Original Contribution

Adult emergency department referrals from urgent care centers

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ABSTRACT

Background: Although urgent care centers (UCCs) can often evaluate and treat minor injuries/illnesses, patients may present with life threatening conditions that require immediate recognition, stabilization, and transfer to a higher level of care, beyond the capabilities of most UCCs.
Objective: To describe adult ED referrals from UCCs and to determine the percentage of referrals considered critical, complex, and simple.
Methods: A prospective study was conducted between 8/2016–8/2017 on patients >18 years referred directly to our ED from surrounding UCCs. Referrals were categorized based on investigations/procedures performed or medications/consultations received in the ED.
Results: We analyzed 317 patient encounters; 23 (7.3%) considered critical, 254 (80.1%) complex, and 40 (12.6%) simple. The most common chief complaints for all ED referrals were abdominal pain (62 encounters), chest pain (28), shortness of breath (16), eye pain/injury (16), and leg pain/swelling (15). 68% of patients received laboratory diagnostic investigations and 69% received radiologic investigations. 37% of patients required consultation from a subspecialist. 78% of patients were discharged home. The most common primary diagnoses for all ED referrals were nonspecific abdominal pain (27 encounters), laceration (22), fracture (20), nonspecific chest pain (12), cellulitis (12), and pneumonia (12). The most common primary diagnoses for critical referrals were appendicitis (7) and fracture (3).
Conclusion: Many adult ED referrals in our sample were considered complex and few were considered critical. Individual UCCs should evaluate their current states of ED referrals, and develop educational and preparedness strategies based on the epidemiology of adult emergencies that may occur.

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1. Introduction

Although minor medical and traumatic emergencies are traditionally evaluated and treated in primary care offices and emergency departments (EDs), limited office hours and long wait times have fueled the economy for urgent care centers (UCCs) [1-4]. According to the American Academy of Urgent Care Medicine, there are currently over 9300 walk in, standalone urgent care centers in the United States, with 50–100 new centers expected to open every year (https://aaucm.org). A recently published study examining trends in visits to acute care venues for low-acuity conditions (acute respiratory infections, urinary tract infections, rashes, and musculoskeletal strains) in the United States from

2008 to 2015 demonstrated a decrease in visits to the ED by 36%, with an increase in visits to urgent care centers by 119%, suggesting that patients are more likely to visit UCCs than EDs for the treatment of low-acuity conditions [5].

It is estimated that approximately 2–3% of patients who present to an UCC are subsequently referred to an ED for further evaluation and management [6,7], and there may be several reasons for this occurrence. With the increasing number of options available to adult patients who require the evaluation and treatment of acute medical and traumatic conditions, patients may be unaware of the capabilities and resources of UCCs and therefore confused regarding the most appropriate venue (primary care office, UCC, or ED) for their care. Because the terms "emergency" and "urgent care" may be interpreted as synonymous, adult patients may present to UCCs with potentially life threatening conditions beyond the capabilities of most UCCs, and thus subsequently transferred to a higher level of care. Secondly, adult patients may present to an UCC instead of an ED, despite having the knowledge that their chief complaint requires a higher level of care that an UCC cannot

provide, because their insurer/payer directs them to an UCC in order to limit cost or because of the patient's fear that their ED visit will not be covered by their insurance company if the final diagnosis is deemed a non-urgent condition.

Although UCCs can often address minor injuries or illnesses, patients presenting with life threatening conditions often require immediate recognition, stabilization, and transfer to a higher level of care. Unfortunately, there are no published recommendations regarding the preparedness of UCCs to deal with emergencies that may occur in adult patients, specifically addressing the certification, experience, and skills required of the health care providers that work in the UCC, as well as minimum standards of care for the presence of emergency drugs, equipment, and supplies. Furthermore, UCCs may be subject to EMTALA rules, depending on whether the UCC is private or hospital owned or affiliated, the state where the UCC is located, the proximity of the UCC to the closest ED, whether the UCC is contracted with the Centers for Medicare & Medicaid Services, or whether the UCC provides treatment for emergency medical conditions on an urgent basis for more than one-third of the visits in the preceding calendar year, and therefore mandated to provide medical screening, treatment, or stabilization needed for emergency conditions. Although there is a fundamental difference between EDs and UCCs in reference to staffing (EDs are staffed by medical professionals trained to respond quickly to life threatening emergencies with medical and surgical specialists immediately available to patients who require advanced treatment, and UCCs are often staffed by family medicine practitioners and/or advanced practice clinicians, such as nurse practitioners and physician assistants, who may or may not have training in the recognition, stabilization and treatment of life threatening conditions), days/hours of operation, presence of emergency drugs, equipment, and supplies, and diagnostic imaging capabilities, UCC may have to acutely manage and transfer critically ill or injured adult patients with life threatening conditions.

