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Coronary Artery Disease

Rationale and Study Design of the TSOC-Fully Organized Registry for the Management of Symptomatic ACS Study (T-FORMOSA Study)

Ting-Hsing Chao,[1]# Hung-I Yeh,[2,3]* Kou-Gi Shyu,[4] Chih-Hung Lai,[5,6] Jen-Kuang Lee,[7] Chin-Chou Huang,[8,9] Ji-Hung Wang,[10] I-Chang Hsieh,[11] Chia-Ti Tsai,[12] Wen-Lieng Lee,[5,9] Ping-Yen Liu,[1,13] Tzung-Dau Wang,[14] Wen-Jone Chen,[7,15] Charles Jia-Yin Hou;[3,16#] on behalf of the T-FORMOSA investigators*

Background: Successful implementation of practice guidelines has been challenging in the treatment of acute coronary syndrome (ACS), leaving room for improvement. A nationwide registry can provide more information than that recorded in the National Health Insurance Research Database (NHIRD).

Methods: We conducted a prospective, nationwide, multi-center ACS full spectrum registry involving 3600 patients admitted to hospitals within 24 hours of the onset of myocardial infarction with ST-segment elevation or ACS without ST-segment elevation. In total, 41 sites including medical centers and regional hospitals were selected across Taiwan. The data for each patient are collected at 3 time points for the main study: during hospitalization, 6 months, and 12 months after the discharge. The milestone for first patient in was reached on January 7, 2022, and complete enrollment is expected before October 2023. The primary aims of the main study are to determine the degree of guideline-directed medical therapies and to identify prognostic predictors associated with 1-year composite outcomes, including death, myocardial infarction, stroke, and unplanned coronary revascularization in ACS patients. Thereafter, the patient data will be analyzed every 3 to 5 years for up to 20 years after discharge using the NHIRD in the extended study.

Conclusions: We hypothesized that a greater increase in the implementation of guideline-directed medical therapies can be observed. The results of the current study will add new and important information regarding a broad spectrum of ACS to drive further investigations.

Key Words: Acute coronary syndrome • Guideline-directed medical therapies • Outcomes • Registry

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[1]Division of Cardiology, Department of Internal Medicine, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Tainan; [2]Departments of Medical Research and Internal Medicine, MacKay Memorial Hospital, Taipei; [3]Department of Medicine, MacKay Medical College, New Taipei City; [4]Division of Cardiology, Shin Kong Wu Ho-Su Memorial Hospital, Taipei; [5]Cardiovascular Center, Taichung Veterans General Hospital, Taichung; [6]Institute of Clinical Medicine, National Yang Ming Chiao Tung University; [7]Division of Cardiology, Department of Internal Medicine, National Taiwan University College of Medicine and Hospital; [8]Division of Cardiology, Department of Medicine, Taipei Veterans General Hospital; [9]School of Medicine, College of Medicine, National Yang Ming Chiao Tung University, Taipei; [10]Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Hualien; [11]Division of Cardiology, Department of Internal Medicine, Linkou Chang Gung Memorial Hospital and Chang Gung University, Taoyuan; [12]Department of Internal Medicine, College of Medicine, National Taiwan University, Taipei; [13]Institute of Clinical Medicine, College of Medicine, National Cheng Kung University, Tainan; [14]Cardiovascular Center and Divisions of Cardiology and Hospital Medicine, Department of Internal Medicine, National Taiwan University Hospital, Taipei; [15]Division of Cardiology, Department of Internal Medicine, Min-Sheng General Hospital, Taoyuan; [16]Cardiovascular Center, Department of Internal Medicine, MacKay Memorial Hospital, Taipei, Taiwan.

Corresponding author: Dr. Ting-Hsing Chao, Division of Cardiology, Department of Internal Medicine, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Tainan 704302, Taiwan. Tel: 886-6-235-3535 ext. 2389; Fax: 886-6-275-3834; E-mail: chaoth@mail.ncku.edu.tw, chaotinghsing@gmai.com

* Both authors equally contribute to this work.

