

Emergency Department Utilization in Orange County



Orange County
Health Care Agency

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February 2010

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Acknowledgements

The authors wish to thank Dr. Janel Alberts, Dr. Madonna Fernandez-Frackelton, and Travers Ichinose for their valuable insights and suggestions on this report.

Suggested Citation

“Emergency Department Utilization in Orange County” (2009) Orange County Health Care Agency, QM Research and Planning, Santa Ana, California.

This report is available online at: www.ocalthinfo.com/pubs/

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Introduction

Emergency departments (EDs) play a key role in the delivery of health care in Orange County (OC), functioning as the principal providers of around-the-clock and guaranteed source of care. In 2007, there were over three quarters of a million visits to the county's 26 EDs. As the local economy has experienced a recession, many individuals have lost their jobs and company sponsored health insurance. Others are simply no longer able to afford the increase in premiums for private insurance.¹ The closure of four EDs in the past eight years coupled with the increase in the uninsured has put an increased burden on the county's safety net and hospitals have become increasingly overcrowded.² The issue is the focus of recent legislation (Assembly Bill 911), which seeks to mitigate the overcrowding that has become all too commonplace in EDs across the state.³ In an effort to provide more services with fewer resources, OC hospitals have to understand not only how their EDs are being utilized, but by whom. One concern is that EDs have become a source of primary care for non-urgent, preventable conditions. This may include individuals who do not have health insurance or a regular source of primary care. Another example could be individuals who have health insurance, but for monetary or other reasons, refrain from seeking primary or preventative care for conditions that ultimately deteriorate to the point of requiring the services of an ED.

The goal of this study was to characterize ED utilization in OC and examine what proportion of visits were for non-urgent, avoidable conditions that could be more appropriately treated in a primary care setting. Profiling ED visits can lead to both improvements in primary/preventable care and a reduction in the burden currently placed on emergency departments in the county.

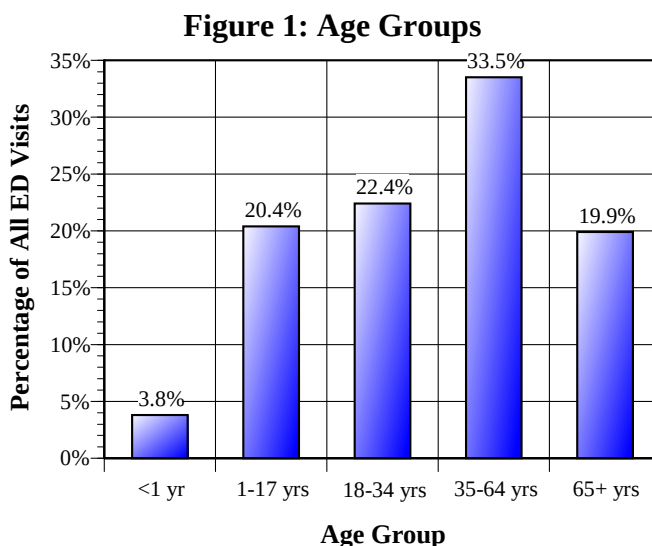
About the Data: The data used in this study were obtained from the California Office of Statewide Health Planning and Development (OSHPD), specifically the 2007 Emergency Department (ED) and Patient Discharge (PD) datasets. These datasets contain individual records included patient demographics, source of payment, and diagnosis specific information for both OC residents and non-OC residents visiting OC facilities. The principal diagnosis (ICD-9 code) recorded for each ED visit was subjected to a classification algorithm developed by researchers and emergency physicians at New York University that grouped ED visits by severity and type.⁴ More specifically, the model classified encounters as avoidable or unavoidable, injury-related, or psychiatric/alcohol/drug related. For example, urgent non-avoidable visits would include conditions such as an appendicitis or heart attack that require immediate ED care. Avoidable visits would include: (1) visits that required ED care but could have been avoided with timely and effective primary care (e.g., asthma, ear infection) as well as (2) visits that are non-urgent and did not require immediate care (e.g., sore throat, fever).

Because the cost of treatment in an ED is much higher than in a primary care setting, it is important to ascertain to what extent non-urgent and preventable conditions are presenting at local EDs. We compare results for OC to a recent report for the entire state of California⁵ as well as present an in depth analysis of the profile and geographic distribution of such avoidable visits.

Visits to Orange County EDs

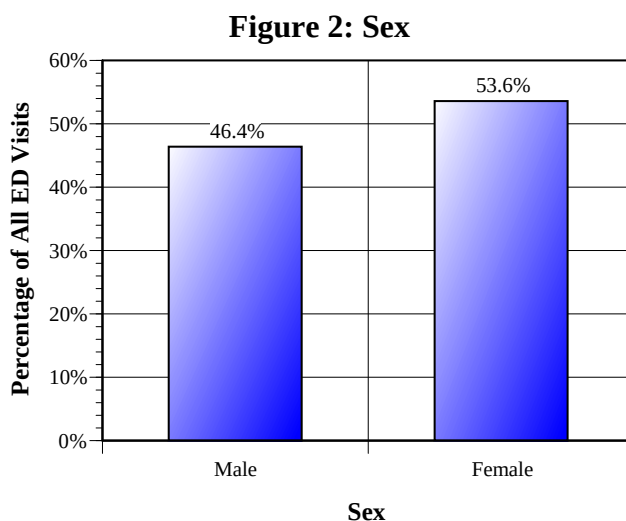
There were a total of 753,617 ED visits in 2007, which included 97,497 visits by non-OC residents presenting at one of 26 OC emergency department facilities in 2007.

Age: Slightly less than 4% of visits to EDs occurred among infants (**Figure 1**). One in five (20.4%) visits occurred for children between the ages of 1 and 17 years of age. Together, 18-34 year olds (22.4%) and 35-64 year olds (33.5%) made up more than half of all visits. Approximately 20% of visits were made by seniors, age 65 years or older.