Although there have been several recently published studies examining the etiology of referrals made directly from UCCs to the ED, two of these studies examined only pediatric patient referrals [8,9] and another study reported data examining both pediatric and adult patient referrals without stratifying reported ED chief complaints and ED interventions performed by age [10]. The objective of this study is to describe adult patient referrals to an ED in central Pennsylvania directly from surrounding UCCs and to determine the percentage of referrals considered critical, complex, and simple. Further characterization of this population may allow for the identification of areas for potential outreach and education to 1) the community, specifically delineating the capabilities and resources available at their local UCC and describing acute medical conditions where their local UCC would be an appropriate venue to be evaluated and treated for their illness or injury, and 2) UCCs to increase proficiency and efficiency in the stabilization, management, and transfer of adult emergencies that may present to their UCC.

2. Methods

We conducted a prospective, observational study between August 1, 2016 and August 1, 2017. Patients >18 years of age directly referred to the ED at the Penn State Hershey Medical Center from a surrounding UCC following medical or traumatic evaluation by a UCC healthcare provider were eligible for inclusion. The Penn State Hershey Medical Center is a Level 1 and tertiary care academic medical center located in central Pennsylvania with a total 420 adult inpatient beds. In fiscal year 2016, there were approximately 75,000 ED visits. Patients who decided to present to our ED on their own volition after being seen by a UCC provider

or who were directed to our ED from the UCC without being evaluated by an UCC healthcare provider were excluded. After identification by ED staff, patient ED stickers (identifying their name, medical record number, and date of birth) were immediately placed on data sheets, secured in identifiable binders located in the triage area and throughout the ED, and collected at the end of each week during the study period by one of the co-investigators (IS).

2.1. Study variables

We retrospectively reviewed ED electronic records for eligible patients, and the following data was abstracted and recorded: patient demographics (gender, age, and race), ED presentation and course (assigned triage level, chief complaint, ED length of stay, disposition, and primary diagnosis based on ICD-10 code assigned), and ED interventions (laboratory and radiologic diagnostic investigations, procedures performed, medications administered, and subspecialty consultations obtained).

2.2. Classification of patient referrals

A panel of 5 physicians, including 3 of the co-investigators (representing emergency medicine and internal medicine) and 2 emergency medicine physicians at our institution (who were blinded to the research study), was assembled to determine a priori the definition of a *simple*, *complex*, and *critical* referrals (Table 1). Because

Table 1
ED interventions considered simple, complex and critical.

Simple	Complex	Critical
Simple laceration repair (Single layer, simple shape, with no complex workup or intervention beyond the repair) All point-of-care testing Urine chemistry, urine beta HCG, glucose, creatinine All oral medications	All supportive measures Supplemental oxygen, fluid resuscitation, blood transfusions All laboratory investigations All serum, urine, cerebral spinal fluid, synovial fluid, and stool diagnostic testing All radiologic investigations X-ray, CT scan, ultrasound, MRI scan All procedures Arterial access, IV placement, central line placement, reduction/ splint placement, complex laceration repair, sedation/ analgesia, ECG, bladder catheterization, foreign body removal, incision and drainage, lumbar puncture, intubation All administered medications IV, subcutaneous, intramuscular, intranasal, topical, nebulized, vaccination All subspecialty consultations All admissions ED Observation Unit, Medicine Admissions, Surgical Admissions	All intensive care unit Admissions All patients who received surgery, cardiac catheterization, or endoscopy/colonoscopy within 24 h of ED visit All resuscitative procedures/protocols as a part of Adult Cardiac Life Support or Advanced Trauma Life Support

of the variability of UCCs to perform laboratory/radiologic investigations and procedures, and to administer intravenous/intramuscular/intranasal/rectal/nebulized medications, for the purposes of defining complex referrals, we assumed that UCCs did not have the capability to perform or administer the interventions listed under "Complex" in Table 1.