Charles Jia-Yin Hou and Ting-Hsing Chao jointly supervised this work and serve as corresponding authors.

Abbreviations

ACS	Acute coronary syndrome
ACS-FS	Taiwan Acute Coronary Syndrome Full Spectrum Registry
CABG	Coronary artery bypass grafting
DCF	Data collection form
ECG	Electrocardiography
GRACE	Global Registry of Acute Coronary Events
ICF	Informed consent form
IRB	Institutional Review Board
MI	Myocardial Infarction
NHIRD	National Health Insurance Research Database
NSTE-ACS	Non-ST-segment elevation acute coronary syndrome
PCI	Percutaneous coronary intervention
STEMI	ST-segment elevation myocardial infarction
T-ACCORD	Taiwan Acute Coronary Syndrome Descriptive
T-FORMOSA	TSOC-Fully Organized Registry for the Management Of Symptomatic ACS Study
TIMI	Thrombolysis In Myocardial Infarction
TSOC	Taiwan Society of Cardiology
TSOC ACS-DM	Acute Coronary Syndrome-Diabetes Mellitus Registry of the Taiwan Society of Cardiology

INTRODUCTION

Heart disease, and mainly coronary artery disease, remains the second leading cause of death in Taiwan.[1] Acute coronary syndrome (ACS) is the most serious coronary artery disease and represents a heterogeneous spectrum of conditions. International[2-5] and local[6,7] clinical practice guidelines have been developed to provide physicians with an evidence-based approach to daily patient care. However, data from international registries and observational studies in Taiwan have demonstrated that many patients do not receive best evidence-based practice as mandated by clinical practice guidelines.[8-12] Therefore, successful implementation of practice guidelines has been challenging in the treatment of ACS, leaving significant room for improvement.[8]

The National Health Insurance Research Database (NHIRD) is a useful tool to understand the status of ACS in Taiwan.[13] However, disadvantages of the NHIRD include a lack of diagnostic and treatment strategies, details of procedures and complications, lifestyle information and laboratory data, and the impact of contemporary interdisciplinary healthcare. Furthermore, disease coding bias and errors are still major concerns. These disadvantages can mostly be overcome by conducting registry studies. The Taiwan Society of Cardiology (TSOC) has conducted four ACS registries,[9-12] and the data have been analyzed and published previously in at least 23 original articles with respect to various aspects of ACS.[9-12,14-32] The time of enrollment, different disease spectrums, number of participating hospitals and patients in these four registries plus the current study are summarized in Table 1.

Many ACS registries have been conducted in Western[33,34] and Asia-Pacific countries.[35,36] The results from different countries may be used for comparisons between countries, however generalizability of the results in different populations and countries is still questionable. Furthermore, previous large-scale randomized controlled trials have usually included a small number of Asian patients.[37] Therefore, it is arguable whether the results of such trials can be generalized to Asian patients.[38-40] Furthermore, different management patterns and different outcomes of a single disease across differ-

Table 1. Summary of 5 ACS registries conducted by TSOC

Registry	T-ACCORD[10]	ACS-FS[11]	ACS STENT[12]	TSOC ACS-DM[13]	T-FORMOSA
Time of enrolment	April 2004-December 2006	October 2008-January 2011	April 2012-December 2015	July 2013-December 2015	January 2022-October 2023
Disease spectrums	NSTE-ACS	ACS	ACS with stenting	ACS with DM	ACS
Participating hospital (n)	27	39	24	27	41
Patient (n)	1331	3183	2357	1534	Estimated 3600
STEMI [n (%)]	0	1665 (52.3)	1294 (54.9)	455 (29.7)	NA

