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The impact of the improvement in internal medicine consultation process on emergency department length of stay

Sangheon Shin, MD [a], Soo Hoon Lee, MD [a,*], Dong Hoon Kim, MD, PhD [a], Seong Chun Kim, MD, PhD [b], Tae Yun Kim, MD, PhD [a], Changwoo Kang, MD, PhD [a], Jin Hee Jeong, MD [a], Daesung Lim, MD [b], Yong Joo Park, MD [b], Sang Bong Lee, MD [a]

[a] Department of Emergency Medicine, Gyeongsang National University School of Medicine and Gyeongsang National University Hospital, Jinju, Gyeongsangnam-Do, Republic of Korea
[b] Department of Emergency Medicine, Gyeongsang National University School of Medicine and Gyeongsang National University Changwon Hospital, Changwon, Gyeongsangnam-Do, Republic of Korea

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ABSTRACT

Introduction: Although consultations are essential for delivering safe, high-quality care to patients in emergency departments, they contribute to emergency department patient flow problems and overcrowding which is associated with several adverse outcomes, such as increases in patient mortality and poor quality care. This study aimed to investigate how time flow metrics including emergency department length of stay is influenced by changes to the internal medicine consultation policy.
Method: This study is a pre- and post-controlled interventional study. We attempted to improve the internal medicine consultation process to be more concise. After the intervention, only attending emergency physicians consult internal medicine chief residents, clinical fellows, or junior staff of each internal medicine subspecialty who were on duty when patients required special care or an admission to internal medicine.
Results: Emergency department length of stay of patients admitted to the department of internal medicine prior to and after the intervention decreased from 996.94 min to 706.62 min. The times from consultation order to admission order and admission order to emergency department departure prior to and after the intervention were decreased from 359.59 min to 180.38 min and from 481.89 min to 362.37 min, respectively. The inpatient mortality rates and Inpatient bed occupancy rates prior to and after the intervention were similar.
Conclusion: The improvements in the internal medicine consultation process affected the flow time metrics. Therefore, more comprehensive and cooperative strategies need to be developed to reduce the time cycle metrics and overcrowding of all patients in the emergency department.

1. Introduction

Timely consultations of specialists are essential for safe, high-quality care for patients in the ED. Therefore, consultations occur frequently in the emergency department (ED). They involve an emergency physician (EP) who requests participation in a patient's care from another specialist. However, consultation delays can affects patient flow in the ED and aggravate the severity of overcrowding, which is a growing concern [1]. In addition, the delay in specialist consultation and lack of specialist coverage can result in delayed patient care and increased transfers to hospitals with a higher level of care [2,3].

ED overcrowding is associated with several adverse outcomes, such as an increase in patient mortality and poor quality care [4-8]. In addition, ED overcrowding usually leads to a long emergency department length of stay (EDLOS), and therefore could be connected to patient dissatisfaction and compromised emergent care. Although a large number of solutions have been proposed to reduce ED overcrowding and EDLOS, they will require multifaceted approaches, including consultation strategies and inpatient bed occupancy [9,10].

There have been several studies on the contribution of consultations to ED patient flow and overcrowding [11-14]. While specialty consultation has been associated with increased EDLOS, there is little data regarding the effect of improvements in the consultation process on ED LOS. Because a larger volume of patients are admitted to the department of internal medicine (IM), improvements in IM consultation process will exert more of an effect on patient flow in the ED than modifications of admission strategies to other departments. For this reason, we paid more attention to improving the consultation policy with IM, and examined its impact on EDLOS. Our hypotheses were that specialty consultation delays are an important component of EDLOS and that improvement of the specialty

* Corresponding author at: Department of Emergency Medicine, Gyeongsang National University School of Medicine and Gyeongsang National University Hospital, Gangnam-ro 79, Jinju 52727, Gyeongsangnam-do, Republic of Korea.
E-mail address: ssoon0702@naver.com (S.H. Lee).

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consultation process would have a substantial effect on the decrease in EDLOS.

2. Method

2.1. Design

This study is a pre- and post-controlled interventional study with pre- and post-intervention cohorts. This study aimed to investigate how EDLOS is influenced by changes in IM consultation policy. Therefore, we implemented a new consultation process and compared the outcomes before and after the intervention.

2.2. Time periods

Pre-intervention consultation and admission cycle times were measured for all ED patients from July 2014 to June 2015. The daily inpatient bed occupancy ratio, admission rate, and inpatient mortality were also measured. After the new consultation process was begun, consultation and admission cycle times, EDLOS, admission rates, the inpatient bed occupancy ratio, and inpatient mortality were monitored and measured from July 2015 to June 2016.