2.3. Data entry and analysis

Data entry and analysis was performed using the Resource Electronic Data Capture system (REDCap; Vanderbilt University, Nashville, Tennessee USA). Descriptive statistics were calculated for all response variables. 95% confidence intervals were calculated by standard methods using an online calculator (http://www.graphpad.com/quickcalcs/index.cfm). Significance of differences between simple, complex, and critical visits was determined by non-overlapping 95% confidence intervals. The institutional review board at the Penn State Hershey Medical Center approved the study as expedited status, and consent was waived.

3. Results

Three hundred seventeen patient encounters met eligibility criteria and were included in the analysis. Table 2 demonstrates patient demographics, ED presentation and course, and disposition. When stratified by referral type, 12.6% (40/317) were considered simple, 80.1% (254/317) were considered complex, and 7.3% (23/317) were considered critical. Patient referrals considered simple had lower acuity assigned triage levels, had shorter ED length of stays, and were more likely to be discharged home.

Table 3 demonstrates the most common chief complaints and primary diagnoses of eligible patients, then stratified by simple, complex, and critical referrals. The most common primary diagnosis associated with simple referrals was laceration, with complex referrals was nonspecific abdominal pain, and with critical referrals was appendicitis. The percentage of primary diagnoses that were associated with the most common simple referrals are as follows: corneal ulcer/abrasion (2/8, 25%), laceration (4/22, 18%),

cellulitis (2/12, 17%), fracture (3/20, 15%), and nonspecific abdominal pain (3/27, 11%).

Table 4 demonstrates ED interventions (laboratory and radiologic diagnostic investigations, procedures performed, medications administered, and subspecialty consultations obtained) performed on eligible patients. Sixty-eight percent of included patients received laboratory diagnostic investigations, 69% received radiologic investigations, 76% received a procedure, and 73% received medications. Thirty-seven percent of included patients required consultation from a subspecialist. None of the patients referred from UCCs required resuscitative procedures/protocols as part of Adult Cardiac Life Support or Advanced Trauma Life Support.

4. Discussion

The objective of this study was to describe adult patient referrals to an ED in central Pennsylvania directly from surrounding UCCs and to determine the percentage of referrals considered simple, complex, and critical. Based on our sample, many adult ED referrals were considered complex (80.1%) and few were considered critical (7.3%), while 12.6% of patient referrals were considered simple. Although our data demonstrate that UCCs in our immediate catchment area perform at a high level by referring adult patients who require a higher level of care, we recommend that EDs develop relationships with UCCs in their communities in order to optimize the care of adult patients who present to UCCs.

As mentioned previously, UCCs may encounter patients presenting with life threatening conditions, often requiring immediate recognition, stabilization, and transfer to a higher level of care for acute management of their condition, because of confusion associated with the capabilities of UCCs and/or fear that their ED visit will not be covered by their insurance company if the final diagnosis is deemed a non-urgent condition. In addition, UCCs may be mandated by EMTALA rules to provide medical screening, treatment, or stabilization needed for emergency conditions. Therefore, the development of educational and preparedness strategies by UCCs, based on the epidemiology of life threatening conditions that may present to their UCC, can potentially expedite the stabilization and transport of critically ill or injured adult patients to a definitive

Table 2
Demographics of eligible patients, then stratified by simple, complex, and critical referrals[a].

