where there were less cases of COVID-19 compared with the most affected north part.[1] The risk of mortality and complications of STEMI also increased significantly.[1] Further study is needed to evaluate whether delay in treatment also cause worse prognosis of STEMI in Taiwan. In conclusion, although there was no reduction of STEMI admission in Taiwan, a significant delay for medical help was found during the COVID-19 pandemic. Further actions are necessary to avoid the negative impact of COVID-19 pandemic on care of STEMI.

Disclosures

The authors have no conflicts of interest to disclose.

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Do We Need a Modified HEART Score to Risk Stratify Chest Pain Patients in the Emergency Department?

To the Editor:—At present, History, Electrocardiogram, Age, Risk factors, and Troponin (HEART) is one of the most common scoring systems to risk stratify undifferentiated chest pain patients at Emergency Department (ED).[1] Low risk HEART scores (0-3) predict very low short-term major adverse cardiac event. We, as ED physicians, are particularly interested in recognizing the value of better directing low risk chest pain patients for their safety to discharge from ED. If patients deem to be "high" risks, such patients might need to be placed to hospital for further evaluations. However, using current HEART score might result in higher unnecessary hospital admissions among certain ED patient populations. One of the reasons is their broad definition of "high risk" items. For example, an elderly (≥65) patient with a history of previous myocardial infarction or cardiac atherosclerotic disease will have a HEART score of at least 4, regardless of his(her) clinical presentations, EKG findings, or troponin value.

We have been expecting the modifications of HEART scoring system to better differentiate "low risk" chest pain patients and avoid unnecessary hospital admissions. The findings in the paper by Roongsritong et al. seems to help answering this question.[2] Specifically, authors derived a novel SVEAT score, similar to the HEART score, with better "risk" definitions. Authors emphasize the differences between stable and unstable angina clinical presentations, the importance of recent cardiovascular events, and recognize the critical new/dynamic ischemic EKG changes, which are the usual thinking on the final patient disposition by ED physicians. More importantly, using SVEAT, a 28.6% of extra "low-risk" chest pain patients, in comparison to HEART score, can be recognized.

However, some of the authors' findings in this paper require further discussions. As mentioned in their limitation, the SVEAT scoring system is derived using clinical gestalt. With the help of statisticians, deriving a better scoring system does not seem to be challenge.[3] If each "risk" is not scored based on their weight to predict major adverse cardiac event outcomes, we are expecting higher misclassification rates. On the other hand, simply reporting c-statistics/area under the receiver operating characteristic curve is not enough for determining the accuracy of the diagnostic tool, though sensitivity, specificity, positive/negative predictive value, and likelihood ratio can be further calculated based on numbers listed in the paper. It is better to report, especially the likelihood ratios, since the readers can estimate the improved post-test probability of using SVEAT score for differentiating low-risk chest pain patients at ED.[4] The findings of this SVEAT score is promising and we expect to see the external validations of this scoring system in the future.

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Prognostic Value of Left Ventricular Global Longitudinal Strain in COVID-19