ACS, acute coronary syndrome; ACS-FS, Taiwan Acute Coronary Syndrome Full Spectrum Registry; DM, diabetes mellitus; NA, not available; NSTE-ACS, non-ST-segment elevation ACS; T-ACCORD, Taiwan Acute Coronary Syndrome Descriptive Registry; T-FORMOSA, TSOC-Fully Organized Registry for the Management Of Symptomatic ACS Study; TSOC ACS-DM, Acute Coronary Syndrome-Diabetes Mellitus Registry of the Taiwan Society of Cardiology.

ent ethnicities and regions are usually present. For example, the efficacy and safety of ticagrelor seems to be different between Taiwan[41,42] and other East Asian countries.[38,39] Therefore, large-scale nationwide registries covering the entire spectrum of ACS to assess current practice and outcomes in a 'real-world' situation within a specific time interval to fill this knowledge gap are needed in Taiwan.

To address these issues, the TSOC initiated a new large-scale, nationwide, multi-center, prospective registry, the TSOC-Fully Organized Registry for the Management Of Symptomatic ACS Study (T-FORMOSA Study), to determine the degree of guideline-directed medical therapies and to identify prognostic predictors associated with 1-year composite outcomes, with the long-term outcomes clarified using the NHIRD of Taiwan. We hypothesized that the 1-year outcomes of patients with ACS would be improved in the current era compared to those in the era of the previous ACS-FS registry, owing to a greater increase in the implementation of guideline-directed medical therapies.

MATERIALS AND METHODS

Study design

The current study was originally designed as a prospective, nationwide, and multi-center registry. The study protocol was initially approved by the TSOC and the first initiating site, the Institutional Review Board (IRB) of National Cheng Kung University Hospital (identifier: B-ER-110-450). The approved version was reviewed and approved by all other participating sites thereafter. All study participants are asked to sign an informed consent form (ICF), and this study follows the regulations of the ethics committees of National Cheng Kung University Hospital and the other participating sites. The investigators and study nurses fully explain the study protocol and collect signed informed consent forms from potential trial participants or authorized surrogates.

Eligible participants

Inclusion criteria

This study is ongoing and consecutively enrolling ACS patients (target number: 3600) (age ≥ 20 years) admitted within 24 hours or transferred from a non-trial site if they are at the non-trial site for less than 12 hours of symptom onset. ACS is defined as patients with unstable angina, myocardial infarction (MI) without ST-segment elevation or MI with ST-segment elevation (STEMI). Unstable angina and non-STEMI are further categorized as non-ST-segment elevation ACS (NSTE-ACS).

Exclusion criteria

Patients are excluded if they meet at least one of the following situations before screening: 1) ACS accompanied by or precipitated by significant co-morbidity e.g. motor vehicle accidents, trauma, severe gastrointestinal bleeding, peri-operative or peri-procedural MI; 2) having been enrolled in the current study already with recurrent ACS; 3) participating in an investigational drug study.

Selection of participating sites and investigators, and enrollment of participants

At least three full-time cardiologists were required at a single qualified participating site, which was required to have an independent IRB (or to collaborate with an outside IRB with regular monitoring) and could provide 24-hour primary percutaneous coronary intervention (PCI) service. A qualified participating site was either a medical center or regional hospital covering a sufficient geographic area to allow for a representative sample. Cardiologists taking care of ACS patients at the qualified participating sites were selected as the participating physicians. The geographic distribution and number of participating sites in each city or county in Taiwan are shown in Figure 1. The participating hospitals and the names of the principal investigators are listed in Supplementary Table 1.

Each participating site was requested to enroll 50-200 patients during the recruitment period of the study. The participating physicians should enroll consecutive patients who meet the study criteria confirmed by the participating physicians, thereby limiting bias of subject selection as far as possible.

Duration, visits, and data collection

This is a non-interventional registry. The patients are treated according to the physician's discretion, local and international guidelines, evidence-based strategies, and local labeling.

