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Emergency Care Episode Methodology[1]

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Abstract. The objectives of this study were to develop a new "episode of care" definition for the emergency care product and to show that charges by episode are valuable in understanding the economic characteristics of emergency care. The emergency care episode (ECE) was defined as the emergency department encounter and all subsequent, related care provided within 48 hours. Data consisting of 1.6 million episodes, generated from a national claims database, were analyzed by ICD-9-CM Major Diagnostic Category (MDC) and level of service. Related adjunct services were a major determinant of episode charges, and, for several MDCs, hospitalization was important. Results support the concept that episodic data are beneficial to the economic analysis and reimbursement of emergency care.

1. Introduction

Previous studies of the emergency care product have focused on the ED encounter/visit [1] or all ED-generated services received the same day as the initial ED visit [2]. Both definitions exclude related adjunct visits, services including surgery and secondary diagnostic tests, and immediate subsequent admission for the same condition as the initial ED encounter. In order to accurately address issues relating to the costs and benefits of emergency care, a more comprehensive definition of the emergency care product was needed. Using data available in processed medical claims and a series of software techniques, we developed the Emergency Care Episode (ECE). The ECE is a total treatment episode consisting of 1) the initial visit to the ED, 2) related adjunct ambulatory and hospital services provided within a specified timeframe, and 3) subsequent hospital admissions (if applicable).

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[1]The opinions expressed herein are those of the authors alone and are not intended to necessarily represent those of the U.S. Department of Defense or U.S. Department of the Army. Some of the information presented in this paper has been published previously in: S. A. Optenberg, P. Jacobs, K. Bay, D. J. Barer, and E. M. Hall, Emergency Care Episodes: An Economic Profile, *The Journal of Ambulatory Care Management* **18**(1) (1995) 1-12.

2. Methods

The ECE record was developed using a national database of paid medical claims reimbursed through the Civilian Hospital and Medical Program for the Uniformed Services (CHAMPUS) health benefits program.[2] Patients for this study were selected by first identifying all individuals who fit the following criteria: 1) patient had an initial ED visit between 1 October 1989 and 1 March 1993, 2) the visit occurred anywhere in the U.S.A., and 3) CHAMPUS reimbursed the hospital or professional services provider. Next all claim records on the identified patients were extracted. Then, after the claim records were converted into episodes, analysis was limited to ECEs with initial ED visits between 1 January 1990 and 31 December 1992. This restriction eliminated incomplete episodes from the analysis.

Episode building started with summarization of the initial ED visit. The initial encounter was identified by CPT-4 code. All allowed charges[3] and workload on claim record(s) for that ED encounter were summarized and placed into an ECE record. Next, after all ED encounters were processed, all additional paid claims for the ECE patients were extracted and evaluated. Related adjunct medicine, surgery, radiology, laboratory, and psychiatry charges for services provided within a specified time frame (24, 48, and 72 hours) were extracted, summarized, and added to the ECE records. Finally, hospital admissions resulting from and related to the initial ED encounters were summarized and added to the ECE records.[4]

The distribution of adjunct services by medical specialty for non-hospitalized episodes was examined. Results were used to determine which time period should be employed in the ECE-building logic system. Remaining analysis examined episode charges and frequency according to ICD-9-CM MDC and level of service. The levels of service examined were: (1) patients who received only ED services; (2) patients who received ED and adjunct services, but were not hospitalized; and (3) patients who received ED care and were subsequently admitted. The mean charge and coefficient of variation (standard deviation divided by the mean) were computed by MDC and level of service. Also, ED mean charges were computed when adjunct services were present and when they were not so as to determine whether a substitution or transfer effect was occurring between initial ED charges and adjunct services for non-hospitalized episodes.

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[2] CHAMPUS provides medical benefits to military dependents and retirees of the U.S. Department of Defense. Study data were obtained from the Tri-Service CHAMPUS Statistical Database Project (TCSDP) located in San Antonio, Texas. The TCSDP, which converts CHAMPUS administrative claims into episodes-of-care, includes all claims submitted to CHAMPUS for payment from fiscal year 1988 to the present. Detailed information on this database and its usefulness in epidemiolgic and outcomes research have been provided elsewhere[3,4].

[3] Allowed charges are the payment levels determined by CHAMPUS to be "reasonable and customary" for the provided services.

[4] Variations of these same techniques have been utilized successfully for total-patient-treatment episode building and analysis of a number of medical treatment protocols [5]. Details and technical specifications of the ECE building logic and record layouts are available from the authors.

Table 1. Distribution of adjunct services relative to initial ED encounter

Time Period	Allowed Charges	Services
Average, all specialties		
Within 24 hours	92.0%	95.0%
Between 24 & 48 hours	5.2%	3.1%
After 48 hrs, large variation by specialty		
Highest: psychiatry	21.9%	24.1%
Lowest: surgery	4.4%	3.8%

3. Results

A total of 809,145 separate patients involved in 1,571,152 ECEs was created from the extracted data. About 1/3 of the patients were in each of three age groups, with the oldest age group, "45 and over," having the least number of patients. Also, the patient population had an over-representation of females in comparison with the United States population.[5]

Distribution of adjunct charges by major specialty and time period is presented in Table 1. Overall, more than 90% of both allowed charges and workload (number of services) occurred within 24 hours, while more than 97% of both factors occurred between 24 and 48 hours. Based on these results, the decision was made to set the specified time period of the ECE at 48 hours; i.e., the ECE would include all related adjunct services provided on the same or the following day. It should be noted that after 48 hours, the percentages of charges and services showed a large variation when examined by major specialty (from less than 5% for surgery to more than 20% for psychiatry).