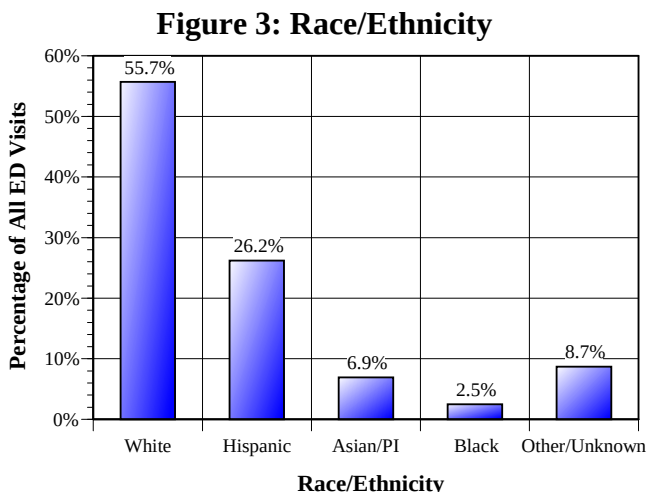


Among OC residents, two age-groups were over-represented, infants by 3% and seniors by 10%, compared to their respective countywide population. In contrast, the three middle age groups were under-represented by about 2 to 8% (not shown).

Sex: Just over half of all visits to OC emergency departments (53.6%) were among females (n=403,760, **Figure 2**). Males represented 46.4% of all visits (n=349,847).

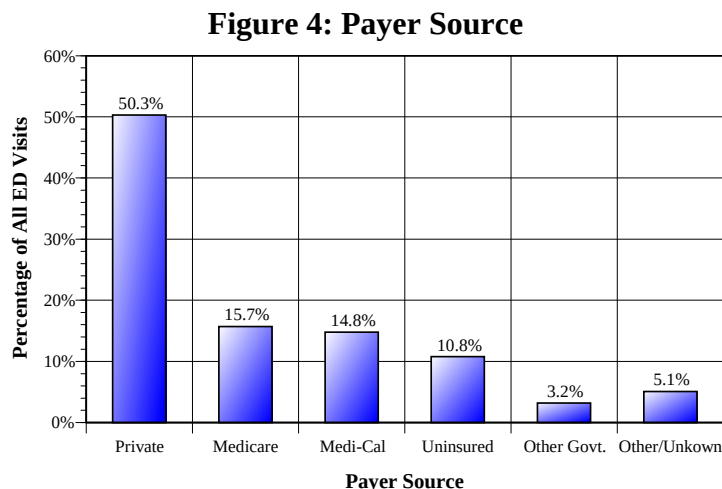


Race/Ethnicity: More than half of all ED visits (55.7%) to OC facilities were made by non-Hispanic whites (n=419,708, **Figure 3**). Hispanics (n=197,188) made up the second largest group, representing about one quarter (26.2%) of visits, while Asian/Pacific Islanders accounted for nearly seven percent (6.9%; n=52,119). The lowest number of ED visits were made by African Americans/blacks (n=18,865), representing 2.5% of all ED visits. For a large number of visits to OC ED's the patient's race/ethnicity was unknown or not provided (n=65,737, 8.7%).



Among OC residents, non-Hispanic whites were over-represented by about 10%, while Hispanics & Asian/Pacific Islanders were under-represented by about 8 to 9%, compared to their respective countywide populations. African Americans were slightly over-represented by less than 1%.

Payer Source: Half of all ED visits (50.3%) were paid for through private insurance (n=379,398, **Figure 4**). Medicare (n=118,533) and Medi-Cal* (n=111,618) each represented approximately 15% of all ED visits. Note that about 2% of Medicare visits were made by eligible (e.g., disabled) persons under the age of 65. Another 3.2% of visits were reimbursed through some other government program (n=24,392). About one-in-ten (10.8%) visits were made by individuals who had no insurance, including individuals who paid out of pocket (n=81,463). The payer source for the remaining 5.1% of visits was either of another form or unknown (n=38,213).



* Includes persons covered by the Healthy Families insurance program.

Most Common Reasons for Visiting Orange County EDs

Typically, health issues affecting individuals vary across the stages of life, as reflected in the presenting conditions for ED visits by different age groups. The five most common diagnoses for ED visits in each age group are presented in **Table 1**.

Table 1: Top Five Diagnoses by Age Group

Top Five Diagnoses for Emergency Department Visits, by Age group (ICD-9 code)	Number of All ED Visits	% of All ED Visits	% of ED Visits Resulting in Hospital Admission
Children age < 1 year, total visits = 28,944 (4%)			
Acute upper respiratory infection (465.9)	3,939	13.60%	1.40%
Fever (780.6)	2,873	9.90%	6.00%
Otitis media (inflammation of the middle ear) (382.9)	1,803	6.20%	0.30%
Acute bronchiolitis (466.1)	1,579	5.50%	30.30%
Nausea and vomiting (787.0)	1,312	4.50%	2.00%
All other diagnoses	17,438	60.20%	12.60%
Total:	28,944	100.00%	10.20%
Children ages 1-17 years, total visits = 153,743 (20%)			
Otitis media (inflammation of the middle ear) (382.9)	7,723	5.00%	0.20%
Open wound of face w/out mention of complication (873.4)	6,660	4.30%	0.20%
Acute upper respiratory infection (465.9)	6,573	4.30%	0.40%
Abdominal pain (789.0)	6,453	4.20%	4.60%
Fever (780.6)	6,340	4.10%	3.50%
All other diagnoses	119,994	78.00%	7.20%
Total:	153,743	100.00%	6.00%
Young Adults ages 18-34 years, total visits = 168,924 (22%)			
Abdominal pain (789.0)	10,020	5.90%	3.30%
Conditions complicating pregnancy, childbirth or puerperium (648.9)	4,576	2.70%	6.30%
Chest pain (786.5)	4,548	2.70%	3.60%
Threatened abortion (640.0)	3,541	2.10%	0.50%
Headache (784.0)	3,201	1.90%	1.50%
All other diagnoses	143,038	84.70%	11.70%
Total:	168,924	100.00%	10.40%
Adults ages 35-64 years, total visits = 252,198 (34%)			
Chest pain (786.5)	14,850	5.90%	26.40%
Abdominal pain (789.0)	12,929	5.10%	6.00%
Headache (784.0)	4,967	2.00%	2.40%
Lumbago (724.2)	3,794	1.50%	1.80%
Migraine (346.9)	3,269	1.30%	3.00%
All other diagnoses	212,389	84.20%	23.50%
Total:	252,198	100.00%	21.80%
Older Adults ages 65+ years, total visits = 149,787 (20%)			
Chest pain (786.5)	6,557	4.40%	41.30%
Urinary tract infection (599.0)	4,476	3.00%	44.80%
Congestive heart failure (428.0)	4,117	2.70%	84.60%
Pneumonia organism (486)	3,843	2.60%	81.70%
Abdominal pain (789.0)	3,568	2.40%	10.60%
All other diagnoses	127,226	84.90%	45.70%
Total:	149,787	100.00%	46.60%