The novel severe acute respiratory syndrome coronavirus 2019 (COVID-

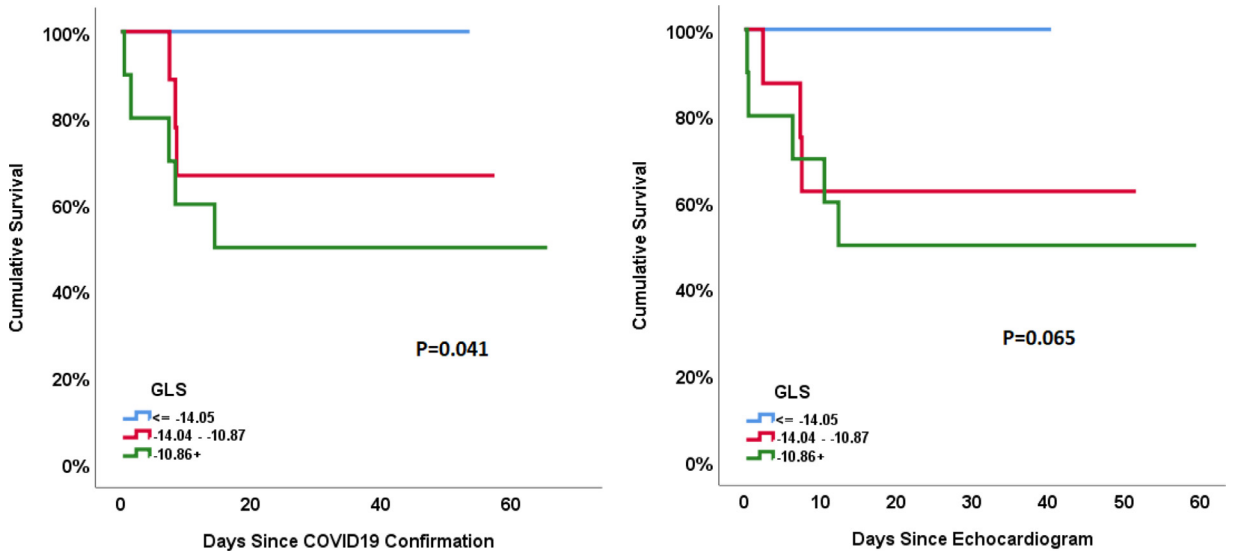

Figure 1. Central Illustration: Model 1 comparing tertile of global longitudinal strain (GLS) and mortality by days since COVID-19 diagnosis as adjusted for ejection fraction (EF) and age. Model 2 comparing tertile of GLS and mortality by days since echocardiogram diagnosis as adjusted for age and EF.

19) was declared a global pandemic by the World Health Organization on March 11, 2020.[1] Reports have noted right ventricular longitudinal strain to be a strong predictor of mortality in patients with COVID-19.[2] Although left ventricular global longitudinal strain (GLS) has been well validated as a prognostic cardiovascular marker,[3] the utility of left ventricular GLS in risk stratification of COVID-19 remains unknown. We assessed the association of left ventricle GLS in patients with COVID-19.

Between March 16, 2020 and May 21, 2020, we reviewed 35 consecutive patients with laboratory confirmed diagnosed COVID-19 within the University Hospital Health System who underwent echocardiography. We excluded echocardiograms performed more than 10 days prior to and 21 days after COVID19 confirmation. We performed retrospective 2D strain analysis using EchoInsight software (Epsilon Imaging).[4] Strain curves were manually examined and segments with poor strain curve quality were excluded. We followed patients for all-cause mortality, through linkage with state death files. Association between GLS and mortality was assessed using Kaplan-Meier survival analysis and Cox regression, using two follow-up times (time since echocardiogram and time since COVID19 confirmation). Cox models were adjusted for age and left ventricular ejection fraction. This study was approved by the institutional review board at University Hospitals.

A total of 31 patients were included in the final analysis (3 were excluded due to poor windows, and 1 was incompatible with the software). A total of 92 segments from 23 patients were excluded due to poor windows. The median time from COVID-19 confirmation to echocardiogram was 3 (1 to 7) days. Median age was 64 (60 to 71), Left Ventricular Ejection Fraction 57.5% (47.5 to 60), median GLS −11.8 (−14.7 to −10.2). At a median follow-up of 38 (26 to 49) days from COVID-19 and 29 (23 to 34) days from TTE, 8 patients died. Mortality by tertiles are shown in Figure 1. For each 1% increase (less negative) in GLS was associated with increased mortality (Hazard ratio [HR] 1.52; 95% confidence interval [CI]: 1.10 to 2.11, $p = 0.013$ from COVID19; HR 1.39 (1.10 to 1.75), $p = 0.006$ from echocardiogram). After adjusting for age and LV ejection fraction, the association between GLS and mortality was unchanged (HR 1.39; 95% CI: 1.11 to 1.76, $p = 0.005$ from COVID19; HR 1.54; 95% CI: 1.10 to 2.15, $p = 0.011$ from echocardiogram).

Thus, we observed significantly increased mortality with decrease (less negative) in left ventricular GLS in patients with COVID-19. This is congruent with prior literature of left ventricular strain as a more powerful predictor of all cause death than visual ejection fraction even when adjusted for multiple confounders.[3] Our study extends these results to patients with the severe acute respiratory syndrome coronavirus 2019 (COVID-19). Potential mechanisms to explain these results, besides specific direct tissue invasion, COVID-19 frequently leads to cytokine storm contributing to multisystem organ dysfunction/failure. Cytokine storm and cardiomyocyte oxidative stress has been linked to impaired global longitudinal strain on echocardiography.[5]

Although limited by the small sample size, observational nature, unobserved confounding variables, and lack of metrics to further classify illness severity, our findings suggest that left ventricular GLS may be associated with mortality in patients with COVID-19. The potential utility of strain echocardiography in the COVID-19 population needs to be further explored.