Separating the total ECEs into progressive levels of service showed that

- 27.6% of all episodes had ED services only;
- 68.4% had adjunct services, but no admission; and
- 4.0% resulted in admission.

Means and variation (CVs) of ECE charges are summarized in Table 2. When no adjunct services were present, the overall mean charge for ED services was $116 per episode; when adjunct services were present, ED services averaged $186 and adjunct services averaged $417 per episode. The overall mean charge for ECEs with admissions was $9,997. When episodes were summarized by MDC, the results can be generalized as follows:

- the mean ED charge in ED-and-adjunct-services-only episodes was always equal or greater than the mean ED charge in ED-only episodes;
- charges for adjunct services was 2-3 times those for ED services (Figure 1); and
- there was a large variation in the mean charge for admission episodes.

[5] Relative to the U.S. population, patients age 65 and older were under-represented due to the fact that, with few exceptions, medical coverage for beneficiaries transfers from CHAMPUS to Medicare at age 65. Females are over-represented because the beneficiary population consists of military dependents and retirees—the spouse of the average military person is a wife, not a husband.

Table 2. Summary of ECE charges

Level of Service	Average, All MDCs Mean (CV) [MDC]	Highest Average Mean (CV) [MDC]	Lowest Average Mean (CV) [MDC]
ED only	$116 (1.88)	$377 (1.54) [Perinatal]	$71 (1.08) [Skin]
ED and adjunct only			
ED	$186 (1.76)	$457 (1.19)	$123 (1.47)
Adjunct	$417 (2.19)	$1,154 (1.19) [Neoplasms]	$184 (2.09) [Infectious]
ED with admission	$9,997 (2.33)	$43,076 (1.38) [Congenital]	$3,692 (0.95) [Pregnancy]

Generally, a CV of more than 1.0 is considered inconsistent with a normal distribution, indicating progressive skewness. Except for two categories—Mental disorders MDC in the ED-only service level (0.9) and Pregancy MDC in the admissions service level (0.95)—all MDCs demonstrated CVs greater than 1. Also, in most MDCs, for episodes having adjunct services, the variation in adjunct charges was usually greater than the variation in ED charges; and in several MDCs, it exceeded 2.0, indicating extreme cost outliers. Variation in admission charges ranged as high as 4.03 (Nervous system MDC).

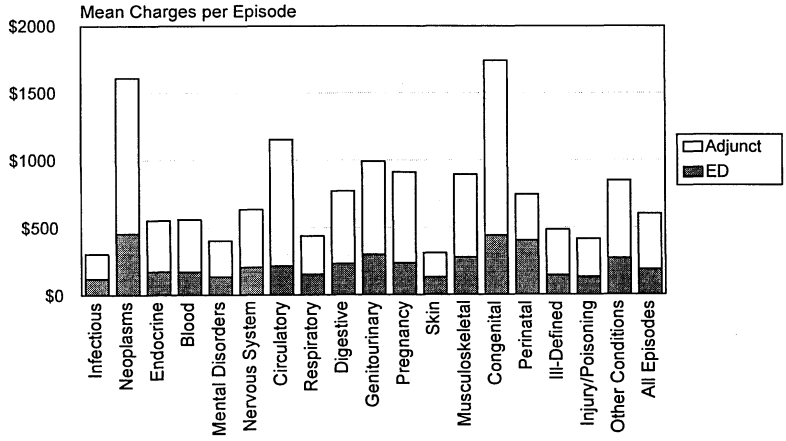

Figure 1. ED and adjunct charges by MDC for episodes with ED and adjunct only services

4. Discussion

The ECE approach to cost and workload measurement of ED care can provide better information for such purposes as reimbursement and economic evaluation. Related adjunct services are frequently present and play a prominent role that needs to be emphasized in any system designed to reimburse the overall emergency continuum of care. When present, adjunct charges averaged more than double the amount of ED charges and demonstrated a very high variation. An important result to note is that ED mean charges did not decrease in the presence of adjunct services. This fact suggests that the presence of adjunct services was not merely an artifact of reporting the initial ER workload in a different way, but represented true additional sources of episode resource consumption. Any "case-mix" funding system would have to account for these sources in inter-episodic variation. Further, the high variance among episodes indicates a large number of high-cost episodes within each MDC (which was verified in further data analysis). Any emergency care case-mix system would have to account for these high-cost episode outliers, just as in the past, high-cost outliers have repeatedly been demonstrated in inpatient case-mix analysis.

5. Conclusions

Our findings show that resources are consumed from the entire episode of care—not just the initial ED encounter. In all MDCs the non-ED components were a significant portion of the total episode charges. Clearly, the episodic approach is the appropriate one to take in evaluating the overall emergency care process, providing a much more accurate estimate of total resource consumption.

References

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