

High Frequency Patient Analysis to Identify Disparities Associated with Emergency Department Utilization in Dallas County

Sushma Sharma^{1*}, Theresa Mendoza¹, Norman Seals², Kristin Jenkins¹, Marshal Isaacs³, Ron J. Anderson⁴

¹Dallas-Fort-Worth Hospital Council Research and Education Foundation, Irving, Texas

²Emergency Medical Service Bureau, Dallas Fire-Rescue

³Emergency Medical Service Bureau, Dallas Fire-Rescue, The University of Texas Southwestern Medical Center, Parkland Health & Hospital System, Dallas, Texas

⁴The University of Texas Southwestern Medical Center, Dallas, Texas

ssharma@dfwhcfoundation.org

ABSTRACT

Objective: Socio-economic, demographic, cultural and environmental inequalities have been reported as determinants of non-urgent use of emergency department (ED). This study aimed to quantify the utilization characteristics of emergency department usage in Dallas County hospitals and to develop an analysis of high ED -utilizing patients using zip codes and “hot blocks”.

Methods: This study used out-patient ED data for 21 Dallas County hospitals from the Dallas-Fort Worth Hospital Council Foundation’s database. Spatial analysis and GIS mapping with ED data was used for high-utilizer patients was used to identify a “hot block” representing patients with the most visits.

Results: In 2012, total 912,302 outpatient ED visits were made by 544,149 patients in Dallas County hospitals. In 2012, total charges for outpatient ED visits were \$2,487,677,034. Based on NYU logarithm, nearly 66 percent of ED visits ideally might be treated in an outpatient venue other than the ED. “Hot spot” analysis enabled us to select zip codes representing the highest ED visits and further investigate the characteristics of those residents who were high ED utilizers.

Conclusion: This study identifies characteristics associated with high ED usage in Dallas County. The study also demonstrates the value and potential public health benefits of health care data-sharing. In the future, we encourage health care data-sharing in order to coordinate care between health care and public health providers ensuring higher quality individual case management.

INTRODUCTION

One in every five Americans has at least one visit to the emergency department (ED) each year.¹ Emergency departments play a key role in the delivery of healthcare services to all people regardless of insurance status or ability to pay for medical needs.² According to US Census Bureau, Texas has the highest number of uninsured people (24.6 percent) in the United States. In Dallas County 33.1 percent of its residents are uninsured.³ However, the ED is not optimal setting for many presenting conditions. Unnecessary use leads to overcrowding and longer wait times, which adversely affect the processes and quality of care.⁴⁻⁶

Socio-economic, demographic, cultural, and environmental disparities have been reported as determinants of non-urgent and excessive use of emergency services.⁷⁻¹¹ Literature suggests that compromised quality of care, endangered patient safety, impaired staff morale and increased cost of care may

result. Additionally, many urban, poor people prefer going to a hospital for care rather than a doctor’s office because of a perceived higher quality than that provided in an ambulatory care setting, including the social and emotional support provided by hospitals which many of these patients lack in the community.¹² Patients, who have traditionally been dependent on ED’s and hospital clinicians, may not understand the importance of the physician- patient relationships available in a patient-centered “medical home” because they have never experienced care in such a setting. During the past few years, a variety of innovative interventions, public health efforts, and community-based case management programs have been implemented to reduce ED overcrowding.¹³

Lack of an integrated healthcare database has been identified as a major barrier to future planning of health care related areas such as expected patient numbers, required work force, quality and safety measures, total charges, cost estimation, community level health care efforts, and public health research. The DFWHC Foundation has built (since 1999) a comprehensive patient data registry that is capable of providing information regarding ED usage, patient charges, and demographic characteristics of the patients from the North Texas region.

Dallas is the largest city in North Texas with a rapidly increasing population and changing demographics.¹⁴ Historically, Dallas’ population was predominantly white (not-Hispanic whites made up 82.8 percent of the population in 1930) but has become diversified as a result of population growth, especially in the last few decades.¹⁵ A report published by DFW international in 2010 highlighted the diversification of population in Dallas with 30.10 percent whites, 43.10 percent Latino, 23 percent African American and 2.40 percent Asian residents.¹⁴ This report also suggested that approximately 26.10 percent of residents in Dallas were new Americans (foreign-born). Over one million new people moved to this area during the past 10 years. In addition, for 43.20 percent of the population, English is not their primary language.¹⁴

To our knowledge, no attempts have been made to investigate characteristics related to emergency department usage in Dallas County. Geographic Information System (GIS) mapping and spatial analysis have been very effective tools for health care research in identifying disparities and to critically examine the issues, strengths, and challenges inherent in disease prevalence and current community and/or hospital-based healthcare.¹⁶ Recognizing the need to investigate the emer-

gency department utilization in Dallas County, researchers explored the use of GIS methodology to analyze the data from zip code levels to “residential blocks i.e hot block” for ED utilization. A ‘hot block’ is an area bounded by four streets in a specific zip code that highest utilization rate of emergency department visits compared to other streets and blocks within the zip code.

