

ED chief complaint categories for a medical student curriculum

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Abstract

Background It is important to stimulate the interest of all medical students in emergency medicine to further its growth nationally and internationally. Students focused on other specialties can benefit from exposure to the more common, less acute problems seen in the emergency department (ED).

Aims We developed a categorization system for chief complaints (CC) in an academic ED fast track (FT) area, so that a curriculum based upon actual CC and clinical experience could be designed for learners.

Methods Primary (first) FTCCs were obtained from the ED electronic record of an academic medical center from 1 to 10 July 2006 and 1 to 10 February 2007. Category definitions were developed, and CCs were collapsed into clinically coherent groups. Inter-rater reliability was

assessed, and CC categories were compared for the two study periods. The study was exempted by the University Institutional Review Board.

Results In the July data set, 493 CCs were placed into 8 categories which captured 96.3% of CCs: pain 32.3%, injury 26.6%, infection 15%, psychiatric 8.1%, miscellaneous 6.1% (those with a frequency of $\leq 2\%$), nurse only visit 5.5%, eye 4.3% and rash 2.2%. The weighted kappa for CC categorization between two observers was 0.8980 (95% confidence interval: 0.8638–0.9322). In the February data set, refinements with 454 CCs resulted in categorization of 96.9% of the CCs into the same 8 categories with 53 subcategories. The distribution of the major categories was similar in July and February ($p=0.13$).

Conclusions The FTCC categorization was valid and reliable and can guide curriculum development for learners in an academic setting.

Research was done while Dr. Kuykendal was a senior medical student at the University of North Carolina

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Introduction

It is important to stimulate the interest of all medical students in emergency medicine to further its growth nationally and internationally. Students focused on other specialties can benefit from exposure to the more common, less acute problems seen in the emergency department (ED). In our medical school, the ED fast track (EDFT) is one option available to medical students to fulfil an ambulatory care curriculum requirement.

We set out to categorize the EDFT patient ‘reasons for visit’, documented as free-text chief complaints (CCs), into clinically useful groupings. Our objective was to better understand the types and volumes of CCs in the EDFT and to assess the educational experience of our students. We

aimed to develop a scheme that would allow us to classify CCs based upon actual clinical experience. A curriculum could then be developed starting with the CC, and then moving onto the process of evaluation and decision making based upon the CC.

Methods

Study design

In this descriptive study, free-text CCs were examined by the lead author, who devised a clinically relevant, hierarchical categorization scheme. The scheme was refined and inter-rater reliability was determined. These data were also compared with free-text CCs analysed during a different time period. This study was exempted by the Institutional Review Board.

Study setting and population

The study took place in an academic medical center's EDFT. The EDFT volume is about 15,000 patients per year, ≥ 16 years of age. FT operates from 9 a.m. to 2 a.m. and all patients presenting during those hours with an Emergency Severity Index (ESI) [1] triage category 4 or 5 (occasionally 3) are examined there. The study analysed the CCs of all patients seen in FT from 1 to 10 July 2006. A second analysis was done from 1 to 10 February 2007.

Study protocol

The triage nurse entered free-text CC as his or her interpretation of the patient's reason for the visit. When > 1 CC was entered, only the first CC was analysed. CCs that were uninterpretable were excluded from analysis. Examples of uninterpretable CCs were the following terms: 'jail', 'bone', 'legs'. From this list of CCs, the lead author developed a hierarchical categorization scheme using face validity. Subcategories were created if there were > 2 complaints in a major category. Each major category had to adequately encompass its subcategories and contain $> 2\%$ of all CCs. When a CC did not meet the above criteria, it was classified as 'miscellaneous'. Face validity [2] was assessed and the scheme revised by the co-authors, two EM faculty members who are experts in emergency medicine medical education. Validity was assessed when CCs were categorized by two different individuals who were medical students on the ED rotation (see "Acknowledgements"), one using CCs from July 2006, and the other using CCs from February 2007. Inter-rater reliability was assessed by one medical student who was blinded to the categorizations, for data from July 2006.

Measurements and data analysis

Simple percentages were used to assess validity, the ability of the scheme to capture the free-text CCs. Kappa scores were used to compare the two independent analyses of the July 2006 data to measure agreement and reliability. Chi-squared analysis was used to compare the data from July and February in order to measure the impact of seasonal variability on the validity of the scheme.

