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EPIDEMIOLOGY OF SHORTNESS OF BREATH IN PREHOSPITAL PATIENTS IN ANDHRA PRADESH, INDIA

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□ **Abstract—Background: Shortness of breath is a frequent reason for patients to request prehospital emergency medical services and is a symptom of many life-threatening conditions. To date, there is limited information on the epidemiology of, and outcomes of patients seeking emergency medical services for, shortness of breath in India. Objective: This study describes the characteristics and outcomes of patients with a chief complaint of shortness of breath transported by a public ambulance service in the state of Andhra Pradesh, India. Methods: This prospective, observational study enrolled patients with a chief complaint of shortness of breath during twenty-eight, 12-h periods. Demographic and clinical data were collected from emergency medical technicians using a standardized questionnaire. Follow-up information was collected at 48–72 h and 30 days. Results: Six hundred and fifty patients were enrolled during the study period. The majority of patients were male (63%), from rural communities (66%), and of lower socioeconomic status (78%). Prehospital interventions utilized included oxygen (76%), physician consultation (40%), i.v. placement (15%), nebulized medications (13%), cardiopulmonary resuscitation (5%), and bag-mask ventilation (4%). Mortality ratios before hospital arrival, at 48–72 h, and 30 days were 12%, 27%, and 35%, respectively. Forty-six percent of patients were confirmed to have survived to 30 days. Predictors of death before hospital arrival were symptoms of chest pain (16% vs. 12%; $p < 0.05$) recent symptoms of upper respiratory infection (7.5% vs. 4%; $p < 0.05$), history of heart disease (14% vs. 7%; $p < 0.05$), and prehospital hypotension, defined as systolic blood pressure <90 mm Hg (6.3% vs. 3.7%; $p < 0.05$). Conclusions: Among individuals seeking prehospital emergency medical services in India, the chief complaint of shortness of breath is associated with a substantial early and late mortality, which may be in part due to the underutilization of prehospital interventions. © 2015 Elsevier Inc.**

□ **Keywords**—prehospital; international EMS; shortness of breath

INTRODUCTION

Shortness of breath is a common complaint of patients with acute exacerbations of cardiac and respiratory illness. It is also a frequent reason for individuals to request ambulance services in nations with mature healthcare systems [1]. In two United States (US) studies, prehospital shortness of breath and other respiratory complaints were strong predictors of hospital admission and mortality [1,2]. Furthermore, several reports from the

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World Health Organization (WHO) indicate that >27% of global deaths are attributable to both communicable and noncommunicable cardiovascular diseases and respiratory illnesses (3,4). Thus, patients with shortness of breath contribute substantially to the burden of disease in developing nations.

India is the world's second most populous country and carries the largest burden of cardiovascular disease. As a result of rapid urbanization and increasing tobacco use, cardiovascular risk factors and respiratory diseases are on the rise among South Asians. A 2005 WHO report estimated that cardiovascular and chronic respiratory diseases accounted for 36% of deaths due to chronic disease in India (5). Several epidemiological studies have revealed a rising burden of chronic diseases, especially cardiovascular and respiratory illnesses, among both urban and rural populations, as well as within the lower socioeconomic classes (5–16). However, we are unaware of any study to date that has examined the epidemiology of shortness of breath in patients in the prehospital setting in India. The objective of this study was to define the characteristics and outcomes of patients with shortness of breath seeking prehospital emergency medical services in India.

METHODS

This is a prospective, observational study describing the characteristics and outcomes of patients transported by a public ambulance service with a chief complaint of shortness of breath in India. In 2005, a free central ambulance service was launched by GVK-Emergency Management and Research Institute (EMRI), and it is currently the largest provider of prehospital care in India, operating in 16 of 28 states and territories throughout the country and covering >700 million people. In the state of Andhra Pradesh, GVK-EMRI provides prehospital emergency medical care to all 85 million residents and responds to 3,200 toll-free medical calls per day.

Each ambulance is staffed by a driver with first responder training and one emergency medical technician (EMT). The scope of practice of EMTs in India is not well defined and functionally ranges from the equivalent skill level of a first responder to the level of EMT-Intermediate, as defined by the US National Highway Traffic Safety Administration. Currently, there are no regulatory or certification standards enforced at the national or state levels, and universally accepted training criteria for prehospital providers are not yet in place. Prehospital service providers each establish their own internal training, practice, and supervision policies. EMTs employed by GVK-EMRI underwent 194 h of didactic training in standardized protocols for common conditions in the prehospital setting, as well as 240 h of clinical training before independent patient care.

At GVK-EMRI, emergency medical services (EMS) calls are routed through a central dispatch center, which subsequently contacts and assigns the responding ambulance by cellular technology. After assessment by the prehospital provider, the patient is transported to the nearest hospital unless the patient or family request transport to an alternative medical center. En route to the hospital, EMTs perform basic interventions commensurate with their level of training and dependent upon available resources. Approved prehospital interventions for a patient with shortness of breath include airway positioning, suctioning, i.v. placement, and delivery of basic medications, such as aspirin, nitrates, and nebulized β-agonists. EMTs may also contact call center physicians, also known as emergency response center (ERC) physicians, to discuss the case and to receive treatment recommendations. At any time, up to four ERC physicians are on duty at the central state-level dispatch center and available to receive calls from the field.

Every third adult patient ($\geq$18 years) with a chief complaint of shortness of breath contacting the emergency call center was enrolled during twenty-eight 12-h periods. Enrollment periods were equally distributed over each hour of the day and day of the week. Patients not present at the scene upon EMS arrival and those that refused services were excluded.

During and immediately after transport to the designated medical center, real-time demographic and clinical data were collected by phone from the responding EMTs using a standardized questionnaire. No written report was required of EMTs, so there was no written confirmation of vital signs or interventions. Follow-up information was collected by phone from the patient or a surrogate at 48–72 h after the initial EMS transport and again at 30 days. The study was approved by the Institutional Review Board at Stanford University (IRB#18185) and Ethics and Research Committee at GVK EMRI.

In addition to descriptive data, main outcomes included medical interventions, functional impairment, and mortality. Two criteria were used as markers of functional impairment: capacity for self-care and, for those employed outside the home, the ability to return to work at 48–72 h and at 30 days. Continuous variables were analyzed using the Wilcoxon rank-sum test, and χ^2 test was used to test independence between categorical variables. Multivariate logistic regression modeling was used to examine variables associated with mortality. Significance was set a priori at $p \leq 0.05$. All analyses were performed using SAS Statistical Software (release 9.2, SAS Institute Inc., Cary, NC).