The objectives of our research were:

1. To identify utilization characteristics including demographics and charges for emergency department visits in Dallas County during the past 3 years (2010, 2011 and 2012).
2. To develop a “High ED utilization Analysis” for Dallas County through a more detailed analysis including zip codes and a “hot blocks” analysis for the year 2012.

METHODS

The Dallas-Fort Worth Hospital Council Research and Education Foundation (DFWHC Foundation) securely houses the combined data warehouse created in 1999 by the North Texas hospital systems which contains information for over 10.7 million regional patients and more than 51 million hospital encounters. This warehouse collects data from 95 percent of the hospitals in North Texas including 21 hospitals from Dallas County. These records reveal demographic data, payer types, up to 25 diagnoses and surgical/testing procedure codes, charges, current procedural test (CPT) codes, severity of disease, and other information. With the regional enterprise master patient index (REMPI), the Foundation assigns a unique identifier to all patients, allowing the Foundation researchers to track any patient over time by hospital and by payer. For this study, the data for all patients who visited an emergency department of any hospital in Dallas County (21 hospitals) during 2010, 2011 and 2012 were extracted from the DFWHC Foundation’s data warehouse. Only out-patient data were used for high ED utilization analysis. For race and ethnicity, our dataset uses the standard classification used by the US census 3 and the Texas Health Care Information Council (THCIC), which was created by the 74th Texas Legislature in 1995 and functions under the direction of the Department of State Health Services. <http://dshs.texas.gov/thcic/default.shtm>. This classification categorizes race as black/white or Caucasian/Asian or Pacific Islander/American Indian/Es-kimo/Aleut/others and ethnicity as Hispanic or Latino/Not Hispanic or Latino.

A validated New York University Emergency Department (NYU) visit severity algorithm was used to classify visits to the ED based upon diagnosis.¹⁷ This algorithm classifies the ED diagnosis in different categories. Namely, emergent: ED care needed (not preventable/preventable), emergent: primary care treatable, non-emergent, injury, mental health, alcohol, substance abuse, intermediate, others/unclassified (none of above). Diabetes prevalence was compared with HCUP statistical brief for diabetes patients in US hospitals (<https://www.hcup-us.ahrq.gov/reports/statbriefs/sb167.jsp>).

To achieve the first objective, the data from 2010, 2011 and 2012 for Dallas county hospitals were analyzed to obtain a descriptive view of the county. For the second objective,

the data from 2012 for Dallas county hospitals and Zip Atlas were used to perform the more in depth zip code “hot” spot analysis. The Arc GIS mapping system (ArcInfo version 10.0, ESRI, Redlands, CA) was used to combine ED visits with their corresponding zip codes for the year 2012. Zip code information from zip Atlas (<http://zipatlas.com/us/texas.htm>) was used for the analysis. This study was the first pilot attempt to investigate high ED utilizers in the Dallas county using two regional data registries. Similar to the method used in the study by Camden, 30 and based on the highest ED utilization, three zip codes from total 104 zip codes of Dallas County were selected for further hot block analysis. The analysis was limited to 3 zip codes due to funding restrictions for this pilot study. Hot blocks (also known as hot spots) in this study refer to the identified residential blocks representing the highest ED visits within a zip code. The combination of our data and GIS analysis also pinpointed individual, high ED utilization patients (also known as “hot spotters”), which was defined as patients who made more than one visit to the ED in one calendar year. This spatial analysis with data from 2012 not only facilitated access to high ED utilization patients, but also helped to identify the characteristics of the high ED utilizers. Data were analyzed using software SPSS19 (IBM SPSS Inc., Chicago IL).

EMS data for 2012 were used for data matching with DFWHC Foundation’s data to confirm hot blocks (Table 3) in selected zip codes. EMS data were provided by the Dallas Fire-Rescue Department’s billing agency the BioTel EMS system. The billing database was queried to determine the highest ED utilization addresses for all 9-1-1 calls during the study period. This research study was approved by the North Texas Health Information and Quality Collaborative (NTHIQC) which approved the research methodology and the patient/hospital confidentiality protection for all research projects conducted by the DFWHC Foundation.

RESULTS Statistics, demographics and charges of emergency department visits (adult and pediatric) in Dallas County hospitals during three years (2010, 2011 and 2012)

In Dallas County hospitals, the average emergency department visits rate per 1000 patients has been relatively stable with 1590, 1643, and 1671 visits per year for 2010, 2011 and 2012 (Table 1). During 2010-2012, results showed that the total charges for ED visits increased from \$1,851,037,156 to \$2,487,677,034 (Table 1). The New York University emergency department (NYU) visit severity algorithm indicated a stable profile of ED cases during these three years. This includes 10 percent emergent not-preventable and 66 percent of total visits were treatable outside the ED (Figure 1). ED visits related to mental health, alcohol and substance abuse increased from 19,730 in 2010 to 30,107 in 2012. In Dallas County, the highest number of ED visits were made by patients with no insurance (38 percent) followed by patients with Medicaid (29 percent). Additionally, 22 percent of these ED visits were made by patients with commercial insurance and 11 percent were by patients with Medicare.