Note: There were 21 visits with missing age information.

Infants (Age <1 year): For almost 14% of infant visits, the most common diagnosis was acute upper respiratory infections, followed by fever (9.9%) and ear infections (6.2%). There was no difference between the top reasons of the ED visits of boys (55% of the infant visits) and girls (45% of infant visits)

Children (Ages 1-17 years): In addition to common childhood illnesses such as acute upper respiratory infection, ear infection and fever, one of the top five reasons children and adolescents (ages 1-17 years) went to the ED was for open wound of face (4.3%). More than two thirds of the visits for open wound of face were among males (67%). Overall, more than 55% of all ED visits in this age group were among males compared to females (45%).

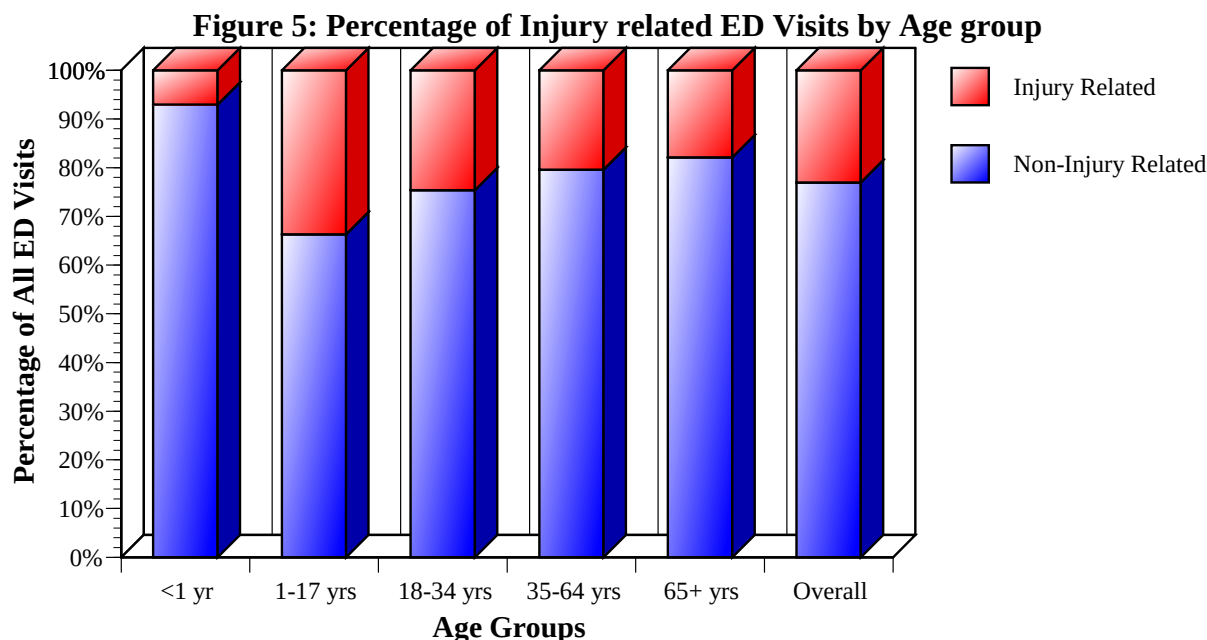
Young Adults (Ages 18-34 years): Fifty eight percent of all visits in this age category were among females compared to males (42%). Abdominal pain, chest pain and headache were the common diagnoses for ED visits among both genders. For female visits complications related to pregnancy and threatened abortion were the other common reasons, while open wound of finger and open wound of face (not shown) were some of the other common reasons for male visits.

Adults (Ages 35-64 years): The common diagnoses among adults in this age group included chest pain, abdominal pain, headache and disorders of back (lumbago). More than half of the visits in this age group were among females (53% Females; 47% Males). Other common reasons for male visits included calculus of ureter (stone formation) and open wound of finger, while urinary tract infection was another common reason for female visits.

Older Adults (Ages 65+ years): The leading conditions for emergency visits for older adults were chest pain, urinary infection, congestive heart failure, pneumonia and abdominal pain. More than half of the visits in this age group were among females (54%). Syncope and collapse was another common diagnosis for ED visits among both males and females in this age group.

Most common Injury-Related Diagnoses for ED Visits

Due to the large number of injury related visits (23%; **Figure 5**), the most common injuries and their underlying cause were analyzed in order to help guide injury prevention efforts. Children 1 to 17 years of age had the highest percentage of injury-related ED visits (34%), followed by young adults (18-34 years; 25%). Middle-aged adults (35 to 64 years) and seniors (65+ years) each had about 20% of ED cases resulting from injury. In contrast, infants had the lowest percentage of injury related visits.



Infants (Age <1 year): Less than 7% of all infant visits were related to an injury, most common being injury to head, face or neck. Nearly one half of injury-related visits for infants were associated with accidental falls, mainly from furniture (**Figure 5**).

