FREQUENT UTILIZERS OF SERVICES IN ALLEGHENY COUNTY:

Emergency Department Services

This series of reports explores the group of people who use crisis services frequently. By looking more closely at this population of frequent utilizers, the Allegheny County Department of Human Services hopes to gain insight into their needs, identify key intervention points, appropriately, and find ways to encourage long-term wellness while reducing the need for repeat intense service usage.

Frequent utilizer: For the purposes of this report series, frequent utilizers are defined as those clients of a particular service system who accounted for roughly the top five percent of individuals using that service in the 2016–2017 period of analysis.

INTRODUCTION

Hospital emergency departments (EDs) are intended to treat critically ill patients in need of immediate care, such as those with major injuries or life-threatening symptomatic events (e.g., cardiac arrest). Since emergency department services are for the purpose of immediate and serious health needs, most people who use them utilize them infrequently, choosing to visit a physician's office or clinic for non-emergency physical health needs. On the other hand, a small percentage of people visit emergency departments frequently; reasons for this vary but may include emergency departments' acceptance of people who are uninsured and availability of around-the-clock care. Allegheny County Department of Human Services (DHS) wanted to learn more about the population who utilize EDs frequently and how we might help reduce their use of crisis interventions and sustain longer-term health and wellness. By understanding the characteristics of the frequent utilizer population and other services they are accessing, we hope to provide the right supports at the right time to stabilize individuals and aid in ongoing good health.

BACKGROUND

Frequent utilizers in the healthcare system are perhaps the most researched amongst the categories of frequent utilizers we analyzed. Frequent utilizer studies often aim to reduce emergency department visit numbers because healthcare costs are the easiest to quantify.[1] Studies and interventions for this group have examined specific populations like homeless populations[2] who frequently use EDs as well as looking at neighborhoods that have a disproportionate amount of healthcare frequent utilizers.[3,4] In this part of the frequent utilizer series, we hope to offer a more complete picture of the ED frequent utilizer population by describing their race, age, gender and service involvement. In addition, we compare the diagnoses of frequent utilizers to those of non-frequent utilizers.

METHODOLOGY

The emergency department cohort is defined as clients who used ED services at least once between January 1, 2016 and December 31, 2017 and whose services were billed to Medicaid. This data comes from the State of Pennsylvania through the County's managed care entity for behavioral health and is inclusive of all publicly funded physical health service interactions.

In addition to analyzing clients' emergency department usage, we completed an analysis of the overlap of frequent utilizer clients in three other types of crisis-related services: mental health crisis services, criminal justice system involvement (criminal filings and jail bookings) and homeless shelter stays. Additionally, we looked at the cohort's use of other non-crisis human services. For both of these cross-system analyses, we used a client's first emergency department visit during the period of study as an anchor date. From there, we determined whether the client had other service involvement during the following time periods: (1) ever before the anchor date (for time periods for which data was available), (2) during the year prior to the anchor date, and (3) during the year after the anchor date. Data for this part of the analysis comes from the Allegheny County Data Warehouse,[5] which brings together and integrates client and service data from a wide variety of sources internal and external to the County.

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1 Doris A. Fuller, Elizabeth Sinclair, John Snook, "A Crisis in Search of Data: The Revolving Door of Serious Mental Illness in Super Utilization," Kent State University College of Public Health, 2017