Table 1: Statistics of Emergency Department visits in Dallas County in 2010 - 2012

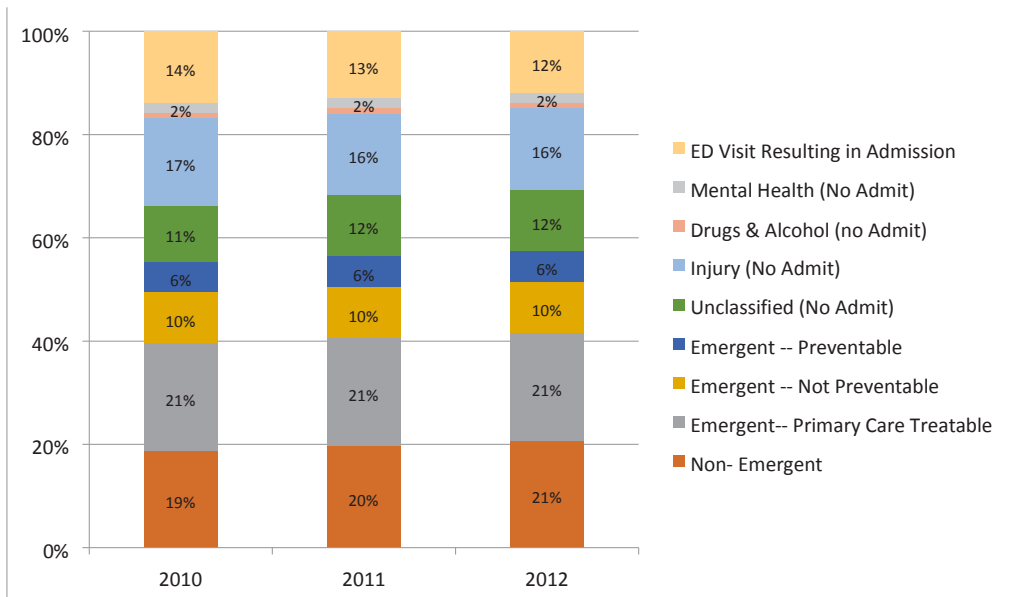
ED visits by year		Dallas		
		2010	2011	2012
Number of Outpatients*		461,158	502,141	544,149
ED Outpatient cases**		732,345	822,495	912,302
ED cases per 1000 patients		1590	1643	1671
Percent Diabetes Prevalence***		13.8%	13.9%	14.1%
ED cases by Females		391,804 (53.5%)	444,147 (54%)	501,766 (55%)
Adult vs. Pediatric Patients	Average Age (Adult/Pediatric)	46 / 7	45 / 7	42 / 6
	ED Cases (Adults/Pediatric)	509,299 / 223,046	583,244 / 239,251	652,797 / 259,505
Payer Group	Insured	138,543	172,753	204,765
	Medicaid	199,963	226,412	268,717
	Medicare	85,234	87,464	89,087
	Uninsured	308,605	335,855	349,733
Charges	Total Charge	1,851,037,156	2,185,046,204	2,487,677,034
	Average Case Charge	2,528	2,657	2,727

*number of out patient emergency department patients during 2010- 2012.

** number of ED visits made by these unique patients during 2010-2012.

*** <https://www.hcup-us.ahrq.gov/reports/statbriefs/sb167.jsp>

Figure1: Percent NYU Categorization of Emergency Department Visits in Dallas County during 2010-2012



Emergency department utilization analysis for Dallas County hospitals (2012)

Zip code analysis using 2012 data: The highest ED utilization zip codes 75216, 75217, and 75243 from Dallas County were selected for further analysis (Map 1). These zip codes had nearly double the ED visits per 1000 patients (3200) than the Dallas County average. More visits were made by females in these zip codes than males. Residents from zip codes 75216 and 75217 had a higher diabetes prevalence (15 percent and 16.1 percent) than the national average i.e. for diabetes is 9.1 percent and 12.6 percent for diabetes related ED visits (Table 2).

When compared with the census data for zip code 75216, whites made more ED visits per capita than other races. Whites in this zip code made nearly 3 visits per resident (3,220 ED visits by 1,121 residents) whereas, 43 percent of black residents visited ED (13,914 ED visits by 32,538 residents. Based on ethnicity, Hispanics/Latinos made up 40 percent ED visits (adjusted for population) and the remainder were by non-Hispanics.

For the zip code 75217, census race data indicated 28 percent black and 38 percent white residents. In 2012, black residents made up 62 percent of the total ED visits. Only 27 percent ED visits were made by whites. Nearly 65 percent of residents in the zip code 75217 were Hispanic/Latino and they made up 38 percent of the total ED visits.