Figure 1. *The geographic distribution and number of participating sites in each city or county in Taiwan. The numbers in circles denote how many participating sites there are in each city or county, and different colors indicate in which part of Taiwan the participating sites are located.*

Main study data are recorded prospectively and entered via data collection forms (DCFs) at the baseline visit (V1) and subsequent visits (V2 at 6 months and V3 at 12 months after discharge) until 1 year of follow-up. Data are collected from medical records and obtained during hospitalization, and/or on clinical visits (or by telephone if the patients do not make contact for more than 10 days of the scheduled visit date). One year after discharge, the data will be followed as the extended study, using the NHIRD every 3-5 years up to a total of 20 years.

The duration of the main part of the study is approximately 3 years with an estimated 12- to 18-month recruitment period in total and 12-month follow-up for each participant. The milestone for the first site first patient in was achieved on January 7, 2022, and the last participant will be expected to be enrolled before October 2023. The timeline is illustrated in Table 2. Each patient will be followed up for approximately 20 years after discharge or until death or withdrawal of consent by the patient or participating physician.

The collected items are summarized as follows.

V1: The following data about the patient during hospitalization are recorded:

- Inclusion and exclusion criteria.
- Demographics (date of birth, sex, and ethnicity).
- Height and weight, and waist circumference, if available.
- Medical history (transient ischemic attack/stroke; coronary artery disease; MI; PCI; coronary artery bypass grafting; positive stress test; peripheral arterial disease; atrial fibrillation; heart failure; malignancy; chronic obstructive pulmonary disease; chronic renal disease; obstructive sleep apnea; gout, etc).
- Cardiovascular risk factors (previous cardiovascular history; smoking status including e-cigarettes; hypertension; hyperlipidemia; diabetes mellitus; hyperuricemia; family history).
- Date and time of symptom onset, and whether they were transferred by ambulance or from another hospital.
- Date and time of hospital presentation; out-of-hospital or in-hospital cardiac arrest.

Table 2. Timeline of the T-FORMOSA study

Time	Task
November to December 2021	First IRB approval and site correspondence training
January 3 2022	First site first patient in
October 2023	Last patient in
May 2024	Interim report of the baseline characteristics
October to December 2024	Data locked
May 2025	Reporting the main results
Every 3-5 years up to 2045	Following up long-term outcomes using NHIRD

IRB, Institutional Review Board; NHIRD, national health insurance research database; T-FORMOSA, TSOC-Fully Organized Registry for the Management Of Symptomatic ACS Study.

- Presenting symptoms, vital signs, arterial oxygen saturation, routine or indicated oxygen supplement or morphine treatment, door-to-electrocardiography (ECG) time, diagnostic ECG, door-to-enzyme time, cardiac-specific enzyme levels, and initial complications.
- Killip class (I to IV), or Thrombolysis In Myocardial Infarction (TIMI) risk score/Global Registry of Acute Coronary Events (GRACE) score.
- HAS-BLED bleeding score, high bleeding risk.
- Serum lipid profile, hemoglobin A1C, uric acid, natriuretic peptide level, creatinine, white cell count and differential count, etc. (if performed by the hospital).
- In-hospital therapies: interventions (COVID-19 screening immediately before the primary PCI or not; cardiac catheterization; coronary artery stenosis; culprit vessel(s) and flow pattern; PCI; door-to-wire time and door-to-balloon time; stent types; vascular access; thrombus aspiration strategy; total ischemic time if available; non-culprit lesion intervention; image- or physiology-guided therapy; coronary artery bypass grafting; intra-aortic balloon pumping; mechanical life support; others); other procedures (echocardiography; modalities to evaluate left ventricular ejection fraction; in-hospital healthcare).
- In-hospital medications: drug treatments (Thrombolytics – streptokinase, alteplase, reteplase, tenecteplase; Anticoagulants – warfarin, unfractionated heparin, low molecular weight heparin, fondaparinux, non-vitamin K oral anticoagulants; Antiplatelets – glycoprotein IIb/IIIa, aspirin, clopidogrel, ticagrelor, prasugrel, ticlopidine, others; Other Medications – angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, sacubitril/valsartan, calcium channel antagonists, beta-blockers, digoxin, diuretics, nitrates, nicorandil, anti-arrhythmic drugs, statins, proprotein convertase subtilisin/kexin type 9 inhibitors, ezetimibe, other lipid-lowering agents, spironolactone or eplerenone, oral or injected sugar-lowering agents, ranolazine, varenicline, colchicine, ivabradine, others).
- In-hospital medications are collected from the time of admission to in-hospital therapies (long-term use; within 24 hours before or after admission to hospital; after 24 hours in hospital; at discharge; not prescribed).
- In-hospital events (death; MI; unplanned revascularization, new-onset congestive heart failure/pulmonary edema; cardiogenic shock; acute renal failure; stroke – hemorrhagic and non-hemorrhagic; stent thrombosis; TIMI major/minor bleeding; sustained ventricular tachycardia or ventricular fibrillation; new-onset atrial fibrillation).
- Date of discharge.
- Primary discharge diagnosis.