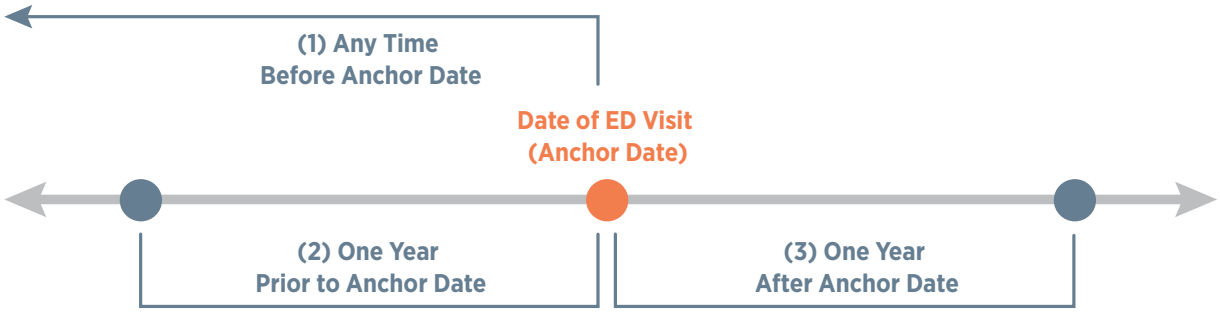
2 Kushel MB, Perry S, Bangsberg D, Clark R, Moss AR. Emergency department use among the homeless and marginally housed: results from a community-based study. Am J Public Health. 2002;92(5):778–84.Crossref, Medline, Google Scholar

3 Atul Gawande, "The Hot Spotters" *The New Yorker*, January 24, 2011.

4 Doran KM, Ragins KT, Iacomacci AL, Cunningham A, Jubanyik KJ, Jenq GY. The revolving hospital door: hospital readmissions among patients who are homeless. Med Care. 2013;51(9):767–73. Crossref, Medline, Google Scholar

5 For more information, see https://www.alleghenycountyanalytics.us/index.php/2018/08/13/allegheny-county-data-warehouse/

FIGURE 1: **Involvement windows for people utilizing the ED**



DATA LIMITATIONS

The frequency metric is the total number of ED visits in the two-year period 2016 through 2017. This definition skews our results in one respect: for individuals whose first episode ever is in 2016 or 2017, the frequency metric counts the number of times they return to the system for a period of anywhere from zero days to two years following their first episode, depending on when their first episode is. For example, those whose first episode is January 1, 2016, are followed for two years. Those whose first episode is December 31, 2017, are followed for one day.

As a result of the two-year cohort methodology, the differences between the frequent and non-frequent utilizer groups are somewhat compressed: The non-frequent utilizer group as we define it is likely to contain some individuals who (1) would qualify as frequent utilizers if we followed them for two years, and (2) are demographically similar to the frequent utilizer group, so any demographic differences between the groups appear to be smaller than they actually are. This should be borne in mind in interpreting our results.