Zip code 75243 had 41percent black, 28 percent white and 26 percent Hispanic/Latino residents. Our results indicated that black patients made more ED visits (57 percent) compared to others. Non-Hispanics/Latino made more visit (78 percent) as compared to Hispanics.

Payer information indicated that these zip codes have the highest percentage of uninsured ED patients (40 percent visits in 75216; 48 percent visits in 75217; 42 percent visits in

75243) followed by Medicaid and Medicare patients. Based on the NYU analysis, 66 percent of ED visits from these zip codes were manageable outside ED. Table 2 presents the total and average charges (the average being \$2415 per ED visit in 2012) for ED visits from these zip codes.

Hot blocks analysis using 2012 data: Block analysis identified the residential blocks within these zip codes with high ED visits using the addresses of the patients who were high ED utilizers. Data from DFWHC Foundation and Dallas-Fire Rescue confirmed these addresses as hot blocks. Table 3 indicates the number of patients and their EMS calls (Dallas-Fire Rescue data) and ED visits (DFWHC Foundation’s data). In addition to these, Dallas-Fire Rescue data also showed that 14 percent-19 percent of the patients were treated on site and were not transported to a hospital ED.

Map 2 shows the high (in red) and moderately high (in green) ED visit hot blocks in zip codes 75216, 75217, and 75243.

Table 3 demonstrates the characteristics of selected patients who were high ED utilizers (based on DFWHC Foundation’s data) residing in identified blocks in selected zip codes. The average age for ED visits varied from 34 to 39 years for adults and 4 to 7 years for children. Percentages of pediatric ED visitors in these hot blocks ranged from 21 percent to 57 percent. Hot blocks were characterized by more ED visits by black patients (48 percent to 70 percent) and non-Hispanics (72 percent-84 percent). Data from the ED visits from these blocks showed that only 26 percent-37 percent were emergent visits (including preventable and non-preventable as well as primary care treatable) and average charges ranged from \$1837 to \$2522 per visit.

High emergency department utilization analysis: Table 4 shows the characteristics of high ED utilization patients in zip codes 75216, 75217, and 75243. The number of ED visits by these high ED utilization patients ranged from 17 to 62 vis-

Map 1: Emergency Department visits in Dallas County zip codes in 2012

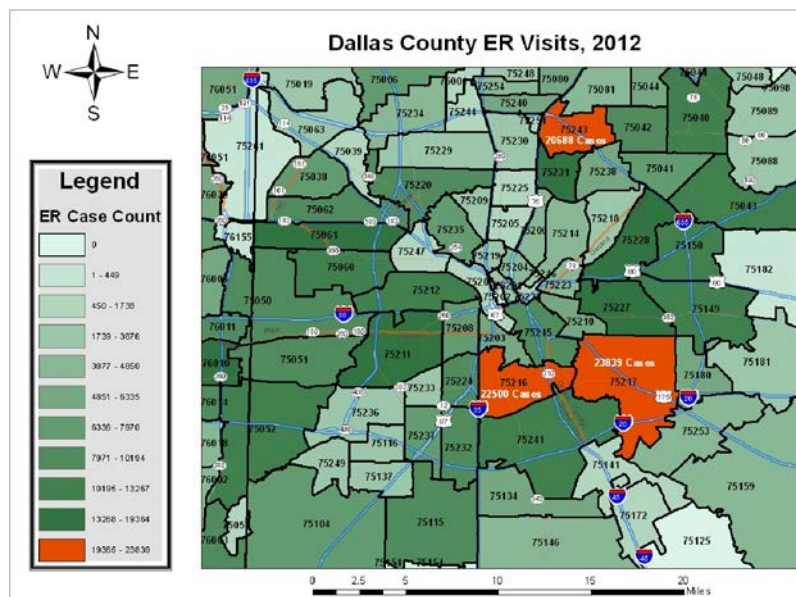


Table 2: Statistics and Demographic Information of high ED visit Zip codes in Dallas County in 2012

County		Dallas		
High ED visits Zip codes		75216	75217	75243
Number of Patients*		6,954	7,615	6,423
ED cases*		22,500	23,839	20,688
ED cases Male/Female		9222/ 13278 (59.4% Female)	8989/ 14850 (62% Female)	7519/ 13169 (64% Female)
% Diabetes Prevalence in ED visitors (number of cases with Diabetes)		15% (3027)	16.1% (2943)	16.2% (1991)
Dialysis/end stage kidney complications		1.18% (266)	0.77%(184)	0.42%(87)
Adult vs. Pediatric Patients	Average Age (Adult/Pediatric)	43 / 5	40 / 5	38 / 5
	Cases (Adult/Pediatric)	18,212 / 4,288	17,675 / 6,164	15,186 / 5,502
Race	Black	13,914	7,716	11,860
	Other***	5,351	9,566	4,782
	White	3,220	6,520	3,564
	Asian or Pacific Islander	9	19	341
	American Indian / Eskimo / Aleut	6	18	142
Ethnicity	Hispanic or Latino	6,061	8,937	4,401
	Not Hispanic or Latino	16,439	14,902	16,283
NYU****	Emergent*****	7,316	7,625	6,302
	Indeterminate	5,391	5,960	5,140
	Injury	2,734	2,986	2,673
	Non-emergent	2,810	3,017	3,114
	Other	4,248	4,252	3,459
Payer Information	Insured	2,927	2,991	2,411
	Medicaid	7,549	8,203	8,003
	Medicare	3,126	2,486	1,696
	Uninsured	8,897	10,159	8,579
Charges	Total Charge	53,091,917	59,211,405	49,671,622
	Average Charge	2,360	2,484	2,401