At 6 and 12 months (± 10 days visit) (V2 and V3):

- Outcome (death; MI; stroke; unplanned revascularization; planned revascularization; stent thrombosis; TIMI major/minor bleeding; rehospitalization; heart failure hospitalization or worsening heart failure).
- Healthcare (smoking abstinence; return to rehabilitation department, complete cardiac rehabilitation program; implementation of telehealth monitoring); serum levels of hemoglobin A1C, lipid profile; high potency statin use; echocardiography performed; HAS-BLED bleeding score; high bleeding risk.
- Medications (warfarin; non-vitamin K anticoagulants; aspirin; clopidogrel; ticagrelor; prasugrel; angiotensin-converting enzyme inhibitors; angiotensin receptor blockers; sacubitril/valsartan; calcium channel antagonists; beta-blockers; digoxin; diuretics; nitrates; nicorandil; anti-arrhythmic drugs; statins; proprotein convertase subtilisin/kexin type 9 inhibitors; ezetimibe; other lipid-lowering agents; spironolactone or eplerenone; oral or injected sugar-lowering agents; ranolazine; varenicline; colchicine; ivabradine, others).

Data obtained every 3-5 years (linked to the NHIRD) after discharge:

- Outcome (death; MI; stroke; revascularization; rehospitalization; major bleeding).
- Medications (warfarin; non-vitamin K oral anticoagulants; aspirin; clopidogrel; ticagrelor; prasugrel; angiotensin-converting enzyme inhibitors; angiotensin receptor blockers; sacubitril/valsartan; calcium channel antagonists; beta-blockers; digoxin; diuretics; nitrates; nicorandil; anti-arrhythmic drugs; statins; proprotein convertase subtilisin/kexin type 9 inhibitors; ezetimibe; other lipid-lowering agents; spironolactone or eplerenone; oral or injected sugar-lowering agents; ranolazine; varenicline; colchicine; ivabradine, others).

Logistic aspects

The DCFs are provided and the electronic data col-

lection form (DCF) platform was established by the TSOC T-FORMOSA Study Steering Committee. Information collected in the DCFs are entered into the electronic DCF platform by the physician or designated representative. The representatives authorized by the participating physicians to make entries in the DCFs provide their names, positions, and contact information to the TSOC T-FORMOSA Study Steering Committee. The DCFs are completed as soon as possible after information is collected, preferably on the same day when the patient is due for treatment or an examination. The completed DCFs must be reviewed and signed on the electronic DCF platform by the physician.

Management of data

Data validation

The TSOC T-FORMOSA Study Steering Committee or the clinical research associate authorized by the TSOC may generate additional requests or queries to which the investigator is obliged to respond by confirming or after reconfirmation to revise the data questioned. The requests or queries with their responses are archived in the document held by the TSOC T-FORMOSA Study Steering Committee. Clinical endpoints will be adjudicated by the Clinical Endpoint Adjudication Taskforce.

