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Acute Coronary Syndromes and Heart Failure Critical Care Units Utilization and Outcomes in Teaching and Community Hospitals: A National Population-Based Analysis

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ABSTRACT

Acute coronary syndromes (ACS) and heart failure (HF) are the leading diagnoses in patients admitted to critical care units (CCUs). Little is known about the differences between CCU resource use and outcomes across hospital types. The Canadian Institute for Health Information was used to identify patients hospitalized with primary diagnoses of ACS or HF. CCUs were categorized as teaching, large community, medium community, and small community hospitals. Outcomes included CCU rates of admission, use of critical care therapy/procedures, and in-hospital mortality. Among 204,900 patients hospitalized with ACS or HF, 73,338 (35.8%, hospital range 0% to 81.4%) were admitted to CCUs, and it varied across hospital types: 41.0% in teaching, 30.0% in large, 45.4% in medium, and 30.9% in small community hospitals ($P < 0.001$). The percentage of patients admitted to CCUs who received critical care therapies in teaching, large, medium, and small hospitals were as follows: 73.6%, 50.9%,

RÉSUMÉ

Les syndromes coronariens aigus (SCA) et l'insuffisance cardiaque (IC) sont les principales affections diagnostiquées chez les patients admis dans les unités de soins intensifs (USI). On sait peu de choses sur les différences entre les hôpitaux en ce qui concerne l'utilisation des ressources dans les USI et les résultats obtenus. On a fait appel à l'Institut canadien d'information sur la santé pour repérer les patients hospitalisés dont le diagnostic principal était un SCA ou une IC. Les USI ont été classées en fonction du type d'hôpital : hôpitaux universitaires, et hôpitaux communautaires de grande, moyenne et petite taille. Les paramètres évalués comprenaient les taux d'admission, l'utilisation de traitements et interventions spécifiques des soins intensifs, et la mortalité hospitalière. Parmi les 204 900 patients hospitalisés atteints d'un SCA ou d'une IC, 73 338 (35,8 %; extrêmes : 0 à 81,4 %) ont été admis dans une USI, la proportion variant selon le type d'hôpital : 41,0 % dans les hôpitaux universitaires, 30,0 %, 45,4 % et 30,9 %

In the prereperfusion era, critical care units (CCUs) provided continuous electrographic monitoring and resuscitative technologies and were associated with improved survival in patients with acute coronary syndromes (ACS). Therapeutic advances that have reduced in-hospital mortality along with telemetry-equipped hospital ward beds have led to contemporary guidelines recommending admitting patients with uncomplicated ACS and heart failure (HF) to a non-CCU telemetry ward. Nonetheless, North American and European registries have reported wide variation in rates of admission to CCUs for patients admitted with ACS (50% to 79%) or HF (10% to 51%).[1-4] Although some of the variability in rates of CCU admission and resource utilization has been attributed to differences in individual patient and

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24.6%, and 8.8% ($P < 0.0001$). Compared with the in-hospital mortality rate for patients admitted to CCUs in teaching hospitals (8.2%), outcomes were worse for CCU patients in large (11.0%, adjusted odds ratio [aOR] 1.50; 95% CI, 1.19-1.90), medium (10.5%, aOR 1.56; 95% CI, 1.27-1.92), and small community hospitals (9.2%, aOR 1.59; 95% CI, 1.20-2.10). Patients admitted with ACS or HF to teaching hospital CCUs had a higher observed use of critical care therapies and lower mortality compared with community hospitals. These differences highlight the need to examine differences in CCU admission thresholds, resource utilization, and outcomes across hospitals types.

dans les hôpitaux communautaires de grande, moyenne et petite taille, respectivement ($p < 0,001$). Le pourcentage de patients admis à une USI qui ont reçu des traitements spécifiques des soins intensifs dans les hôpitaux universitaires et les hôpitaux communautaires de grande, moyenne et petite taille a été respectivement de 73,6 %, de 50,9 %, de 24,6 % et de 8,8 % ($p < 0,0001$). Pour ce qui est du taux de mortalité hospitalière chez les patients des USI, les résultats ont été pires dans les hôpitaux communautaires de grande taille (11,0 %; rapport de cote ajusté [RCa] = 1,50, IC à 95 % : 1,19-1,90), de taille moyenne (10,5 %; RCa = 1,56, IC à 95 % : 1,27-1,92) et de petite taille (9,2 %; RCa = 1,59, IC à 95 % : 1,20-2,10) que dans les hôpitaux universitaires (8,2 %). Chez les patients atteints d'un SCA ou d'une IC qui ont été admis dans les USI d'hôpitaux universitaires, on a observé une plus grande utilisation des traitements spécifiques des soins intensifs et une mortalité plus faible, comparativement aux hôpitaux communautaires. Ces écarts mettent en relief la nécessité d'examiner les différences entre les types d'hôpitaux en ce qui a trait au seuil d'admission, à l'utilisation des ressources et aux résultats dans les USI.