*number of out patient emergency department patients during 2012

** number of ED visits made by these unique patients during 2012

*** Patients other than black or white race/mixed race/ not known or not reported ****A validated New York University Emergency Department (NYU) visit severity algorithm was used to classify visits to the ED based on diagnosis.²⁰

***** including preventable and non-preventable as well as primary care treatable emergent visits.

its in 2012. NYU analysis revealed that one patient had 81 percent non-emergent visits in 2012 and the average charges ranged from \$1909 to \$5103 per visit. These patients were in the Medicaid, Medicare and uninsured payer group. Pain, chest pain, headache, abdominal pain and acute upper respiratory infections and bronchitis were the most common primary diagnoses.

Table 5 demonstrates the top ten primary diagnoses of high ED utilization patients from zip codes 75216, 75217, and 75243 during their ED visits in 2012.

DISCUSSION

This study provides the first detailed analysis of ED utilization in Dallas County using two key data registries for the area.

Our results indicated no significant change in rate of ED visits (ED visits/1000 patients) during 2010-2012 whereas previous studies have reported steady increases in ED visits in United States since the 1990s.⁸ In addition, percent NYU classification of ED visits in Dallas County during 2010-2012 has been consistent with only 10 percent non-preventable emergent visits. This non-significant increase in ED utilization during the past three years could be partially explained by the recently developed community based, primary care network by public hospital (Parkland Health System) in the low socio-economic status areas. As reported, Dallas Fire-Rescue also treated about 14 percent -19 percent patients in the community in response to their 9-1-1 calls and referred them to community clinics for follow up visits. In addition to the above, long waits

**Table 3: Statistics and Demographic information for the Hot Blocks in Dallas County
Zip codes 75216, 75217 and 75243 (2012)**

Zip code		75216		75217		75243	
Hot blocks		3500 Block E OVERTON RD	3000 Block E LEDBETTE R DR	200 Block STONEPORT DR	100 Block S MARDEA UX LN	9600 Block FOREST LN	9700 Block FOREST LN
EMS data in 2012	(EMS Patients)	290	156	54	82	72	111
	(EMS cases)	636	424	160	228	295	348
	(% Treated onsite and Not Transported)	17%	19%	14%	18%	15%	18%
ED cases in 2012	Hospitals ED Patients*	202	158	155	130	484	349
	Hospitals ED Cases**	525	407	490	399	1312	1088
Adult vs. Pediatric Patients	Average Age (Adult/Pediatric)	39 / 7	38 / 5	37 / 6	34 / 7	34 / 4	34 / 4
	Cases(Adult/Pediatric)	431 / 94	329 / 78	399 / 91	303 / 96	834 / 478	798 / 290
Race	Black	332	283	316	243	634	700
	Other***	187	116	162	151	382	230
	White	<50	<50	<50	<50	255	155
Ethnicity	Not Hispanic or Latino	383	338	400	303	947	898
	Hispanic or Latino	142	69	90	96	365	190
NYU****	Emergent** ***	162	128	143	144	390	399
	Indeterminate	111	117	118	90	344	261
	Non-emergent	80	54	101	52	193	170
	Injury	69	44	50	48	169	119
	Other	103	64	78	65	216	139
Charges	Total Charge	1,061,5 38	784, 330	1,120, 587	892, 353	2,938, 617	2,744, 064
	Average Charge	2,022	1,927	2,287	2,236	2,240	2,522

*number of out patient emergency department patients during 2012

** number of Emergency department visits made by these unique patients during 2012

*** Patients other than black or white race/mixed race/ not known or not reported

****A validated New York University Emergency Department (NYU) visit severity algorithm was used to classify visits to the ED based on diagnosis.²⁰***** including preventable and non-preventable as well as primary care treatable emergent

