient-level research focuses on logistic regression analysis of the correlation between patient-level AMI single measures derived from guidelines/clinical trials and patient outcomes. These studies usually present a positive association with mortality outcome [7,8,26]. Regarding the mortality outcome, our research also generates similar results; however, this is not the case for the other two outcomes.

The third type of study only focuses on the association between hospital-level process measures and hospital-level risk-adjusted outcomes [9-11,28,29]. These studies have shown that hospital performance on AMI process measures is negatively associated with risk-adjusted mortality at the hospital level [9-11,28] but not with readmission [10,29]. Our study derives similar results that process measures have negative links with risk-adjusted mortality at the hospital level. However, we find that the process measures have negative links with risk-adjusted unscheduled readmission and add a new finding that the process measures have negative links with return to ED. Compared to previous studies that found the AMI process measures have no significantly negative links with risk-adjusted readmissions, [10,29] the inconsistent results may be due to the fact that readmission may include scheduled and unscheduled returns [30] and may be confounded with different factors [31]. When discussing the association with readmission, we must separate the overall readmissions into scheduled and unscheduled returns so that we can derive the true association between the process measures and readmissions. The other reason is one of the research studies employed a hierarchical model to explore the association, [29] and as with our previous description, applying this kind of model and the association usually presents an insignificant result. Hence, these may be the reasons we derive significantly negative results.

The implication for the report card design is that the AMI process measures of Taiwan's report card probably have good validity, since most of them were associated with those negative outcomes; however, we should use these measures with caution because inconsistent results were found at the patient level and the hospital level. However, fortunately, the report card always demonstrates hospital-level proportions instead of patient-level data, and thus, judging a hospital's quality based only on any or several process-based measures should lead to a correct classification due to a hospital having good scores on those valid hospital-level measures; this may also demonstrate that they potentially are high performers in terms of lower negative outcome rates.

There are some limitations in our study. The first is that we could not use the comprehensive controlled factors to form the risk-adjusted rates, because these data, such as severity, are unavailable in the database. However, we have included patient comorbidities and socioeconomic factors to form the risk-adjusted rates. Second, we only include two-year data to verify the single measures. More long-term data may be used to verify whether the link between the process measures and outcomes still exists and is consistent. Third, some of the rates of measures at the hospital level seem to be lower (i.e., aspirin: 83%, clopidogrel: 77%) than other studies [10]. These differences may be due to the definition of AMI patients and the inclusion of small-sized hospitals (we only excluded hospitals that treated fewer than 10 cases per year). Fourth, the definition of AMI cases comes from the official public report card website, which does not include non-STEMI AMI cases. Hence, the validity results of our study could not be extrapolated to other countries outside of Taiwan if they implement an AMI report card calculated from both STEMI and non-STEMI AMI cases. Fifth, in our study, these outcomes were adjusted for socio-economic factors, including income and the degree of urbanization of living area. Some may argued that patient socioeconomic status also are not appropriate for profiling models because they may "adjust out" "inequities" [32]. However, to account for socio-economic status of patients was still a debate while applying profiling mode [33]. In this study, we considered adjusting social-economic factors that have been mentioned as possible necessity in recent articles, especially for hospital readmission, because it could make the profiling model fairer for physicians/hospitals [34,35] and also to avoid adverse selection of patients with a better socio-economic status [36,37]. Actually, those two aforementioned socio-economic factors were only significant in the return to ED models at patient level, and removing them in the model were still derive the similar level of association between process measures and return to ED (data not shown). Hence, we assumed if we did not include the socioeconomic status into outcome models according to the suggestions from some articles, the conclusions proposed by our study would have minimum chance to be changed. Sixth, our data cover the years 2011 to 2012, and thus perhaps one may consider that old data can cause some research limitations. We do consider that the definitions of the measures or external interventions may jeopardize the conclusions our research has provided. Up until now, the definitions of every process and adverse outcome measures have not been changed; however, the emergency pay-for-performance (P4P) program is a mandatory P4P program that was initiated in May 2012 and targeted for the timely PCI procedure (≤90 minutes) [38]. Although we do not empirically study the increase in the higher rate of timely PCI execution via the implementation of emergency P4P, the possibly rising rate of this procedure may reduce these adverse outcomes and may inflate the associations between them and the process measures. In the future, we need a sufficiently long-term dataset to verify the aforementioned assumption.

Conclusion

On the basis of the requirement for transparency, the validity of report card measures should be transparently demonstrated. If the quality measure of report card is highly valid, then it can enhance confidence over the use of report cards by citizens, and physicians would be more willing to make improvements based on the results of performance. Our research suggests that most of these process measures used by AMI report cards in Taiwan are valid based on the results of associations with those negative outcomes. In other words, a hospital that achieves high scores on process measures probably also realizes better outcome quality.

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台灣AMI品質報告卡住院過程指標的效度驗證

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目標：檢視台灣心肌梗塞品質報告卡過程指標的效度。若報告卡的品質指標具有高效度，則可以增加民眾使用品質報告卡的信心，醫師也較願意根據成效結果做出改善。**方法：**本研究主要分析2011到2012年，5個公開的過程指標與負向結果指標的關係，選取對象為前述期間健保資料庫住院資料有急性心肌梗塞主診斷（ICD-9-CM 410）的病人。主要的結果指標分別為病人和醫院層級的3天內重返急診、14天內非預期性再住院，以及出院30天死亡率。**結果：**除了低密度脂蛋白檢查指標外，4個過程指標皆與醫院層級的結果指標有顯著負相關。**結論：**因應報告卡效度透明化的要求，我們的研究指出，立基於報告卡使用的過程指標與負向結果有相關，現行台灣AMI品質報告卡上的過程指標具有效度。換句話說，在過程指標獲得高分的醫院，可能也具有較佳的結果品質。（台灣衛誌 2019；**38(3)**：289-300）