socioeconomic characteristics, admission diagnosis, physician specialty, and annual volume, the reasons underpinning these disparities are incompletely understood.[5] Previous studies have reported that teaching hospitals have better adherence to practice guidelines and outcomes in patients admitted with pneumonia, stroke, acute myocardial infarctions, and HF, but little is known about the associations among hospital type, resource utilization, and clinical outcomes among patients admitted to CCUs with ACS or HF. Accordingly, the purpose of this study was to examine differences in rates of CCU admission, use of critical care therapies, and clinical outcomes among patients with ACS or HF admitted to teaching, large, medium, and small community hospitals with CCUs.

Methods

The Canadian Institute of Health Information Discharge Abstract Data was used to identify patients ≥ 18 years of age admitted to hospitals with CCUs (special care unit codes 10, 20, 25, 30, 35, 40, 45, 60, 80) between April 1, 2007 and March 31, 2013, with primary diagnoses of ACS or HF. Critical care procedures and therapies were identified using Canadian Classification of Health Interventions codes (see Supplemental Table S1). Teaching hospitals of any size were identified by membership in the Association of Canadian Academic Healthcare Organizations, and community hospitals were categorized as large (≥200), medium (50 to 199), and small (1 to 49) hospital beds. The primary outcome of interest was in-hospital all-cause mortality, and resource utilization outcomes included rates of admission to CCUs and the prevalence of critical care-restricted therapies. Logistic regression models were used to examine the independent association between hospital size and mortality. Propensity score matching was used to adjust for the propensity to be admitted to teaching and community hospitals and matched on the logit of the propensity score using calipers of width equal to 0.2 of the standard deviation of the logit of the propensity score. A comprehensive description of study methodology and statistical methods are provided in the Supplemental Methods.

Results

A total of 204,900 patients with primary diagnoses of ACS or HF were admitted to hospitals with a CCU in Canada (Supplemental Fig. S1). Baseline characteristics among all patients hospitalized are presented in Supplemental Table S2 and patients admitted to the CCU in Supplemental Table S3. The overall rate of CCU admission was 35.8% (hospital range 0% to 81.4%), and this varied by hospital type as follows: 41% (interhospital range 0% to 71.4%) teaching hospitals, 30.0% (interhospital range 0% to 77.3%) large community, 45.4% (interhospital range 0% to 78.7%) medium community, 30.9% (interhospital range 0% to 81.4%) small community hospitals ($P < 0.001$). Resource utilization metrics by hospital type are provided in Supplemental Table S4. The use of critical care procedures and therapies—including mechanical ventilation, revascularization, dialysis, and vascular access procedures—were highest in teaching hospitals. The percentage of patients with no critical care-related procedure of therapies within the first 2 days of admission to CCU was lowest in teaching hospitals (Fig. 1).

Using teaching hospitals as a reference, adjusted in-hospital mortality rates were higher among patients with an ACS or HF admitted to CCUs in large (adjusted odds ratio [aOR]

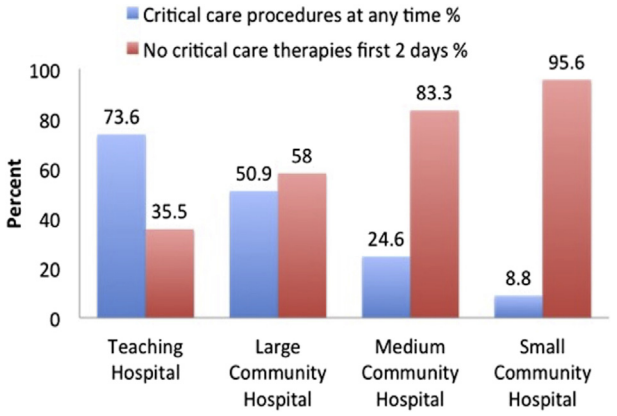

Figure 1. Critical care procedures and therapies by hospital type.

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