Results

July 2006 study period

Of 512 first CCs, 493 were interpretable and were used for study analysis. For the July 2006 study period, CCs were grouped into 8 major categories and 44 subcategories; 96.3% CCs were categorized. The major categories and their proportions were: pain 32.3%, injury 26.6%, infection 15%, psychiatric 8.1%, miscellaneous 6.1%, nurse only visit 5.5%, eye 4.3% and rash 2.2%.

The unweighted kappa score comparing the two independent analyses for the July study period was 0.89 (95% confidence interval: 0.86–0.93).

February 2007 study period

Of 483 first CCs, 454 were interpretable and analysed during February; 96.9% were categorized into the 8 original major categories. The major categories and their proportions were: pain 30%, injury 24%, infection 21%, psychiatric 10%, miscellaneous 6%, nurse only visit 3%, eye 2.6% and rash 2%. Refinements added 6 additional subcategories (blunt force injury to trunk, blunt force injury to head or neck, transplant, epistaxis, hardware problem and medication refill) (Table 1).

July-February comparison

There was no significant difference for the distribution of the eight major categories between July 2006 and February 2007 ($p=0.13$).

Some important clinical subcategory differences were found in the major category of infection: respiratory infections were more common in February than in July. Respiratory infections comprised 63.9% of all infections in February and 44.5% of all infections in July. Abscesses and other skin infections were more common in July, comprising 36.4% of all infections in July and 15.4% of all infections in February. Bites, burns, lacerations and punctures were more common in July (46% of all injuries) than in February (21% of all injuries). Blunt force extremity

Table 1 Chief complaint, major and subcategories

Major category	Subcategory
Pain	Ear pain
Pain	Jaw pain
Pain	Dental pain
Pain	Headache or migraine
Pain	Neck or shoulder or upper extremity pain
Pain	Knee pain
Pain	Hip or lower extremity pain
Pain	Foot pain
Pain	Chest or side pain
Pain	Abdominal pain
Pain	Back pain
Pain	General muscle or joint pain
Injury	Animal exposure concerning for rabies
Injury	Insect bite or sting
Injury	Blunt force injury to head or neck
Injury	Blunt force injury to trunk
Injury	Blunt force injury to arm or shoulder
Injury	Blunt force injury to wrist or hand
Injury	Blunt force injury to leg or hip
Injury	Blunt force injury to ankle or foot
Injury	Fall
Injury	Low-speed collision
Injury	Minor burn
Injury	Puncture wound
Injury	Laceration to face or scalp
Injury	Laceration to upper extremity
Injury	Laceration to lower extremity
Injury	Wound or incision complication
Injury	Wound or infection follow-up
Infection	Abscess
Infection	Dermatitis suspicious for infection
Infection	Fever
Infection	Pharyngitis symptoms
Infection	Respiratory infection symptoms
Infection	Urinary tract infection or gynaecological symptoms
Psychiatric	Alcohol or drug problem without suicidal ideation
Psychiatric	Depression without suicidal ideation or substance abuse
Psychiatric	Suicidal ideation/attempt or homicidal ideation
Psychiatric	Other mental health issue
Miscellaneous	Allergic reaction
Miscellaneous	Dizziness or vertigo
Miscellaneous	Masses or lumps
Miscellaneous	Nausea/vomiting/diarrhoea/constipation/rectal bleeding
Miscellaneous	Swelling of an extremity
Miscellaneous	Swelling of the face
Miscellaneous	Syncope
Miscellaneous	Epistaxis
Miscellaneous	Transplant
Miscellaneous	Medication refill
Miscellaneous	Hardware problem
Nurse only visit	
Eye	
Rash	

injuries were more common in February (26% of all injuries) than in July (13% of all injuries). Otherwise, the distributions of CCs between July and February were similar.

Discussion

This study demonstrates that an EDFT rotation for medical students can be organized using CCs that are encountered in actual practice. We are using this categorization as we develop a CC-based curriculum for our EDFT medical student rotation. Any educational curriculum is designed to teach the learner what he or she needs to know about the subject. It must be focused enough so that educators can cover the topics, yet broad enough to meet the EDFT educational goals. We feel that this eight major category system (pain, injury, infection, psychiatric, eye and rash) can serve as a starting point for an EDFT curriculum and allows easy breakdown into smaller subcategories. It is not all-inclusive, but can be expanded to incorporate EDFT CCs resulting from different triage practices and patient populations.