2.3. Setting

This study was conducted in the ED of an 885-bed, suburban, academic teaching hospital with 45 beds and an annual ED census of approximately 35,000 patients. The hospital is the sole tertiary medical care facility in the area and treats a large number of patients. The ED is staffed by board-certified emergency attending physicians and residents who are supervised by them. Approximately 11,000 ED patients are admitted annually through the ED, with more than half admitted to the department of internal medicine.

2.4. Measures

The performance measures were the consultation and admission cycle times of ED patients. In electronic medical record (EMR) of our hospital, it can register the subspecialty and attending physician who were on duty when requesting consultation with internal medicine, and the registration time will be automatically entered as well. When the subspecialty of internal medicine changes, it is possible to register the additional subspecialties and attending physicians. Therefore, it is possible to comprehensively understand the contents of every consultation with each subspecialty. To investigate how the new IM consultation and admission policy affected patients admitted to the department of IM differently from patients admitted to other departments, we estimated EDLOS for the group admitted to IM and other departments separately in the pre- and post-intervention period, as well as the overall EDLOS for all ED patients. In addition, the EDLOS for patients discharged by the ED were also measured to investigate the relationship between the rapid admission process to the IM and the burden of the ED. Other time metrics, including arrival to consultation order, consultation order to admission order, arrival to admission order, and admission order to ED departure, were also measured during the study periods. EDLOS data were extracted from our hospital's EMR databases. The data include the time stamps of all patients who visited our ED and bed occupancy data for inpatients. In addition, the inpatient bed occupancy ratio was also measured to investigate the relationship between inpatient bed occupancy and ED overcrowding during the study period. Inpatient mortality was also measured to investigate the relationship between the rapid admission process and insufficient evaluation and acute care in the ED.

2.5. Intervention

Prior to the intervention, attending EPs and senior EM residents consulted IM junior or senior residents of each IM subspecialty who were on duty when patients needed special care or admission to IM. When they were required for patient consultations, they came to the ED and discussed the patient's problem with a number of the admitting physicians including staff from the IM subspecialty after examining the patient, and determined the final admission decision. Thus, all levels of IM physicians were involved in the admission process when an IM consultation for admission was requested by EPs in our hospital. This IM consultation model has an admitting process in which EPs make a request for IM consultations for admission and transfer admission decisions to IM admitting physicians. During the consultation, EPs communicate with admitting physicians while reviewing patient data in real time through EMR. The IM and ED attending physicians involved in the admission process collaborated to design the new consultation and admission process to decrease EDLOS. Therefore, we attempted to improve the IM consultation and admission process to be more concise. After the intervention, only attending EPs consult IM chief residents, clinical fellows, or junior faculty of each IM subspecialty who were on duty when patients required special care or an admission to IM. They review the laboratory and radiologic results of the patient through EMR. If further evaluation is needed for admission, the admitting physicians on duty travel to the ED and make the final admission decision after examining the patient. After making an admission decision, the admitting physician promptly assigns the patient to an on call IM resident to review the patient and facilitate the admission. The difference in the IM consultation and admission process between the pre- and post-intervention periods depends on how involved residents are in the final admission decision (Fig. 1). During the post-intervention period, only high level IM physicians from the admitting physician service take responsibility for admitting patients. However, this new collaborative process may deprive IM residents of training opportunities to learn how to make appropriate decisions regarding patients who need to be admitted. Therefore, we decided to implement this process only during the daytime (7 am–6 pm) and maintain the pre-interventional consultation and admission process during the evening and nighttime (6 pm–07 am). We met to discuss improvements to the consultation and admission process bimonthly during the study period.

2.6. Data analysis

Continuous data are reported as the mean ± standard deviation (SD) or median with IQRs and were compared using Student's *t*-test. Binomial data are represented as the percentage frequency of occurrence and were compared using univariate analysis with the Pearson χ^2-test. Admission cycle times including arrival to consultation order, consultation order to admission order, arrival to admission order, admission order to ED departure, EDLOS, and inpatient bed occupancy, were compared between the pre- and post-intervention groups using Student's *t*-test. We used the two sample Mann-Whitney *U* test to compare each of the post-intervention periods with the pre-intervention periods for variables distributed non-normally among admission cycle times. The pre- and post-intervention IM admission rates and mortality were also compared using the Pearson χ^2-test for differences in proportions. Statistical significance was set at $P < 0.05$. All of the analyses were performed using SPSS statistical software (version 21.0, IBM, Chicago, IL, USA).

2.7. Ethics approval

The study was approved by the Institutional Review Board of Gyeongsang National University Hospital.

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