	All study subjects N = 317	Simple referrals N = 40	Complex referrals N = 254	Critical referrals N = 23
Demographics				
Gender				
Female	173, 54.6%, [49–60]	26, 65%, [49–78]	137, 54%, [48–60]	10, 43.5%, [26–63]
Male	144, 45.4%, [40–51]	14, 35%, [22–51]	117, 46%, [40–52]	13, 56.5%, [37–74]
Age in years (mean)	46, (18), [28–64]	40, (16), [35–45]	47, (18), [45–49]	48, (20), [39–57]
Race				
Caucasian	280, 88.6%, [84–91]	36, 90%, [76–97]	225, 89%, [84–92]	19, 83%, [62–94]
Hispanic	17, 5.4%, [3.3–8.5]	2, 5%, [0.5–1.7]	13, 5.1%, [2.9–8.6]	2, 8.7%, [1.3–28]
African-American	12, 3.8%, [2.1–6.6]	2, 5%, [0.5–1.7]	8, 3.2%, [1.5–6.2]	2, 8.7%, [1.3–28]
Other	8, 2.5%, [1.2–5.0]	0	8, 3.2%, [1.2–5.7]	0
ED presentation and course				
Triage level[b]	2.97, (0.62), [2.9–3.0]	3.5, (0.64), [3.3–3.7]	2.89, (0.59), [2.8–3.0]	2.96, (0.37), [2.8–3.1]
ED length of stay (minutes)[c]	328, (246), [82–574]	135, (63), [115–155]	336, (216), [309–363]	575, (442), [395–755]
Disposition				
Discharge	248, 78.2%, [73–82]	40, 100%, [90–100]	208, 82%, [77–86]	0
ED Observation	7, 2.2%, [0.98–4.6]	0	7, 2.8%, [1.2–5.7]	0
Admit to Medicine	34, 10.7%, [7.8–15]	0	32, 12.6%, [9.0–17]	2, 8.7%, [1.3–28]
Admit to Surgery	27, 8.5%, [5.9–12]	0	7, 2.8%, [1.2–5.7]	20, 87%, [67–96]
ICU	1, 0.3%, [<0.01–2.0]	0	0	1, 4.3%, [<0.01–23]

[a] All values expressed as number of responses, %, [95% confidence interval], except for "age in years", "triage level", and "mean length of stay", expressed as mean, (standard deviation), [95% confidence interval].

[b] Triage level was assigned by the ED triage nurse according to the 2004 ESI (Emergency Severity Index) triage algorithm (www.ahrq.gov).

[c] ED length of stay was determined from the electronic medical record, defined by the time from ED arrival (recorded by the registration associate upon arrival to the ED) to ED disposition (physician entry of an order for admission or discharge from the ED).

Table 3
Most common chief complaints and primary diagnoses of eligible patients, then stratified by simple, complex, and critical referrals[a].

	All study subjects N = 317	Simple referrals N = 40	Complex referrals N = 254	Critical referrals N = 23
Most common chief complaints	1. Abdominal pain (62) 2. Chest pain (28) 3. Shortness of breath (16) 4. Eye pain/injury (16) 5. Leg pain/swelling (15) 6. Laceration (11) 7. Flank pain (11) 8. Finger pain/injury (10) 9. Headache (9) 10. Fall (7)	1. Eye pain/injury (3) 2. Rash (3) 3. Headache (3) 4. Abdominal pain (3) 5. Fall (2) 6. Laceration (2) 7. Facial pain/swelling (2)	1. Abdominal pain (48) 2. Chest pain (26) 3. Shortness of breath (16) 4. Eye pain/injury (13) 5. Leg pain/swelling (13) 6. Finger injury (10) 7. Flank pain (9) 8. Laceration (8) 9. Abnormal labs (5) 10. Cellulitis (5) 11. Cough (5) 12. Headache (5)	1. Abdominal pain (11) 2. Flank pain (2) 3. Altered mental status (1) 4. Leg pain/injury (1) 5. Hand injury (1) 6. Back pain (1) 7. Fall (1) 8. Laceration (1) 9. Difficulty swallowing (1) 10. Trauma (1) 11. Headache (1) 12. Chest pain (1)
Most common primary diagnoses[b]	1. Nonspecific abdominal pain (27) 2. Laceration (22) 3. Fracture (20) 4. Nonspecific chest pain (12) 5. Cellulitis (12) 6. Pneumonia (12) 7. Kidney stone (9) 8. Corneal ulcer/abrasion (8) 9. Urinary tract infection (8) 10. Appendicitis (7) 11. Leg pain/swelling (7)	1. Laceration (4) 2. Nonspecific abdominal pain (3) 3. Fracture (3) 4. Rash (3) 5. Corneal ulcer Abrasion (2) 6. Cellulitis (2) 7. Leg Pain/swelling (2) 8. Muscle strain (2)	1. Nonspecific abdominal pain (24) 2. Laceration (18) 3. Fracture (14) 4. Nonspecific chest pain (12) 5. Pneumonia (11) 6. Cellulitis (10) 7. Kidney Stone (7) 8. Urinary tract infection (7) 9. Corneal ulcer/abrasion (6) 10. Leg pain/swelling (5)	1. Appendicitis (7) 2. Fracture (3) 3. Cholecystitis (2) 4. Kidney stone (2) 5. Ruptured ectopic pregnancy (1) 6. Brain tumor (1) 7. Hand injury (1) 8. Hepatitis (1) 9. Impacted food bolus (1) 10. Traumatic intracranial hemorrhage (1) 11. Subdural hematoma (1) 12. NSTEMI (1) 13. Intestinal perforation (1)