Children (Ages 1-17 years): Injury-related diagnoses accounted for 1 in 3 ED visits for this age group. The majority of injuries typically resulted from striking against or being struck accidentally by objects or persons during sports, accidents due to overexertion, and falls due to slipping or tripping.

Young Adults (Ages 18-34 years): Almost 25% of visits were related to injury – the most common injury diagnoses included open wound of finger, sprains of back or foot, and open wound of face. Over 44% of injuries were caused by accidents due to overexertion; accidents caused by cutting/piercing instruments, or sports-related injuries. Motor vehicle traffic crashes and falls were external causes of 30% of injury-related visits.

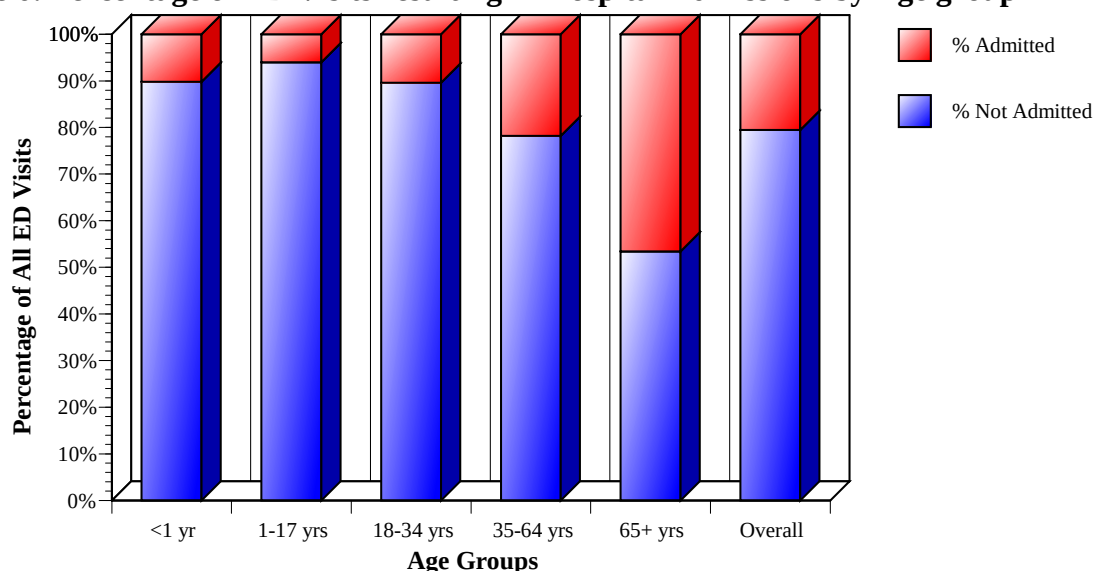
Adults (Ages 35-64 years): One in five ED visits were injury related among middle aged adults. Common injury-related diagnoses were the same as for younger adults above including open wound of finger or face, and sprains of back or foot. Sports-related injury, accidents due to overexertion, or injury caused by cutting/piercing instruments accounted for 40% of the injuries. Nearly 23% of injuries were caused by falls and 12% were caused by motor vehicle traffic collisions in this age group.

Older Adults (Ages 65+ years): Eighteen percent (18%) of all visits for this age group were related to injuries. The most common injury diagnoses included open wound of head, contusions of face, scalp or neck, fracture of neck or femur and injury of head, face or neck. Accidental falls including slipping or stumbling caused more than a half (57%) of injuries for seniors.

Hospital Admissions

While the majority of people visiting the ED are routinely sent home, about 20% need to be admitted to the hospital for further treatment and/or observation. About 10% of ED visits of infants (age <1) and 6% of children (ages 1-17) resulted in a hospital admission (**Figure 6**). Importantly, the percentage of visits resulting in admission increased systematically with age, from 10% for young adults (ages 18-34) to almost half (47%) of the ED visits for seniors.

Figure 6: Percentage of ED Visits resulting in Hospital Admissions by Age group



Among infants, acute bronchiolitis (6% of all infant visits) was the only diagnosis among the most common conditions in which almost 1 in 3 visits to the ED resulted in a hospital admission, while 26% of the visits related to chest pain among adults ages 35 to 64 years resulted in a hospital admission (**Table 1**). Among seniors, the diagnoses with the highest percentages of admissions were for congestive heart failure (84.6%) and pneumonia (81.7%).

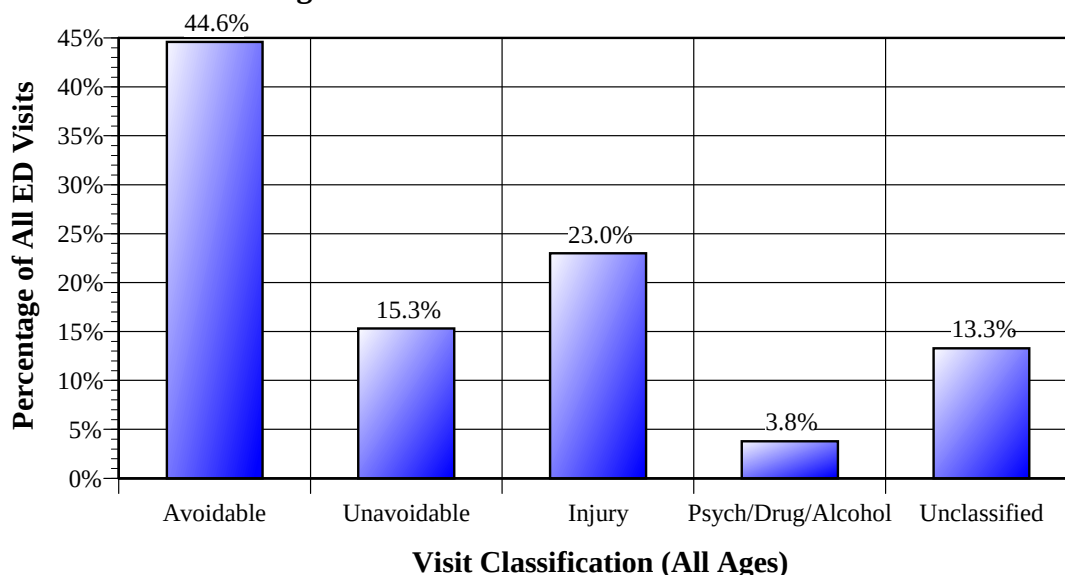
Classification of Urgent versus Non-Urgent ED Visits