Monitoring visits for data quality control

Site monitoring visits are performed by a study site monitor, who is a qualified and independent member of staff working for the TSOC. After a site has enrolled > 50 subjects, an Interim Monitoring Visit will be made based on the monitoring plan. Furthermore, a Remote Monitoring Visit will be made every 3 to 6 months, depending on the recruitment status. Auditing may be conducted by the IRB of each site annually as planned. All ICFs should be checked for completeness, and DCFs should be verified for the existence and eligibility of each patient. Complete source data verification is performed on at least 5% of the DCFs at 40% of the sites (Table 3).

The results of the monitoring visits are reported to the Steering Committee. If specific issues are identified at some sites, the percentage of sampling for quality control at the site of concern or at all sites must be appropriately increased, and corrective actions must be taken.

The Steering Committee encourages the principal investigators and site correspondents to reduce the number of participants who are "lost to follow-up" as best as they can and provide incentives to the principal investigators and site correspondents for complete follow-up.

Power estimation and sample size calculation

Due to the descriptive character of this study, there was no requirement for sample size calculation. The study sample size has therefore been chosen arbitrarily.

There are about 50 new ACS cases per 100,000 people per year in Taiwan.[6,44] Based on the known background incidence rate of 0.0025, a sample of 2395 patients achieves 80% power to detect an additional incidence rate of 0.003 with a precision of 0.2% and 95% confidence interval. Considering a dropout rate of 20%, 3000 subjects is required, and 3600 was chosen to compare with the previous TSOC ACS-FS and ACS-DM registries.

Table 3. Requirement for site data quality control

DATA checked	Percentage of sampling	Details
Patient initials and date of birth	100% of DCFs	The presence of source documents with medical records corresponding to this patient will be checked.
ICF	100% of DCFs	The completeness of ICF signed by the patient or authorized designated surrogate will be checked.
Inclusion and exclusion criteria	100% of DCFs	The eligibility of all patients will be checked.
All other data	At least 5% of DCFs in 40% of the sites	It means 1 out of 20 DCFs with corresponding source documents and medical records will be 100% checked in 2 out of 5 sites. The top recruiting sites take priority to monitor. In sites with less than 20 enrolled patients, at least 1 DCF will be entirely cross-checked with source documents and medical records.

DCFs, data collection forms; ICF, informed consent form.

Primary aims of the main study

The primary aims of the main study are to determine the degree of implementation of guideline-directed medical therapies, including dual anti-platelet treatment, lipid-lowering therapy, an angiotensin-converting enzyme inhibitor/angiotensin receptor blocker, and a beta-blocker, and to identify prognostic predictors associated with 1-year composite outcomes, including death, MI, stroke, and unplanned coronary revascularization.

Statistical analysis

Analysis population

Statistical analysis will be based on all patients enrolled in the registry. All data recorded will be analyzed in an explorative manner. The results will be presented in tables and figures.

Statistical methods

Parameters will be summarized using mean, median, standard deviation and interquartile range where appropriate for continuous data, and count or percentage for categorical data. Survival and "event-free survival" will be analyzed by Cox proportional hazards modeling to test the impact of clinical and demographic covariates, as well as variations in patient management. Where possible, propensity score matching will be undertaken to adjust for non-randomized comparisons. All statistical analyses will be performed with an alpha level of < 0.05 on two-sided testing considered as statistically significant. Analyses will be conducted as time to first event without double counting of events within analyses involving composite endpoints. Patients who are "lost to follow-up" will be censored at the time of last contact, with their vital status deemed as being alive and "event-free" at that time.