Map2: Hot Blocks analysis in Dallas County Zip codes 75216, 75217 and 75243

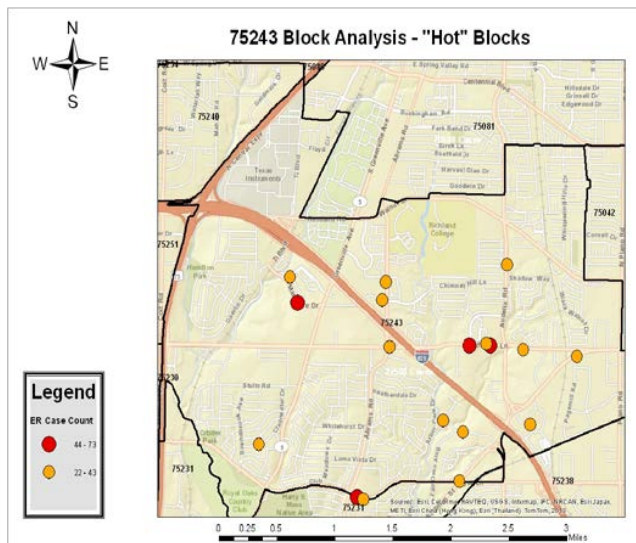
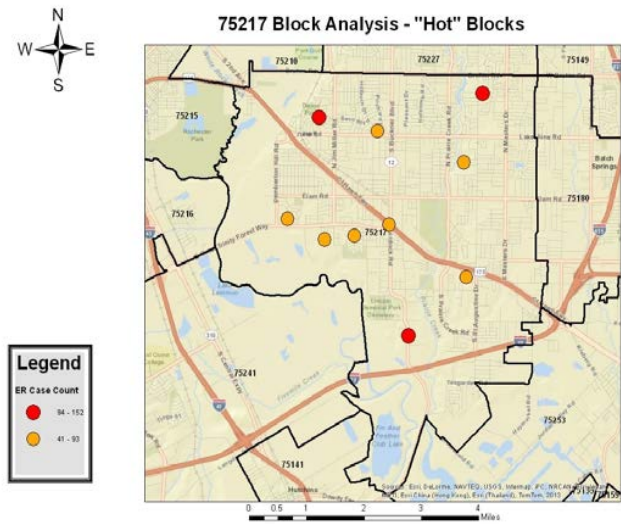
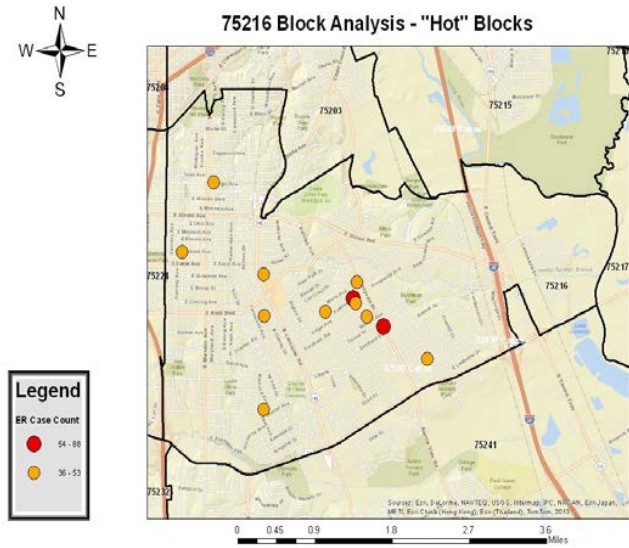


Table 4: High Emergency Department visits from hot blocks (2012)

Zip code		75216		75217		75243	
Top Patients Review		Patient 1	Patient 2	Patient 1	Patient 2	Patient 1	Patient 2
ED Visits in 2012		18	17	49	22	62	53
NYU*	Emergent**	5	12	2	6	41	14
	Indeterminate	3	3	4	5	10	17
		3	1	40	2	3	8
	Non-emergent	4	0	2	5	4	10
	Injury Other	3	1	1	4	4	4
Total Charge		85,624	21,917	93,524	65,260	316,385	202,065
Average Charge		4,757	1,289	1,909	2,966	5,103	3,813
Payer Information		Medicare	Medicaid	Medicare	Medicaid	Medicaid	Uninsured

*A validated New York University Emergency Department (NYU) visit severity algorithm was used to classify visits to the ED based on diagnosis (20).

** including preventable and non-preventable as well as primary care treatable emergent visits.

and overcrowding in EDs could also be a reason for diverting insured patients towards their primary care providers or special care facilities.^{8, 22, 23}

According to The Centers for Disease Control and Prevention (CDC), safety-net emergency departments are facilities that provide more than 30 percent of the total ED visits to people with Medicaid, more than 30 percent of the total ED visits involving uninsured individuals, or a combined Medicaid and uninsured patient population greater than 40 percent.¹⁸⁻²¹ Dallas County hospitals served an average of 68.53 percent combined Medicaid and uninsured patients each year during 2010 (69.44 percent), 2011 (68.36 percent) and 2012 (67.79 percent). In Dallas County hospitals (21 hospitals) during 2010-2012, 38 percent of their ED visits were made by uninsured patients followed by Medicaid, insured, and Medicare patients.