Treatment of non-urgent conditions or visits that are urgent but could have been avoided with the proper preventative care can be a heavy burden on emergency departments. Therefore, it is important to assess the magnitude of primary care treatable or avoidable cases presenting at EDs in OC. To accomplish this, a classification algorithm developed by researchers and physicians at New York University was utilized.⁴ Based on the algorithm, all visits were grouped into one of five categories:

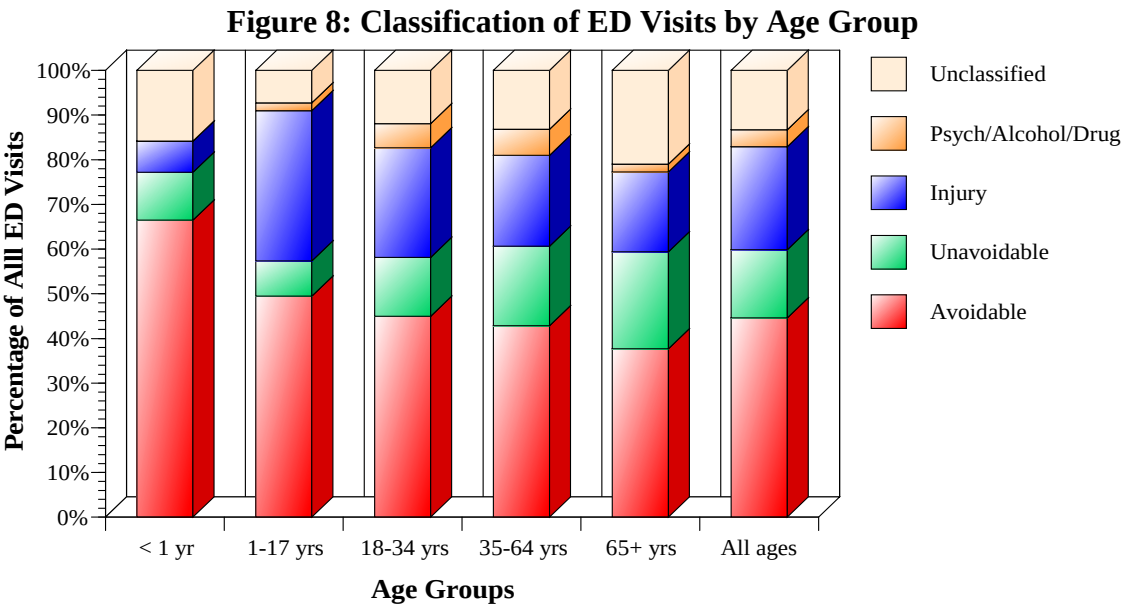
- (1) *Avoidable* - Includes cases that did not require immediate care, required immediate care but could have been treated in a primary care setting (e.g. certain lab tests), and those cases that required the services of an ED, but could have been prevented with regular primary care treatment (e.g. chronic conditions such as diabetes).
- (2) *Unavoidable* - Those cases that were emergent and could not have been prevented (e.g. appendicitis).
- (3) *Injury* – Cases where the primary diagnosis was coded as an injury.
- (4) *Psychiatric & Drug/Alcohol* - Cases where the primary diagnosis was related to mental health, drugs or alcohol.
- (5) *Unclassified* – Those residual cases where the diagnosis could not be otherwise classified in one of the above categories.

As shown in **Figure 7**, 44.6% or 336,113 of all visits to OC EDs could have been avoided or otherwise treated in a primary care setting. In contrast, 15.3% of all ED visits were classified as unavoidable. Nearly one-in-four (23%) were injury-related and 3.8% were classified as Psychiatric, Drug, or Alcohol-related.

Figure 7: Classification of All ED Visits.