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Predictors of Home Health Care Utilization and Its Relationship With Early Outcomes in Patients Undergoing Transcatheter Mitral Valve Repair

Transcatheter mitral valve repair (TMVR) has become an important treatment option for patients with moderate-to-severe or severe primary or secondary mitral regurgitation who are at prohibitive or high surgical risk.[1] Although TMVR has been shown to reduce rehospitalization and mortality, there remains few studies identifying risk factors for increased rehospitalization or mortality after repair.[2–4] As early rehospitalization has a significant impact on health care systems and patient level outcomes, patients who are homebound or need nursing care are discharged with home health care (HHC) services to assist with the transition of management to their home environment and possibly reduce rehospitalization and other adverse events. Although this has been the goal of HHC utilization, there have been mixed results in recent studies focusing on heart failure (HF) readmissions and HHC referral.[5] Patients discharged with HHC after acute HF exacerbation have higher 30-day all-cause readmissions and mortality compared with their matched routine home discharge counterparts.[6] Similar to other patients with HF, patients discharged after TMVR who meet requirements for HHC are discharged with this service. However, it remains unknown if HHC utilization influences the 30-day outcomes in this high-risk group of patients. Hence, we conducted this study on post-TMVR patients to identify the predictors of HHC referral at discharge, and its impact on 30-day outcomes utilizing a large national database.

The Nationwide Readmission Database (NRD) from 2014 to 2017 was used to identify patients hospitalized for TMVR using International Classification of Diseases-9th (35.97) and-10th (02UG3JZ) procedure codes.[7] NRD provides variables that have information regarding discharge disposition of every hospitalized patient. For this study, we included all patients with a HHC referral upon discharge and compared this group with patients with routine home discharge. Patients discharged to a skilled nursing facility and those who died during hospitalization were excluded from the analysis. We analyzed outcomes (30-day all-cause readmission, 30-day HF-related readmission, and 30-day mortality) after propensity score matching (PSM) to reduce selection bias and heterogeneity between the groups. PSM was conditioned on baseline demographics, co-morbidities, hospital characteristics, and in-hospital complications. Additionally, predictors of HHC utilization on discharge were identified using multivariate logistic regression analysis. All statistical analyses were performed using RStudio software (RStudio, Boston, MA) and IBM SPSS version 26 (IBM Corporation, Armonk, NY).

A total of 11,005 (weighted national estimate) patients underwent TMVR during the study period. Of those patients included in the analysis, 2,512 (22.8%) were discharged with HHC. In the overall cohort, patients discharged with HHC were more likely to be elderly, of female gender, and had a higher prevalence of diabetes mellitus, heart failure, atrial fibrillation, peripheral vascular disease, chronic kidney disease, and anemia (p for all <0.05). Additionally, patients discharged with HHC had increased in-hospital complications including stroke, acute kidney injury, cardiogenic shock, transfusion requirement, bleeding, and need for circulatory support (p for all <0.05). On multivariate analysis, weight loss, peripheral vascular disease, anemia, diabetes mellitus, female gender, atrial fibrillation, hypothyroidism, prior percutaneous coronary intervention, and age were all significant baseline characteristics independently predicting HHC referral at discharge. In-hospital events including stroke, need for circulatory support, need for mitral valve surgery, acute kidney injury, nonelective admission, blood transfusion, bleeding, weekend admission, and cardiogenic shock were identified as independent predictors of HHC discharge (Figure 1). In the PSM cohort, 30-day readmission and mortality outcomes remained significantly increased within the HHC group. Those discharged with HHC had higher incidence of 30-day all-cause readmission (18.8% vs 13.3%; adjusted odds ratio [aOR] 1.50; 95% confidence interval [CI] 1.28 to 1.77), 30-day HF readmission (3.7% vs 2.4%; aOR 1.44; 95% CI 1.02 to 2.05), and 30-day mortality (1.3% vs 0.4%; aOR 3.18; 95% CI 1.49 to 6.78; p for all <0.05; Figure 1).

In this study, patients who were discharged with HHC after TMVR had higher 30-day all-cause readmission, 30-day HF-related readmission, and 30-day mortality compared with those discharged without HHC, likely related to increased prevalence of co-morbidities. As seen in the baseline characteristics of the 2 groups, patients receiving a HHC referral at discharge were more likely to have other cardiovascular and systemic diseases. Furthermore, significant hospital events such as stroke, need for circulatory support, AKI, and others predicted the need for HHC referral at discharge. Interestingly, after propensity matching between the 2 cohorts to correct for the underlying baseline comorbidities, 30-day all-cause readmission, 30-day HF-specific readmission, and 30-day mortality all remained significantly higher in the HHC population, although with propensity matching the differences in the outcomes were slightly mitigated. One possible explanation is that there may be additional patient characteristics that portend worse outcomes that