Planned analyses will include, but not be limited to:

- Description of the baseline clinical and demographic characteristics of patients presenting with intermediate or high-risk ACS in the Taiwanese context.
- Prevalence of risk factors.
- Description of the management strategies administered, including use of invasive management, and the use of clinical guideline-advocated therapies.
- Identification of high-risk groups where an increased risk of late reinfarction or death is observed.
- Evaluation of the relationship between the implementation of guideline-directed medical therapies/healthcare or risk predictors and late clinical outcomes.
- Validation of predictive models such as the TIMI and GRACE risk scores.
- Comparisons of the implementation of guideline-directed medical therapies and clinical outcomes between this and previous TSOC ACS registries.

DISCUSSION

The current study provides the best opportunity to compare adherence to the best evidence-based approach and clinical outcomes after ACS in Taiwan between the contemporary and previous eras. New features of the current registry study will include: 1) evaluation of the impact of management strategies such as routine oxygen supply, thrombus aspiration during primary PCI, non-culprit lesion intervention, image- or physiology-guided intervention, vascular access, single or dual anti-platelet treatment, dual or triple anti-thrombotic treatment; 2) evaluation of the implementation and prognostic impact of interdisciplinary healthcare; 3) evaluation of high-intensity statin use and low-density lipoprotein cholesterol goal attainment rate in the contemporary era; 4) evaluation of the prognostic impact of a full spectrum of medications, including contemporary cardiovascular- and reno-protective drugs such as sodium-glucose cotransporter 2 inhibitors and glucagon-like peptide-1 receptor agonists; 5) evaluation of the efficacy and safety of different designs of coronary stents; 6) evaluation, for the first time, of the long-term cardiovascular outcomes of ACS.

A recent study based on data from the NHIRD on the practice pattern of ACS in Taiwan from 2008 to 2015 showed that PCI and secondary preventive medications, including dual antiplatelet therapy, angiotensin converting enzyme inhibitors/angiotensin receptor blockers, beta-blockers and statins, were less prescribed for NSTEMI compared with STEMI.[9] Although the use of statins increased year by year in STEMI patients,[9] about one quarter of NSTEMI patients were still not receiving statin therapy before discharge in 2015. Data from two nationwide ACS registries (2008-2010 and 2012-2015) con-

ducted by the TSOC also showed that the prescription rate of secondary preventive medications for ACS was still relatively low compared with Western data, especially for patients with NSTE-ACS.[11] However, owing to the introduction and adoption of the Disease-Specific Care Certification Program advocated by the Joint Commission of Taiwan, we may optimistically expect a significant improvement in adherence to guideline-directed medical therapies and clinical outcomes after the index ACS.[44]

The long-term outcomes and prognostic predictors of ACS may change with the innovation and development of evidence-based diagnosis and management strategies, and the adoption of interdisciplinary healthcare. For example, the in-hospital mortality rate of STEMI stratified by Killip classification has dramatically improved[45] compared to decades ago.[46] Some surrogate biomarkers have become the most important predictors of cardiovascular events and have been shown to have an even greater prognostic value than other traditional risk factors.[47] The current study will further demonstrate the long-term outcomes and prognostic predictors of ACS in Taiwan in the contemporary era.

CONCLUSIONS

In conclusion, the results of the current study will provide new and important information regarding a broad spectrum of ACS in the contemporary era in order to drive both researchers and clinicians to explore and solve potential unmet clinical issues.

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DECLARATION OF CONFLICT OF INTEREST

Ting-Hsing Chao have been on the speaker bureau for AstraZeneca, Bayer, Boehringer Ingelheim, Daiichi-Sankyo, Novartis, Pfizer, Sanofi, Tanabe, Orient Euro-Pharma, and TSH biopharm.

Tzung-Dau Wang has been on the speaker bureau for AstraZeneca, Daiichi-Sankyo, Medtronic, Novartis, Pfizer, and Omron.

All other authors declare no potential conflict of interest in relation to this work.