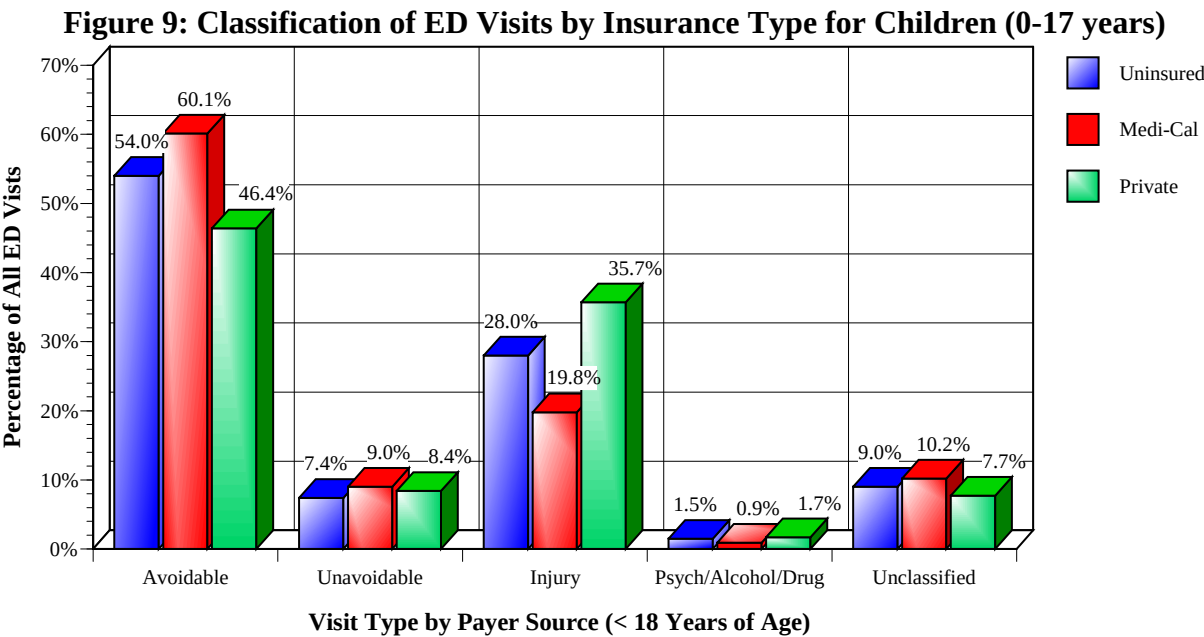


Classification of ED Visits by Age Group: Infant children (<1 year) had the highest percentage of avoidable ED visits, accounting for almost seventy percent of all visits for this age group (**Figure 8**). The percentage of avoidable visits decreased with age from about 50% for children 1 to 17 years down to about 40% of ED visits by older adults (65+ yrs) being classified as avoidable.



Injury-related ED visits were most common for children (1-17 years) while seniors had the highest percentage of unavoidable visits (and subsequent hospital admissions, see **Figure 6**). Adults 18-34 and 35-64 years had the highest percentages of psychiatric/alcohol/drug related ED visits.

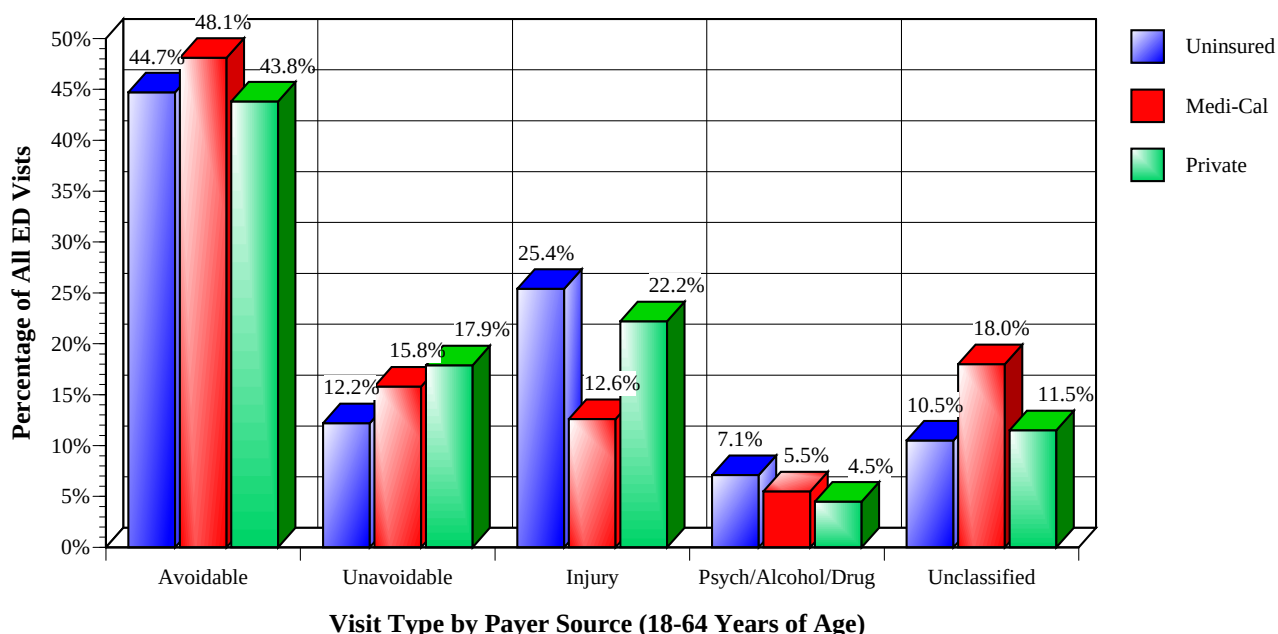
Classification of ED Visits by Payer Type for Children (0-17 years of age): Children covered by Medi-Cal had the highest percentage (60.1%; 95% CI: 59.7%-60.5%) of avoidable ED visits, specifically 14% more than children with private insurance (46.4%; 95% CI: 46.1%-46.7%) and 6% higher than uninsured children (54.0%; 95% CI: 53.3%-54.8%; **Figure 9**). One possible reason that those with private insurance had the lowest percentage of avoidable visits may be access to a regular source of primary/preventive care (i.e., medical home).



Interestingly, children with private insurance had a much higher percentage of injury-related ED visits (35.7%; 95% CI: 35.4%-36.0%) compared to uninsured (28%; 95% CI: 27.3%-28.8%) and Medi-Cal (19.8%; 95% CI: 19.5%-20.1%) covered children. These findings were similar to those found in a study based on a sample from the National Hospital Ambulatory Medical Care Survey (NHAMCS).⁶ We found that privately insured children were at least two times more likely to have a sports injury related ED visit compared to Medi-Cal and uninsured children. One might speculate that privately insured parents have fewer barriers to taking their child to the ED just in case for minor injuries.

Classification of ED Visits by Payer Type for Adults (18-64 years of age): Adults (18-64 years of age) demonstrated a similar, albeit less pronounced pattern, with the highest percentage of avoidable ED visits by those covered by Medi-Cal (48.1%; 95% CI: 47.7%-48.5%; **Figure 10**). About 45% of uninsured adults' ED visits could be classified as avoidable (44.7%; 95% CI: 44.4%-45.1%), while about 44% of adults with private insurance had avoidable ED visits (43.8%; 95% CI: 43.6%-44.0%).

Figure 10: Classification of ED Visits by Insurance Type for Adults (18-64 years)



Compared to children, adults had much higher percentages of unavoidable ED visits across all payer types. Predictably, adults also had higher percentages of psychiatric, alcohol, drug related ED visits. It is unclear why Medi-Cal (12.6%; 95% CI: 12.3%-12.9%) insured adults have fewer injury-related ED visits compared to uninsured (25.4%; 95% CI: 25.0%-25.7%) and privately insured adults (22.2%; 95% CI: 22.1%-22.4%, **Figure 10**).

