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Original Research

CRITICAL CARE

Prehospital Management of Evolving Critical Illness by the Primary Care Provider

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Background: **The factors that limit primary care providers (PCPs) from intervening for adults with evolving, acute, severe illness are less understood than the increasing frequency of management by acute care providers.**

Methods: **Rates of prehospital patient management by a PCP and of communication with acute care teams were measured in a multicenter, cross-sectional, descriptive study conducted in all four of the adult medical ICUs of the three hospitals in central Massachusetts that provide tertiary care. Rates were measured for 390 critical care encounters, using a validated instrument to abstract the medical record and conduct telephone interviews.**

Results: **PCPs implemented prehospital management for eight episodes of acute illness among 300 encounters. Infrequent prehospital management by PCPs was attributed to their lack of awareness of the patient's evolving acute illness. Only 21% of PCPs were aware of the acute illness before their patient was admitted to an ICU, and 33% were not aware that their patient was in an ICU. Rates of PCP involvement were not appreciably different among provider groups or by patient age, sex, insurance status, hospital, ICU, or ICU staffing model.**

Conclusions: **We identified lack of PCP awareness of patients' acute illness and high rates of PCP referral to acute care providers as the most frequent barriers to prehospital management of evolving acute illness. These findings suggest that implementing processes that encourage early patient-PCP communication and increase rates of prehospital management of infections and acute exacerbations of chronic diseases could reduce use of acute care services.**

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Abbreviations: PCP = primary care provider

Informal conversations with adult, critically ill patients and their families about their strategies for managing evolving acute illness suggested that there are barriers that limit patients from leveraging the expertise of their primary care providers (PCPs). Patients preferred the timely response of the emergency medical system to contacting outpatient offices, in part due to processes that delayed access to their PCP. Patients also believed that the urgent treatments that they needed were not readily or routinely available through the office of their PCP. These observations are consistent with a those of a growing number of studies that detail who manages acute illness in our current health-care environment. According to a US study of 354 million episodes of acute illness, PCPs managed

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care for 42% of acute care episodes, ED providers managed 28%, specialty providers managed 20%, and urgent-care providers managed 7%.[1] The high level of uninsured patients who had acute care episodes managed by ED physicians has been interpreted as evidence for a lack of access to PCPs. More detailed information regarding when, where, and how acutely ill patients engage the health-care system is key to advancing our understanding of how to best provide early intervention for infections and acute exacerbations of chronic illness.

We sought to understand how often PCPs were involved in the prehospital management of adults with evolving acute illnesses. To make estimates that were less dependent on local and known complicating factors, we selected a population that included patients from many PCP practices, included patients from more than one nonfederal health-care system, and selected a population with a diverse, well-balanced mix of public and private payers.[2] A survey was used to measure rates of prehospital management and identify the barriers that prevented PCPs from implementing treatments for patients with evolving acute illness.

Materials and Methods

Study Design

This was a multicenter study evaluating PCP prehospital management for patients with evolving acute illness. This study was conducted between July 19, 2011, and May 14, 2012, at all four adult, medical, tertiary hospital ICUs of the three hospitals in central Massachusetts that provide tertiary care. Three of the four ICUs used a closed staffing model and one ICU used an open model. The study was designed to identify institutions and processes that resulted in higher rates of PCP prehospital management. After accounting for a 10% rate of incomplete or unavailable records, a sample size of 300 episodes of care was calculated to have an 80% probability of detecting a 20% difference in the rates of prehospital management among the participating ICUs using the χ^2 test at an α level of 0.05. The University of Massachusetts Medical School Committee for the Protection of Human Subjects in Research (approval number 00004009) and the institutional review boards at each participating site approved the study. Informed consent was obtained from each PCP at the start of a telephone interview.

A six-item questionnaire was developed by an interdisciplinary focus group using a modified Delphi method and was refined after review by a focus group of seven PCPs who had used the instrument to measure communication regarding one or more of the patients admitted to an adult medical ICU. The instrument was validated by comparing the responses of the PCPs regarding their interactions with the patients to reports from the patient or their representative.

Cases were acquired using a cluster sampling approach in which screening was conducted on randomly selected days. On these days, all patients in an ICU were screened using electronic tools and efforts were made to contact the PCP of every qualifying case. Telephone interviews were conducted by study staff, trained by established methods,[3] who contacted PCPs identified by the patient, family, or in the electronic medical record. Cases were eligible for enrollment when identified within 96 h of patient ICU admission and if they had an identifiable PCP who responded to one of three daily contact attempts made during office hours. If the PCP was not readily available for an immediate telephone conversation, the study staff left a message with return contact information to call back at a convenient time, made a follow-up call later the same day, and, when necessary, on the two following working days.

After confirming the patient's identity using two identifiers and that a PCP-patient relationship existed, the PCP was contacted, verbal consent for the interview was obtained, and a standardized scripted interview was conducted. It included the following six items:

1. Were you aware that the patient is in the hospital? (Yes/No)
2. Who let you know about the illness or hospitalization? (Six levels of response)
3. Did the patient contact your service about the present illness before coming to the hospital? (Yes/No)
4. Was any prehospital intervention recommended by you? (Five levels of positive response/No) If yes, describe.
5. Have you seen the patient in clinic in the last 6 months? (Yes/No)
6. Was this telephone call useful to you? (Yes/No)

Responses were recorded on data-gathering forms, transferred into an electronic database, and confirmed as correctly transcribed by a second member of the study staff.

Categorical variables were compared by χ^2 analysis with appropriate degrees of freedom when numbers of observations in each cell were adequate or by the Fisher-Freeman-Halton Test. Significance was prospectively set at the 0.05 level. Statistical analyses were performed with SPSS version 19 (IBM Corp).[4]

Results

A PCP-patient relationship, defined as at least one patient encounter with their PCP, was identified for 363 encounters (93%) (Fig 1). Complete interview data were obtained from 235 PCPs for 300 of 363 encounters. One subject had two separate ICU encounters during a single hospital stay. We were unable to contact 63 PCPs (17%): 32 PCPs (8.8%) were out of office without a readily available covering clinician, and 31 (8.5%) were unable to complete the interview and did not return calls (Fig 1). The age and sex of the patients and information about their PCPs are presented in Table 1. The characteristics of the 91 patients who were excluded on the basis of not having a PCP who could be identified or contacted were similar to those of included cases. Excluded cases were slightly younger, more likely to be men, and to have an alcohol-related rather than a chronic disease-related diagnosis like congestive heart failure or COPD. The instrument had favorable reliability and accuracy characteristics, as PCP responses were fully concordant with the report or patients or proxies for all 46 instances in which this information was available.

Among patients with a PCP who was available by telephone, prehospital management was prescribed for eight of 300 episodes of acute illness (3%). The