The following examples illustrate how a CC-based curriculum is different from a diagnosis-based curriculum. In diagnosis-based curricula, a student may be taught about the radiologic findings and treatment of a Lisfranc fracture of the foot. Using a CC-based curriculum in the category of ‘injury (ankle/foot)’, the student will be taught the process of evaluation of the complaint ‘jumped off a ladder and hurt my foot’—a process that must consider factors such as exactly how the patient got injured, the implications of the mechanism of injury to the body, patient co-morbidities that can affect the injury or its prognosis, the associated injuries that should be anticipated and the proper diagnostics or examination points to confirm or eliminate elements of the differential diagnosis. In our study, 32% and 30% of visits were for the CC category of ‘pain’ in July and February, respectively. CC-based curricula should focus on the assessment of pain using a variety of pain scales, identifying individual risk factors for oligoanalgesia and, most importantly, translating these aspects into timely and effective ED and aftercare pain management [3].

Medical education usually focuses upon diagnosis-based pathophysiology. However, diagnoses do not reflect severity of the condition, mechanism of illness or injury, or co-morbidities, and can vary with the diagnosis terminology preferences of the physician [4]. Educational curricula that typically discuss diagnoses rather than CCs are especially limited when applied to the ED where no information other than the CC is available at the start of the patient encounter, and the evaluation must be focused on the CC. In addition, curricula that list conditions to be mastered may not

adequately reflect the types of complaints seen in day-to-day practice [5].

EDs are typically divided into care areas based upon acuity, for efficiency and staffing. Worldwide, the EDFT is a rich and efficient environment for learning, teaching and clinical practice [6, 7], even in smaller sized EDs [8]. Students interested in specialties besides emergency medicine can benefit from exposure to the more common, less acute problems seen in the EDFT. For the first 2 years of our Department's EDFT offering to meet the medical school's ambulatory care rotation requirement (2006–2008), medical students interested in internal medicine, family practice, anaesthesia, psychiatry, radiology, urology, as well as emergency medicine, selected the EDFT rotation. For most students, this experience would be their only exposure to the world of emergency medicine and the more mundane human ailments. In addition, EDFT provides exposure to important elements such as history taking, physical examination, procedural skills and radiographic interpretation, which are sometimes deficient in interns [9].

Using the CC to develop a systematic approach to learning is effective when applied to common conditions that the student expects to see on a daily basis. However, analysing the CC is difficult due to the variety of presenting complaints, the lack of a standardized terminology or categorization system for CC and the common use of free-text entry to describe a patient's CC.

We arbitrarily selected 10 days of visits, in one summer and one winter month, to obtain about 500 CCs for each study period. Census and admission rate do not vary from week to week in our EDFT. The number of CCs was limited to 500 because the lack of a controlled vocabulary or standardized system for CC required manual categorization. Several studies have used computer text-parsing algorithms to change free-text chief complaints into a coded scheme [10–13]. In these studies, most chief complaints were codable, but only post hoc. These studies concluded that coded CCs could improve syndromic surveillance, communication, ED technology support, inter-hospital evaluation and medical education. While improved medical education is one of the goals listed in these studies, education was not the primary focus for developing a CC coding system. Furthermore, the best scheme for a coherent educational curriculum may not be the same as the best scheme for outbreak detection or research.

Limitations

This system only applies to the EDFT and would not accurately reflect what learners would see in the entire ED. It should be used as a starting point, not as an all-inclusive list. However, the assessment and care of lower acuity

problems is an important part of overall medical education, not just emergency medicine education, and this information could be used in developing part of the curriculum for an entire ED rotation. Our results are limited by location and geography as this was only performed at an academic ED in central North Carolina, and we are unsure about local, regional or global differences in CCs or patient populations. CC analysis in EDFT was limited by triage procedures which could be unique to our institution. For example, patients with mental health complaints who are felt by the triage nurse to not be dangerous to themselves or others are triaged to EDFT. Triage errors, or the use of EDFT in the case of ED overcrowding, could result in triage of more acute patients into EDFT. We attempted to address seasonal variability to ensure that students rotating at different times of the year would have similar clinical experiences based upon CC, and the scheme performed well, but it has only been tested during the months of July and February.

Conclusions

This study describes a valid and reliable categorization scheme for free-text CCs in the EDFT of an academic ED. The scheme can guide curriculum development for learners in an academic setting, based upon actual anticipated clinical encounters that begin with the patient's reason for visit, or CC, rather than upon a diagnosis established at the completion of the encounter.

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Authors' contributions Adam R. Kuykendal, M.D. developed the categorization scheme and had primary responsibility for analysing data and preparing the manuscript.

Judith Tintinalli, M.D., M.S. had primary responsibility for the study concept, developing methodology and editing the manuscript.

Kevin Biese, M.S., M.D.: analysis and interpretation of data; review and editing of the manuscript.

Conflicts of interest None.

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