Classification of ED Visits Among OC Hospitals

The classification of visits to the ED for all county hospitals is presented below in **Table 2**. The percentage of avoidable ED visits ranged from a low of 37.5% to a high of 58.1%. On average, each hospital saw 12,449 avoidable ED visits (range: 5,101 to 26,714) in 2007.

Table 2: Classification of ED Visits by Hospital

Hospital Name	Total Visits	Avoidable Unavoidable Injury Mental Health/ Drugs/Alcohol* Unclassified				
		%	%	%	%	%
Children's Hospital Of Orange County	45,979	58.1	9.3	21.0	0.6	11.0
Anaheim General Hospital	10,391	56.5	11.6	17.5	3.0	11.4
Coastal Communities Hospital	20,701	52.0	12.9	19.8	4.4	11.0
Garden Grove Hospital And Medical Center	25,928	51.0	14.3	19.2	3.0	12.5
Anaheim Memorial Medical Center	42,858	50.8	16.1	18.7	1.7	12.7
Fountain Valley Regional Hospital	34,675	46.7	16.5	20.2	2.1	14.6
Western Medical Center Hospital Anaheim	19,072	46.6	11.2	19.9	11.0	11.2
Anaheim Regional Medical Center	26,646	46.2	14.8	19.7	6.1	13.2
St. Joseph Hospital Orange	52,205	44.7	17.1	18.2	5.4	14.7
Tustin Hospital Medical Center	2,949	44.6	10.0	30.3	4.9	10.3
La Palma Intercommunity Hospital	14,363	44.2	15.2	23.4	4.5	12.6
Children's Hospital At Mission	16,788	44.1	9.4	35.3	1.3	9.9
St. Jude Medical Center	46,991	43.8	18.0	23.1	2.3	12.7
Placentia Linda Hospital	21,971	43.8	14.9	27.9	2.2	11.2
Chapman Medical Center	11,015	43.2	12.6	26.2	6.1	11.8
Kaiser Foundation Hospital Anaheim	41,254	42.9	16.2	23.3	2.9	14.7
Los Alamitos Medical Center	28,407	42.3	17.1	26.2	2.1	12.3
Orange Coast Memorial Medical Center	24,316	42.1	17.9	22.2	3.5	14.2
Western Medical Center Santa Ana	23,386	41.8	15.4	24.7	2.8	15.2
University Of California Irvine Medical Center	33,741	41.7	14.4	20.5	5.8	17.5
Irvine Regional Hospital And Medical Center	25,020	41.1	17.3	27.6	3.2	10.8
Mission Hospital Regional Medical Center	38,777	40.4	18.5	22.3	3.1	15.7
Huntington Beach Hospital	19,482	40.4	12.8	26.1	8.2	12.5
Saddleback Memorial Medical Center	33,598	40.2	17.8	24.0	2.8	15.2
Hoag Memorial Hospital Presbyterian	65,306	38.3	16.6	25.8	4.7	14.7
Saddleback Memorial Med Center SC	14,193	38.2	12.2	34.8	4.1	10.7
South Coast Medical Center	13,605	37.5	12.2	27.6	12.5	10.2
Total:	753,617	44.6	15.3	23.0	3.8	13.3

*Mental Health, Alcohol, & Drugs Combined.

Geographic Distribution of Avoidable ED Visits (OC Residents only)

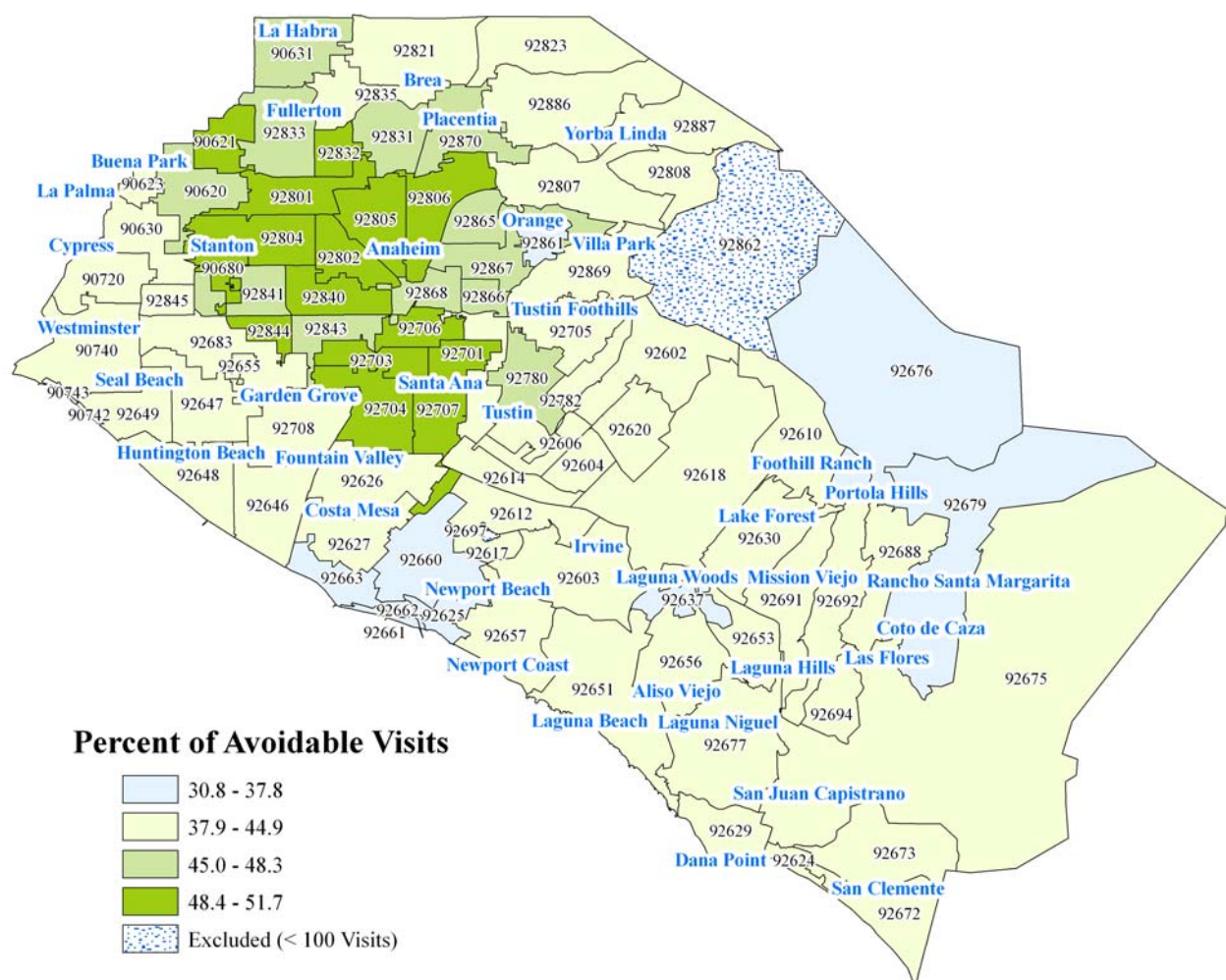
The geographic distribution of the 294,598 avoidable ED visits made by county residents is presented in the map below (**Figure 11**) by the patient's ZIP code of residence. The range of avoidable ED visits was divided into four levels, with the county-wide average (44.9%) dividing the two highest ranges from the two lowest.[†] The highest percentages (48.4 - 51.7%, lime green) of avoidable ED visits were made by patients residing in generally less affluent central and northern parts of the county, specifically Santa Ana, west Anaheim, and parts of Buena Park and Stanton. This finding is consistent with the recent American Community Survey results showing that the highest percentages of uninsured are in the central and northern regions of the county.⁷

