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Original Contribution

DO EMERGENCY PHYSICIANS IMPROVE THE APPROPRIATENESS OF EMERGENCY TRANSFER IN RURAL AREAS?

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Abstract—Background: Until recently, there have been few studies on the transfer of patients from emergency departments (EDs) overall, as such studies were limited primarily to trauma patients. **Objectives:** The purpose of this study was to investigate the association between the specialty of the primary referring physician and the appropriateness of the emergency transfer (AET). **Methods:** This was a retrospective, observational study performed at two level-3 EDs in a rural area. A transfer to a higher-level ED for the purpose of patient stabilization was defined as an emergency transfer, and transfers were classified as “appropriate” when the emergency status of the patient could not be resolved by the referring ED. The primary outcome was AET, which was reviewed by an expert panel for reliability. Statistically significant variables were selected as covariates based on the results of a univariate analysis, and a multivariate logistic regression analysis was performed to estimate the odds ratios (ORs) with 95% confidence intervals (CIs) on the AET. **Results:** A total of 1325 patients underwent transfer to another hospital from the two EDs. Of these, 1003 were classified into the emergency transfer group. In both EDs, the incidence of appropriate emergency transfers was significantly higher when the primary referring physician was an emergency physician (OR 4.005, 95% CI 2.619–6.125 and OR 4.006, 95% CI 1.696–9.459 for each hospital, respectively). **Conclusion:** There was a positive association between the specialty of the primary referring physician and the AET among EDs located in rural

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Keywords—emergency service; hospital; patient transfer; physician’s role; referral and consultation

INTRODUCTION

The primary cause of difficulties in treating critically ill patients in rural areas is that there are very few specialists with sufficient training and there are limited medical resources available to stabilize emergency-status patients (1–3). Thus, it is impossible to prepare for critically ill patients at all rural emergency centers. Therefore, when patients visit lower-level emergency departments (EDs) that cannot stabilize their emergency status, they should be transferred to upper-level EDs that can (4). However, in some cases, primary ED physicians in lower-level EDs may overestimate a patient’s severity, causing an improper emergency transfer, which may overwhelm tertiary emergency center resources (5). In addition, inappropriate emergency transfer can delay definitive care and can be costly or inconvenient for patients and their families (6). Emergency physicians are trained to determine the severity of a patient’s status to identify and

manage emergencies. Therefore, we hypothesized that if emergency physicians were the primary ED physicians in lower-level emergency centers, it would reduce inappropriate emergency transfers. However, most studies on inappropriate emergency transfers have been limited primarily to trauma patients (7–9).

In this study, we evaluated whether secondary triage was more accurate when the emergency physician served as the primary ED physician in level-3 EDs and whether the appropriateness of the emergency transfer (AET) was more accurate for emergency physicians than for other specialists.

MATERIALS AND METHODS

Study Design

This was a retrospective, observational study of patients transferred to another hospital from two level-3 EDs in rural Korea. This study was approved by the institutional review boards of the study institutions and was performed in accordance with the ethical standards laid down in an appropriate version of the Declaration of Helsinki.

Study Setting

This study was completed in two rural counties in Korea, Soon-chang and Moo-an. The population was 30,368 in Soon-chang (2014) and 81,696 in Moo-an (2014). The population density was 61/km² in Soon-chang and 124/km² in Moo-an. In Korea, EDs are formally designated as level 1, 2, or 3 by a government health authority. The designation is largely based on the ED's level of human resources, essential instruments and equipment, and service levels, such as the availability of certain specialists. Most level-3 EDs are not well equipped and are usually served by general physicians. However, by law, level 1 and level 2 EDs must be covered by emergency physicians 24 h per day. In Korea, there are 20 regional EDs (level 1), 99 local EDs (level 2), approximately 300 small EDs (level 3), and approximately 400 non-ED facilities that treat small numbers of emergency patients (10). The two study hospitals were level-3 EDs, and the majority of the primary ED physicians were not emergency physicians. The ED located in Soon-chang (ED1) is visited by 10,000 people per year and operates 15 beds. It has 30 hospital beds, excluding the intensive care unit (ICU). There are three level-1 EDs nearby to which patients can be transferred after the primary evaluation, and transfer takes approximately 30 min by ambulance. Approximately 7000 people visit the ED located in Moo-an (ED2) annually, which operates nine available beds; the hospital has 300 beds, including the ICU. There are two level-1 centers nearby to which patients can be

transferred immediately after the primary evaluation; transfer takes approximately 30 min by ambulance. In ED1, one primary ED physician, two nurses, and one radiologist work on each shift, and plain radiography and arterial blood gas analysis are available to confirm results immediately. Emergency laboratory testing and computed tomography, magnetic resonance imaging, emergency endoscopy, angiography and intervention, and dialysis are not available. In ED2, one primary ED physician, two nurses, and one radiologist work on each shift, and plain radiography, emergency laboratory testing, portable ultrasonography, and computed tomography are available 24 h per day. Magnetic resonance imaging, emergency endoscopy, angiography and intervention, and dialysis are not available in the ED. The primary physicians in both EDs should be able to stabilize the patient's emergency status and determine the patient's disposition using the available facilities without specialist consultation. If they need to consult a specialist to stabilize an emergency, or if they need to use additional emergency facilities, they should transfer the patient to another hospital. In both EDs, four primary physicians rotate the same number of working days and cover 365 days per year. During the study period, 21 physicians served as the primary physicians for both EDs combined. Five primary ED physicians were board-certified emergency physicians, and 16 were physicians who were not specialists in emergency medicine. The 16 nonemergency physicians were six internal medicine physicians, two general surgeons, two neurologists, one rehabilitation physician, one neurosurgeon, one orthopedic surgeon, one otolaryngologist, one ophthalmologist, and one anesthesiologist.

Study Population

From April 2013 to November 2014, we studied only patients transferred to another hospital from these two EDs who were eligible for emergency transfer based on the study definitions. The process of patients visiting an ED can be divided into input, throughput, and output stages (11). Generally, there are two types of transfers from EDs to another hospital. First, patients could be transferred to a higher-level ED for stabilization when the diagnostic evaluation and emergency treatment (throughput stage) could not be performed by the referring hospital. Second, transfers could occur when the patient wished to be admitted to another hospital after completing evaluation and emergency treatment, when admission units of the referring hospital were not available, or when they were transferred for use of inpatient resources in the receiving hospital (output stage). In our study, only the former case was defined as an "emergency transfer" in the transfer registry. If researchers were not

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