a Numerical value in parentheses denotes total number of chief complaints or total number of primary diagnoses.
b Based on primary ICD-10 code at time of disposition.

care facility. Although we recognize the fundamental differences between UCCs and EDs (staffing, days/hours of operation, presence of emergency drugs, equipment, and supplies, and diagnostic imaging capabilities), our data demonstrate that 21.8% of total adult patients referred were hospitalized, emphasizing the fact that a significant proportion of patients presenting to UCCs in our catchment area were relatively ill or injured with high acuity, and thus inappropriately utilized their local UCC.

We believe that a strategy to decrease the number of adult patients with potentially life threatening conditions that present to UCCs is twofold. First, health care professionals should educate their community, specifically delineating the capabilities and resources available at their local UCC and describing acute medical conditions where their local UCC would be an appropriate venue to be evaluated and treated for their acute illness or injury. Two adult patients may have identical symptoms but have different diagnoses, one with a life threatening condition and one with a nonurgent condition. In a recently published study, attempting to determine whether ED presenting complaint and ED discharge diagnosis correspond sufficiently to support use of the discharge diagnosis as the basis for policies discouraging ED use, the authors conclude that there is an approximately a 90% overlap in symptomology between emergencies and primary care-treatable nonemergencies [11]. For example, an adult with chest pain and shortness of breath may be related to a myocardial infarction (life threatening cardiac etiology) or cough-associated musculoskeletal pain secondary to an upper respiratory infection (non-urgent). We suggest that instead of a list of individual chief complaints that would direct an adult patient to an UCC or ED (as often encountered by a patient who performs an internet search of "urgent care versus emergency department"), algorithms utilizing signs and symptoms, severity and duration of symptoms/pain, and past medical/surgical history be readily available to communities to guide them when seeking appropriate venues for care (primary care office, UCC, or ED). Secondly, health care professionals should

advocate for the universal implementation of the Prudent Layperson Standard. Patients with acute life threatening conditions may delay care, potentially increasing morbidity and mortality, or present to UCCs, knowing the fundamental limitations of UCCs compared with EDs, for fear that their ED visit will not be covered by their insurance company if the final diagnosis is deemed a nonurgent condition. Raven et al. demonstrated that among ED visits with similar presenting complaints as those ultimately diagnosed with a primary care-treatable diagnosis based on ED discharge diagnosis, a significant proportion required immediate emergency care or hospital admission. Thus, this limited concordance between presenting complaints and ED discharge diagnoses suggests that discharge diagnoses are unable to accurately identify nonemergency ED visits [11]. The Prudent Layperson Standard requires health insurance companies to cover ED visits based on the patient's symptoms, and not the final diagnosis, and also eliminates the requirements for prior authorization before seeking emergency care. The specialty of emergency medicine should continue to advocate for and protect patients under the Prudent Layperson Standard despite more recent attacks by government and private payers.