[†] Among non-OC residents the percent avoidable ED visits was slightly lower at 42.5% (n=41,436 of 97,497)

ZIP codes with the second highest range (45.0 - 48.3%, light green) were generally contiguous with this region, and included much of Orange and parts of Tustin, Placentia, Fullerton, Garden Grove, Westminster and La Habra.

The areas of the county with the lowest percentages (30.8 - 37.8%) of avoidable ED visits included ZIP codes in parts of Newport Beach, Corona Del Mar, Villa Park, Coto De Caza, and Trabuco/Silverado Canyon – some of the more affluent communities in the county. The majority of the ZIP codes were in the middle level (37.9 - 44.9%, pale yellow) just below the county-wide average of 44.9% and encompass most of south (e.g., Irvine, Laguna Beach, Mission Viejo, San Clemente), west (e.g., Seal Beach, Huntington Beach) and north-east (e.g., Yorba Linda, Anaheim Hills) regions of the county.

Figure 11. Percentage of Avoidable ED Visits by ZIP Code of Residence, All Ages



Data Source: 2007 OSHPD Emergency Department and Patient Discharge Data.

Three ZIP codes (92862, 92863, and 92888) with fewer than 100 visits were not mapped, due to statistical instability.

This map includes only those cases where a valid OC ZIP Code was provided.

Previously, it was shown that the highest percentages of avoidable ED visits were for infants (**Figure 8**), patients covered by Medi-Cal and the uninsured (**Figures 9 and 10**, respectively).⁵ This pattern is also consistent with the known geographic distribution of Medi-Cal eligible residents.⁸ Thus, we sought to determine the relative contributions of these factors on the geographic profile presented in **Figure 11**. A comparison was made between those ZIP codes that fell within the lowest two ranges of

avoidable visits and those that fell within the highest two ranges. The ZIP codes within the two highest ranges of avoidable ED visits were characterized by having *twice* as many Medi-Cal covered visits (67,700 vs. 34,659) and almost *one and a half times* the number of uninsured ED visits (38,914 vs. 28,167). The areas with high percentages of avoidable ED visits also had *twice* as many infants being brought in to the ED for avoidable conditions (17,725 vs. 8,555). Conversely, ZIP codes with relatively low percentages of avoidable visits had *one and a half times* more ED visits covered by private insurance (175,890 vs. 120,201).

Conclusions

The present study helps to elucidate the profile of emergency department visits in Orange County and demonstrates the challenges hospitals face in fulfilling their mission. With nearly half (44.5%) of all the 753,000+ ED encounters each year for non-urgent, avoidable conditions, policy-makers would be well advised to develop/expand alternative sources of care such as urgent care centers, clinics, preventive services, and/or dial-a-nurse hotlines to meet this need.

While one can certainly appreciate the concern parents of infants often have, nearly 7 in 10 ED visits made for infants were avoidable and more appropriately treated in a primary care setting. Similarly, half of all the 153,743 ED visits made by children 1-17 years of age were for avoidable conditions.

Consistent with the results of a state-wide study, OC residents covered by Medi-Cal insurance and the uninsured had relatively high percentages of avoidable ED visits.⁵ Children (0-17 years) covered by Medi-Cal in particular had 14% more avoidable ED visits than privately insured children and 6% more than uninsured children. Medi-Cal patients' knowledge of and ability to access alternative outpatient sources of primary care clearly needs to be studied in more detail. Additional cuts to Medi-Cal reimbursement rates will only exacerbate this problem, potentially reducing the number of primary care providers.

A hospital's percentage of avoidable ED visits was based largely on its geographic location and the demographics of its patient population. We found that the five EDs with the highest percentages of avoidable visits were all located within the central/northern region of the county. Correspondingly, the ZIP codes in this region also had the highest percentages of residents making avoidable ED visits, as well as high numbers of Medi-Cal covered and uninsured patients. Finally, this region included Santa Ana and Anaheim, two cities that have very high number of births each year.⁹

Increased patient awareness and education regarding the appropriate situation to go to the emergency department as well as greater access to primary and preventative care would help alleviate this burden on the county's EDs.

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