Dallas County had the highest number of ED visits in North Texas during 2012. The highest ED utilization zip codes in Dallas County were 75216, 75217, and 75243. More ED visits were made by females which was a finding consistent with that previously reported by Carret et al 2009.⁷

Zip code analysis (75216, 75217 and 75243) for 2012 data indicate that only 30-32 percent ED visits from selected zip codes were emergent. Results clearly indicate that 68-70 percent visits were not emergent and could have been treated outside ED. This is higher than previously reported results (43 percent) based upon the urban public hospitals data from Dallas.²²

These patients may indicate a lack of access or limited availability to other healthcare options. Studies have reported that this may be a patient's trust in hospitals compared to local clinics because of issues related to timing, appointment, access, and/or cultural reasons.^{7, 11} In addition, due to low reimbursement rate and time consuming payment process, acceptance rates for Medicaid and Medicare patients by Texas physicians is very low.³ As reported previously, many urban, poor patients prefer going to a hospital for care rather than a doctor's office because they perceive hospital care as less expensive and more accessible for them.¹² Finally, providers' and patients' perspectives of emergent vs non-emergent conditions and the need for utilization of the ED often differ. It may seem appropriate to the patients to use a particular resource or service whereas the provider sees it as abusing the EMS instead of using alternative transport or primary care venues.^{7, 12, 22} Interventions promoting patient health education has shown significant impact by reduction in inappropriate ED visits, reduced missed days of school for children and missed days of work for adults.²³

Non-urgent use of ED utilization has been associated with availability of community-based primary care facilities.^{7, 12, 13, 23} In high ED visit zip codes such as 75243, patients have limited healthcare options with only one pediatric community practice and no other community healthcare options. Zip code 75216 has 2 community oriented primary care (COPC) clinics, 1 women's health clinic, 1 pediatric clinic and 1 dental clinic. Zip code 75217 has 1 community oriented primary care (COPC) clinic, 1 youth and family health center, 1 women's

health clinic, 1 pediatric clinic and 2 dental clinics. There were a number of physician's offices in these zip codes but many of these providers do not accept uninsured patients and accept only a very limited number of Medicaid and Medicare patients. As reported earlier, patients often have problems accessing private practices due to limited hours and appointment related challenges.¹² These results highlight the need to develop more community-based health care venues which are easily accessible for extended hours, affordable and culturally competent so that individuals with non-urgent medical conditions may be less likely to delay treatment until an urgent/emergent condition develops. In addition to the above, Kellermann et al 2014 have proposed a model of leveraging the capabilities of modern health information technology, telehealth and training primary care technicians who can expand the impact and reach of patient-centered medical homes by providing basic preventive, minor illness, and stable chronic disease care in rural and resource-deprived communities.²⁴

This analysis revealed that the average age of the ED patients from these hot blocks was 31-40 years. These results support the findings published by Carret et al 2007 reporting that inappropriate ED use was higher in the younger age group (15-49 years) compared to the older age group (50 years or older).²⁵ In Dallas County, this may have been due to the combination of high rate of uninsured patients and the limited health insurance coverage options available to them at the time. In the communities with low socio-economic status, children, pregnant women and the elderly are generally covered by some kind of public or private healthcare coverage (CHIP, Medicaid or Medicare) but young adults and the middle-aged in Texas often have limited options available to them. In addition, simply qualifying for insurance coverage does not solve the problem of access, as these insurance programs often come with many restrictions. Primary care physicians often limit acceptance of these patients due to the lower reimbursement rate compared to that of insured patients.

There are several regulatory barriers to the referral of Medicaid and uninsured patients for specialty care from primary care physicians. Lack of coordination of care and responsibility sharing between different care providers also makes treatment complicated for these patients. In addition to economic reasons, there are social barriers that limit health care access for these patients at primary care clinics (treating the underserved might compromise their clinic's reputation).

Medicaid expansion was a recent opportunity to cover some of the eligible uninsured Texans (individuals and families earning up to 138 percent of the federal poverty level) into the expanded Medicaid plan. But, Texas' decision not to accept the federal Medicaid expansion plan left these uninsured patients with the hospital ED as their most accessible healthcare option. These patients, who would otherwise qualify for the Medicaid expansion coverage, may always be ED- dependent because plans offered by the new Affordable Care Act's may be too expensive, even if it is the lowest-price or with federal subsidies.

According to the National Association of State Mental Health

Program Directors Research Institute's report, in 2012 Texas spent only \$38.99 per capita on mental health care compared to the national average of \$121.47 per capita, ranking Texas 49th in the country.²⁶ Our study showed that in 2012, 30,107 ED visits were made because of behavioral health (mental health, alcohol and substance abuse) related problems. In 2012, the total charges of these behavioral health related emergencies were \$93,142,056 or approximately \$3093.70 per ED visit. Significant increases in behavioral health-related ED visits during the past few years have been associated with a financial burden on Dallas County. Our results indicate an urgent need to address increasing disparities related to behavioral health in specialized settings outside ED. Significant correlations between ED visits and those who are uninsured or Medicaid indicate the economic disparity related to an increased amount of ED visits. Zip code as well as high frequency patient analysis confirms that uninsured and Medicaid were the top two payer groups in high ED visit areas.