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SUPPLEMENTARY MATERIAL

Supplementary Table 1. Participating hospitals and the names of principal investigators

Number	Location	Participating hospital	Principal investigator
1	Keelung City	Chang Gang Memorial Hospital, Keelung	Chun-Tai Mao
2	Yilan County	Lo-Hsu Medical Foundation Lotung Poh-Ai Hospital	Yu-Cheng Hsu
3	Taipei City	Tri-Service General Hospital, National Defense Medical Center	Cheng-Chung Cheng
4	Taipei City	Taipei Veterans General Hospital	Tse-Min Lu
5	Taipei City	National Taiwan University Hospital	Yen-Hung Lin
6	Taipei City	Shin Kong Wu Ho-Su Memorial Hospital	Kou-Gi Shyu
7	Taipei City	Cathay General Hospital	Chi-Hung Huang
8	Taipei City	Mackay Memorial Hospital, Taipei	Cheng-Ting Tsai
9	New Taipei City	Mackay Memorial Hospital, Tamsui	Cheng-Ting Tsai
10	Taipei City	Wan Fang Hospital, Taipei Medical University	Jen-Hung Huang
11	Taipei City	Taipei Medical University Hospital	Chun-Yao Huang
12	Taipei City	Cheng Hsin General Hospital	Wei-Hsian Yin
13	New Taipei City	Far Eastern Memorial Hospital	Yen-Wen Wu
14	New Taipei City	Taipei Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation	Shih-Jung Jang
15	New Taipei City	Shuang Ho Hospital	Kuan-Rau Chiou
16	Taoyuan City	Chang Gung Memorial Hospital, Linkou	Chi-Jen Chang
17	Hsinchu City	National Taiwan University Hospital Hsin-Chu Branch	Chao-Lun Lai
18	Hsinchu City	Mackay Memorial Hospital, Hsinchu	Po-Jung Yuan
19	Taichung City	Taichung Veterans General Hospital	Tsun-Jui Liu
20	Taichung City	China Medical University Hospital	Chiung-Ray Lu
21	Taichung City	Tungs' Taichung MetroHarbor Hospital	Bao-Tzung Wu
22	Taichung City	Kuang Tien General Hospital, Shalu	Shih-Chung Huang
23	Taichung City	Kuang Tien General Hospital, Dajia	Chih-Ping Hsia
24	Taichung City	Chung Shan Medical University Hospital	Chin-Feng Tsai
25	Changhua County	Changhua Christian Hospital	Bing-Jung Yang
26	Changhua County	Show Chwan Memorial Hospital	Ho-Pang Yang
27	Changhua County	Chang Bing Show Chwan Memorial Hospital	Chih-Peng Hsu
28	Yunlin County	National Taiwan University Hospital Yunlin Branch	Fu-Chun Chiu
29	Chiayi City	Ditmanson Medical Foundation Chia-Yi Christian Hospital	Han-Lin Tsai
30	Chiayi County	Chang Gung Memorial Hospital, Chiayi	Jung-Jung Chang
31	Chiayi County	Dalin Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation	Tin-Kwang Lin
32	Tainan City	Chi Mei Medical Center	Chon-Seng Hong
33	Tainan City	National Cheng Kung University Hospital	Ting-Hsing Chao
34	Kaohsiung City	Kaohsiung Veterans General Hospital	Feng-Yu Kuo
35	Kaohsiung City	Chang Gung Memorial Hospital, Kaohsiung	Shu-Kai Hsueh
36	Kaohsiung City	Kaohsiung Medical University Hospital	Tsung-Hsien Lin
37	Kaohsiung City	E-Da Hospital	Chao-Ping Wang
38	Hualien County	Hualien Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation	Ji-Hong Wang
39	Taitung County	Taitung Mackay Memorial Hospital	Kuang-Te Wang
40	Tainan City	Tainan Municipal Hospital	Liang-Miin Tsai
41	Taichung City	Feng Yuan Hospital of the Ministry of Health and Welfare	Chen-Rong Tsao