關鍵詞：心肌梗塞、品質公開、死亡率、再住院率、病人和醫院層級

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評論：醫療品質指標風險校正模型，是否應納入病患社經特性？

本研究經由分析急性心肌梗塞（acute myocardial infarction, AMI）照護中的過程面指標與出院後3日內急診、14日內非計畫性再入院照護結果、30日內死亡率等三個照護結果的相關性，探討AMI過程面指標是否具有效度。本篇研究結果對國內AMI指標的實務應用有重要的參考價值。

本研究探討的研究問題之一、AMI出院後的非計畫性再入院率與照護過程的品質的關係，在國外亦是備受重視的議題。對於再入院率與過程面品質之間相關性的討論由來已久[1-4]，國內陳楚杰等人的研究亦曾探討將再入院率納入品質報告卡的可行性[5]。近年此議題再次受到醫療界的關注，除了是因為美國Centers for Medicare and Medicaid Services（CMS）的Hospital Readmission Reduction Program（HRRP）將再入院率作為核扣住院給付的標準，CMS在醫療品質公開及「以價值為基礎」(value-based)的醫療支付制度改革中[6,7]，非計畫性再入院率都是重要的監測項目，而且進一步擴展到對出院後重返急診的監測。

本研究特色之一是使用風險校正後（risk adjusted）的照護結果來分析與過程面指標的相關性。本研究雖然在照護結果的定義是採用健保署「全民健康保險醫療品質資訊公開網」中的定義，但是該品質資訊公開網站上的結果面指標並未經風險校正，也限制了民眾用該類指標進行跨醫療機構比較的適當性[8]。本研究雖有進行結果面指標的風險校正，但校正模型中的風險因子，與國外品質報告卡中選用的風險因子有相當的差異。除了肇因於研究資料自身的差異，另外一個重要的差異是本研究將收入、都市化程度等社經變項納入校正模型中。

是否在品質報告卡或論質計酬支付制度中，納入對社經地位的校正，在相關領域一直頗受爭議[9]。實務上，目前多數的品質報告卡多未校正社經地位相關的風險因子，許多研究者對於在風險校正模型中納入社經特性提出批判[10-12]，主要是因為病患的社經特性經常是過程面照護品質與照護結果之間的中介變項，校正病患的社經特性反而干擾對機構間的比較，且猶如間接認同「不同社經地位的民眾所接受的醫療照護品質有差異」的不公平現象[13]。也有研究指出，即使校正社經因子對品質報告卡中的醫院排名影響不大[14]。因此，台灣的結果面醫療品質指標，在進行風險校正時是否應納入社經特性、以及納入社經特性對於跨醫療機構比較（或排序）的影響，是值得後續關注的議題。

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作者回覆：醫療品質指標風險校正模型，是否應納入病患社經特性？

首先謝謝評論者對於本篇研究的肯定，雖然本篇研究主要是從事我國品質報告卡過程指標的效度研究，研究中間會有風險校正的過程，評論者提到的「醫療品質指標風險校正模型，是否應納入病患社經特性」議題，雖非本研究主要探討的問題，但我們還是一併探討如下。

評論者在文章中提出，「目前多數的品質報告卡多未校正社經地位相關的風險因子」，並提出2016年Bernheim等人的研究「即使校正社經因子對品質報告卡中的醫院排名影響不大」，同時舉例1997年Iezzoni、2012年Shahian等人以及Krumholz等人的文章，說明這些學者曾批判過「風險校正模型中納入社經特性」，此外，評論者更特別舉出國內文章，以總結上述的批判，第一點總結在於「主要是因為病患的社經特性經常是過程面照護品質與照護結果之間的中介變項」，第二點總結在於「間接認同不同社經地位的民眾所接受的醫療照護品質有差異」。

首先，我們同意目前多數的品質報告卡多未校正社經地位的論點，也同意不同社經地位的民眾所接受的醫療照護品質可能有差異，然而我們認為應該以實證研究結果為主來看待這個議題，而非單純參考實務面品質報告卡的做法。再者，評論者認為不同社經地位的病人接受到不同的品質是一個事實，因此不應該“被動”校正此事實（adjust out），反而應該讓主管機關或醫療院所“主動”改善此不平等的現象。但我們憂心的是，在profiling系統下（品質報告卡及論質計酬為例），如果社經地位未經過校正，「不平等」可能會更擴大。最近這兩年，許多重量級期刊的研究紛紛指出，校正病人的社經地位相當重要，校正能避免醫師可能的逆選擇病人現象發生（選擇社經地位較高的病人診治）[1,2]，事實上，如果有逆選擇現象發生，其實不一定可完全歸責到醫院或醫師，在論分數定輸贏的品質報告卡或者是論質計酬制度下，照護社經地位較弱勢的病人或者身處較偏僻位置的醫療院所，與照護社經地位較高的病人或者身處較富裕地區的醫療院所相比，起跑線本就不公平[1,3-6]。因此以上國外的文章強調先讓醫療院所能有公平比賽的環境，也就是先以風險校正消弭“劣勢”醫院的現象。最近（2019年6月）召開的annual research meeting（ARM），以Tim Doran以及Andrew Ryan等知名學者為首進行的「Evaluating the Equity Impacts of Major Health Reforms」研討場次[7]，亦同樣提出許多證據詳盡闡述以上的論點。最後，我們認為評論者提出的「病患的社經特性經常是過程面照護品質與照護結果之間的中介變項」的論點需更多的證據，如果評論者所言為真實的現象，病人的種族、收入、職業、教育程度等會受到過程品質影響而改變，然而目前似乎並沒有充分的實證說明此項路徑是成立的。

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