Health, socio-economic, racial, ethnic, cultural, and environmental disparities have previously been reported as determinants of non-urgent/excessive use of the ED.⁷⁻¹¹ Cultural and linguistic competence is widely recognized as a fundamental aspect of quality health care (including mental health), particularly for a diverse patient population like in Dallas, which is home to 26 percent foreign-born residents and where English is not the first language for 43 percent of the population.¹⁴ In this study, black and not Hispanic/ Latino patients made significantly more visits to ED. Cultural and linguistic competence is an essential element for reducing disparities by improving access, decreasing utilization and ultimately improving the quality of care delivered. Studies have documented the impact of a patient's language deficiency (e.g. limited English proficiency) and racial and ethnic background in accessing and receiving quality healthcare.²⁸

The number of visits by high ED utilization patients ranged between 17-69 visits in 2012. The non-emergent visits made by high ED utilization patients ranged from 30 percent to 81 percent with an average cost of \$2700 per visit. The top 10 common primary diagnoses of their ED visits were mainly pain (chest pain, headache and abdominal pain), bronchitis, and diabetes related complications. Authors suggest that in addition to expanding culturally-competent and easily accessible primary/community healthcare options and sustainable public health efforts, individualized case management with these patients should be made available. Evidences suggest that the sickest 5 percent of patients account for over half of healthcare costs.²⁹ Therefore, efforts aimed at the "super-utilizers" (including sickest patients) providing intensive outpatient care management to high-need, high-cost patients are being developed and implemented. In New Jersey, the Camden coalition of healthcare providers developed the first successful model for identifying high-utilizers and providing them with highly coordinated care.³⁰ Similar successful efforts have been reported by Amarasingham et al 2013 in reducing heart failure related readmissions.³¹ Our study also suggests that there is an urgent need for targeted efforts in these hot spots and more importantly with these high ED utilization patients,

Table 5: Top Ten Diagnoses in 75216, 75217 and 75243 in 2012

Dallas County					
75216		75217		75243	
Top Ten Diagnosis	Number of Cases	Top Ten Diagnosis	Number of Cases	Top Ten Diagnosis	Number of Cases
Acute upper respiratory infections of unspecified site	628	Acute upper respiratory infections of unspecified site	489	Acute upper respiratory infections of unspecified site	744
Urinary tract infection, site not specified	433	Chest pain, unspecified	379	Abdominal pain, unspecified site	518
Chest pain, unspecified	414	Urinary tract infection, site not specified	337	Fever, unspecified	498
Asthma, unspecified, with (acute) exacerbation	394	Other current maternal conditions classifiable elsewhere, antepartum	326	Headache	466
Unspecified otitis media	370	Asthma, unspecified, with (acute) exacerbation	324	Acute pharyngitis	452
Abdominal pain, unspecified site	352	Headache	322	Unspecified otitis media	450
Headache	351	Chest pain, other	284	Chest pain, unspecified	428
Chest pain, other	294	Abdominal pain, unspecified site	279	Urinary tract infection, site not specified	359
Other current maternal conditions classifiable elsewhere, antepartum	271	Abdominal pain, unspecified site	271	Other current maternal conditions classifiable elsewhere, antepartum	331
Acute pharyngitis	270	Bronchitis, not specified as acute or chronic	233	Bronchitis, not specified as acute or chronic	322

in order to manage their health conditions at non-urgent levels to prevent the development of an urgent/emergent condition. Continuing to rely on emergency departments to provide primary care services for these patients is not a sustainable solution. Author Malcolm Gladwell has also discussed the cost and consequences of not addressing public health issues such as homelessness. In his book, he questions the efficacy of continuing to invest resources on programs which are not sustainable, and in some cases may not be ethical.³²

In Dallas County, authors have identified that to facilitate the personalized care and case management for these patients the first step could be to revise the legal guidelines of patient privacy and health information laws. Staying within the same objective of maintaining high level confidentiality and respecting patient privacy, adding a scope for consent to treat and do case management in an ethical way to provide coordinated

care as a sustainable solution might be an appropriate approach.

Conclusion and Future Implications

This study is the first effort to identify characteristics associated with ED usage in Dallas County. This research examined data from two patient data registries (DFWHC Foundation and EMS) in the Dallas area. Results explaining sociodemographic patterns in ED utilization have major significance in terms of public health planning. High/inappropriate ED use is a multi-faceted problem and requires public health approaches focused on patient, provider, community, and healthcare system level changes. With the identification of the social determinants of health in high ED utilization areas, public health efforts and resources can be more efficiently targeted and focused on management of identified inequalities. These results may guide ongoing community and public health programs

in the Dallas area to implement public health promotion programs.

In the future, we support improvements in health information exchange (HIE) in order to coordinate efforts between different stakeholders and, more importantly, to be able to perform case management like the New Jersey-based Camden program. In addition, health policies and information protection laws i.e. HIPPA and PHI may need to be revised in order to facilitate more personalized efforts for efficient public health programs in these communities.

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