Despite advocating for the education of communities to the capabilities of UCCs and EDs and supporting the universal implementation of the Prudent Layperson Standard, adult patients with life threatening medical conditions may continue to utilize UCCs due to convenience of care (location proximity, hours of operation), limited hours at primary care offices, and long ED wait times. Based on our sample of ED referrals, the most common chief complaints were abdominal pain, chest pain, shortness of breath, eye pain/injury, and leg pain/swelling, similar to those reported in other published studies [10,12,13]. Since these common chief complaints may be associated with either a life threatening diagnosis or non-urgent diagnosis, we advocate for educational strategies targeted towards health care providers working in UCCs, utilizing validated risk stratification tools and prediction models, focusing

Table 4
ED interventions performed on all eligible patients[a].

	Patients who did not receive ED intervention	Patients who received ED intervention
Laboratory investigations		
None	102, 32.2%, [27–38]	
Serum		208, 96.7%, [93–99]
Urine		125, 58.1%, [51–65]
Stool		2, 0.93%, [0.03–3.6]
Cerebral spinal fluid		0
Radiologic investigations		
None	100, 31.5%, [27–37]	
X-ray		108, 49.8%, [43–56]
CT Scan		94, 43.3%, [37–50]
Ultrasound		38, 17.5%, [13–23]
MRI		6, 2.8%, [1.1–6.0]
Procedures		
None	75, 23.7%, [19–29]	
Peripheral IV catheter placement		209, 86.4%, [81–90]
Electrocardiogram		82, 33.9%, [28–40]
Laceration repair		25, 10.3%, [7.0–15]
Reduction, casting, or splinting		8, 3.3%, [1.6–6.5]
Foreign body removal		6, 2.5%, [1.0–5.4]
Incision and drainage		4, 1.7%, [0.5–4.3]
Administered medications		
None	87, 27.4%, [23–33]	
Intravenous fluids		120, 52.2%, [46–59]
Analgesics		111, 48.3%, [42–55]
Antibiotics		65, 28.3%, [23–34]
Anti-emetics		61, 26.5%, [21–33]
Local anesthetics/nerve block		26, 11.3%, [7.8–16]
Vaccination		20, 8.7%, [5.6–13]
Steroids		15, 6.5%, [3.9–11]
Proton pump inhibitors		11, 4.8%, [2.6–8.5]
Nebulized respiratory medication		9, 3.9%, [2.0–7.4]
Anxiolytics		9, 3.9%, [2.0–7.4]
Antihistamines		9, 3.9%, [2.0–7.4]
Antiplatelets		8, 3.5%, [1.7–6.8]
Anticoagulants		8, 3.5%, [1.7–6.8]
Antipyretics		8, 3.5%, [1.7–6.8]
Anti-hypertensives		6, 2.6%, [1.1–5.7]
Antispasmodics		4, 1.7%, [0.52–4.6]
Anti-arrhythmics		3, 1.3%, [0.26–3.9]
Laxatives		2, 0.87%, [0.03–3.3]
Insulin		2, 0.87%, [0.03–3.3]
Pro-coagulants		1, 0.43%, [<0.01–2.7]
Anti-epileptics		1, 0.43%, [<0.01–2.7]
Vasodilators		1, 0.43%, [<0.01–2.7]
Subspecialty consultations		
None	200, 63.1%, [58–68]	
Surgical		69, 59.0%, [42–59]
Medical		53, 45.3%, [37–54]

[a] All values expressed as number of responses, percent, [95% confidence interval].

on the recognition and evaluation of potentially life threatening conditions, such as appendicitis (AIR score) [14], cardiac chest pain (HEART score) [15], pneumonia/shortness of breath (CURB-65 and PORT scores) [16,17], and deep vein thrombosis/pulmonary embolism (Wells and PERC scores) [18-20]. Although we are aware of the fundamental differences between UCCs and EDs, UCCs, whether or not they are mandated under EMTALA rules, should be able to immediately recognize, stabilize, and transfer adult patients with life threatening conditions to a higher level of care. Furthermore, increasing the capabilities of UCCs to recognize medical conditions that do not require a higher level of care may avoid unnecessary ED visits, with median charges for common outpatient conditions reported as $1233 (95% CI $1199– $1268) [21].

Our study has several limitations. Because our data is based on the experience of one ED in central Pennsylvania, our conclusions may not be generalizable to other general EDs in the United States. Another recently published study from an academic, tertiary care ED in Las Vegas Nevada reported that many of their transfers were considered unnecessary, but examined both pediatric and adult patient referrals and did not examine chief complaints, final diagnoses, or ED interventions specific to adult transfers from UCCs [10]. Furthermore, since our ED does not have a transfer agreement with any of the five privately owned UCCs in the surrounding counties, adult patients referred from UCCs may have presented to other medical facilities, and thus not included in our data. We may have overestimated the acuity of patients referred to our ED since our institution is a tertiary care center, or underestimated the acuity of patients referred to our ED since adults with life threatening conditions may have been transported to EDs in closer proximity to the UCC. Therefore, a large multicenter study, including general EDs in a variety of geographic regions and settings (inner city, rural, suburban) and serving UCCs with a variety of practice types (privately owned and operated, hospital/university based), needs to be conducted in order to determine a more accurate view of the epidemiology of life threatening medical and traumatic presentations to UCCs, as well as simple, complex, and critical adult ED referrals from these UCCs.

Another identified limitation is the a priori definition of simple, complex, and critical referrals. The referral categories were based on the opinion of a panel of 5 physicians, including 3 of the co-investigators (representing emergency medicine and internal medicine) and 2 emergency medicine physicians at our institution who were blinded to the research study. Since there are no evidence-based guidelines for the preparedness of UCCs in the United States to manage adult urgencies and emergencies (recommended list of equipment/medications stocked and laboratory/radiologic investigations or procedures provided), variability exists in the capabilities of UCCs, therefore potentially affecting the stratification of our data based on referral category. Data from a large multicenter study would help to develop evidence-based recommendations for preparedness, may help guide the education of health care professionals working in the UCC setting, and would determine if compliance with these recommendations may lead to improved clinical outcomes, such as improved morbidity and mortality rates.

Because of our research design (we did not collect data on the UCC making the referral), we were unable to determine if the ED referral was secondary to the inability to perform certain laboratory/radiologic investigations or procedures, lack of equipment/ medications, lack of experience or knowledge in the assessment and initial management of ill or injured adult patients, or a combination of these factors. Furthermore, we did not collect data on whether certain interventions were performed at the UCC prior to transfer, and therefore referral classification was based on interventions performed in the ED following transfer. By knowing the demographics and overall preparedness of the specific UCC making the ED referral may help to develop individualized educational and preparedness strategies, thus potentially reducing the number of simple ED referrals or the number of complex ED referrals that are subsequently discharged home.

Lastly, although our research design involved prospectively identifying ED patients and retrospectively reviewing their electronic medical records (in order to maximize the number of patients identified in a busy ED without research assistants to prospectively collect data), the data abstracted for each study patient (patient demographics, ED presentation and course, most common chief complaints, ED length of stay, disposition, and most common primary diagnosis) was easily found in their electronic medical record. By utilizing the collection of patient ED stickers and placement of stickers on data sheets in binders, we may have

failed to enroll eligible patients due to the reliance on ED staff who may have been busy or forgot about the research study.

5. Conclusions

Based on our sample, many adult ED referrals were considered complex (80.1%) and few were considered critical (7.3%), while 12.6% of patient referrals were considered simple. Individual UCCs should evaluate their current states of ED referrals, and develop educational and preparedness strategies based on the epidemiology of adult emergencies that may occur. In addition, a large multicenter study would help to develop evidence-based recommendations for preparedness, may help guide the education of health care professionals working in the UCC setting, and would determine if compliance with these recommendations may lead to improved clinical outcomes, such as improved morbidity and mortality rates. Lastly, primary care, UCC, and ED health care providers should focus on educating their communities to the decrease the confusion regarding the most appropriate setting (primary care office, UCC, or ED) to seek medical care based on their presenting signs and symptoms.

Declarations of interest

None.

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