FINDINGS

Service Usage of Frequent and Non-Frequent Users

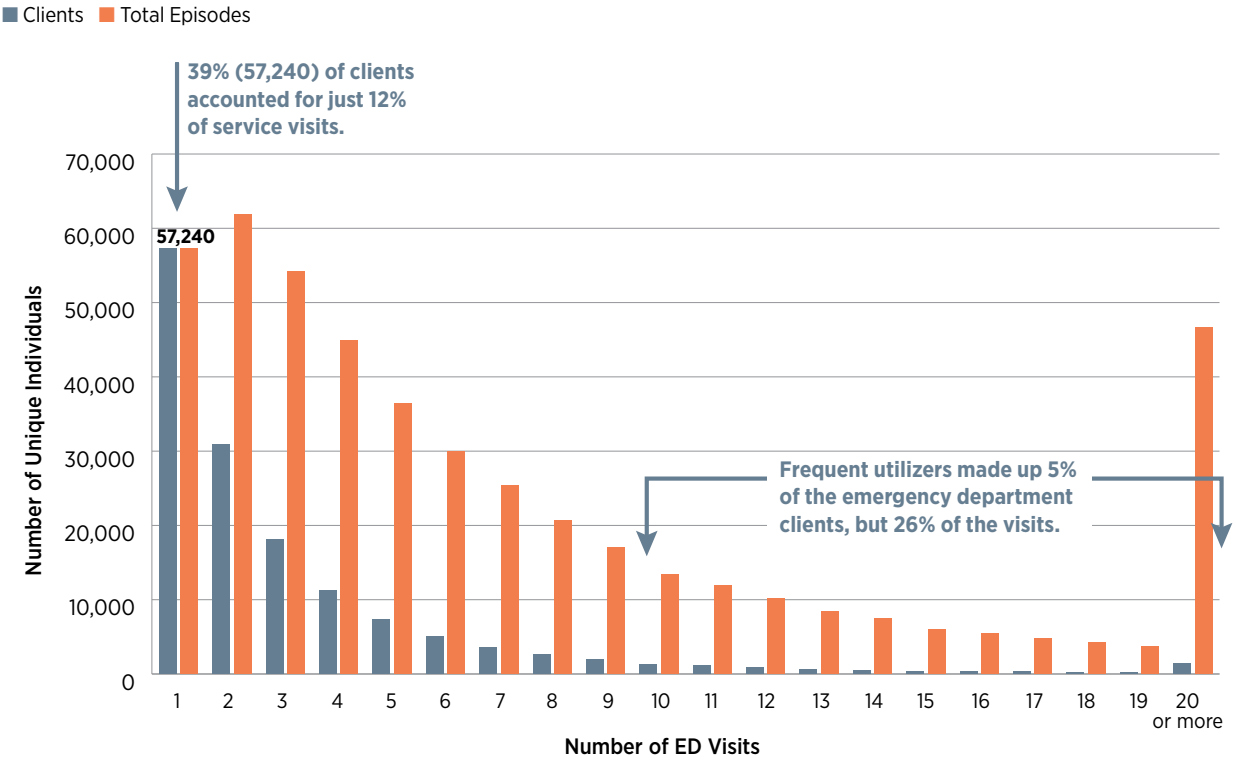
A total of 145,218 clients visited an Allegheny County emergency department in 2016 or 2017. These clients generated 469,903 ED visits, averaging 3.2 visits per client with a median of two visits per client.

For the purposes of this report, emergency department frequent utilizers were defined as those who used ED services 10 or more times during calendar years 2016 and 2017. This frequent utilizer group consists of 7,363 individuals, which represented the top 5% of ED clients. While frequent utilizers of ED services represent the top 5% of ED clients, they account for 26% of all ED visits in the analysis time period. Frequent utilizers had an average of 16.6 visits per client, in comparison to 2.5 visits per non-frequent utilizer client (**Figure 2**).

As seen in the left side of **Figure 2**, 39% of the cohort (n=57,240) visited the emergency department just once in the analysis timeframe. This represents 12% of the total visits for that two-year period. The disparity between the number of individuals and their number of visits to the ED quickly widens. At the threshold of individuals who are defined as frequent utilizers for this analysis, we see that five percent of the cohort (n=7,363) have visited the

emergency department ten or more times.

FIGURE 2: **Number of people who utilized emergency department services one or more times by number of visits, 2016–2017 (n=145,218)**



Demographics

Frequent utilizers of emergency department services are more likely to be female and are older than non-frequent utilizers on average (**Table 1**).

- Almost two-thirds of frequent utilizers are female (n=4,700, 64%) while 56% of non-frequent utilizers are female.
- Frequent utilizers are an older population, with 11% (n=822) younger than 18 years old, while 35% of the non-frequent utilizers are in that age category. Seventy-three percent of frequent utilizers are 25 years or older.
- Racial distribution was similar between the two groups. The frequent utilizers group showed a slightly higher percentage of Black individuals (n=3,682, 50%), while 44% of non-frequent utilizers were Black.

TABLE 1: Gender, race and age of clients who used emergency department services, frequent vs. non-frequent utilizers, 2016–2017

	FREQUENT UTILIZERS (N = 7,363)	NON-FREQUENT UTILIZESR (N = 137,855)
Gender		
Female	64%	56%
Male	36%	44%
Unknown*	0%	1%
Race		
Black	50%	44%
White	48%	51%
Other	1%	3%
Unknown**	1%	2%
Age Range		
Under 18	11%	35%
18–24	15%	12%
25–34	23%	17%
35–44	17%	11%
45–54	18%	11%
55–64	12%	9%
Over 64	3%	5%
Unknown***	0%	1%

** 1,019 individuals did not have a documented gender.*

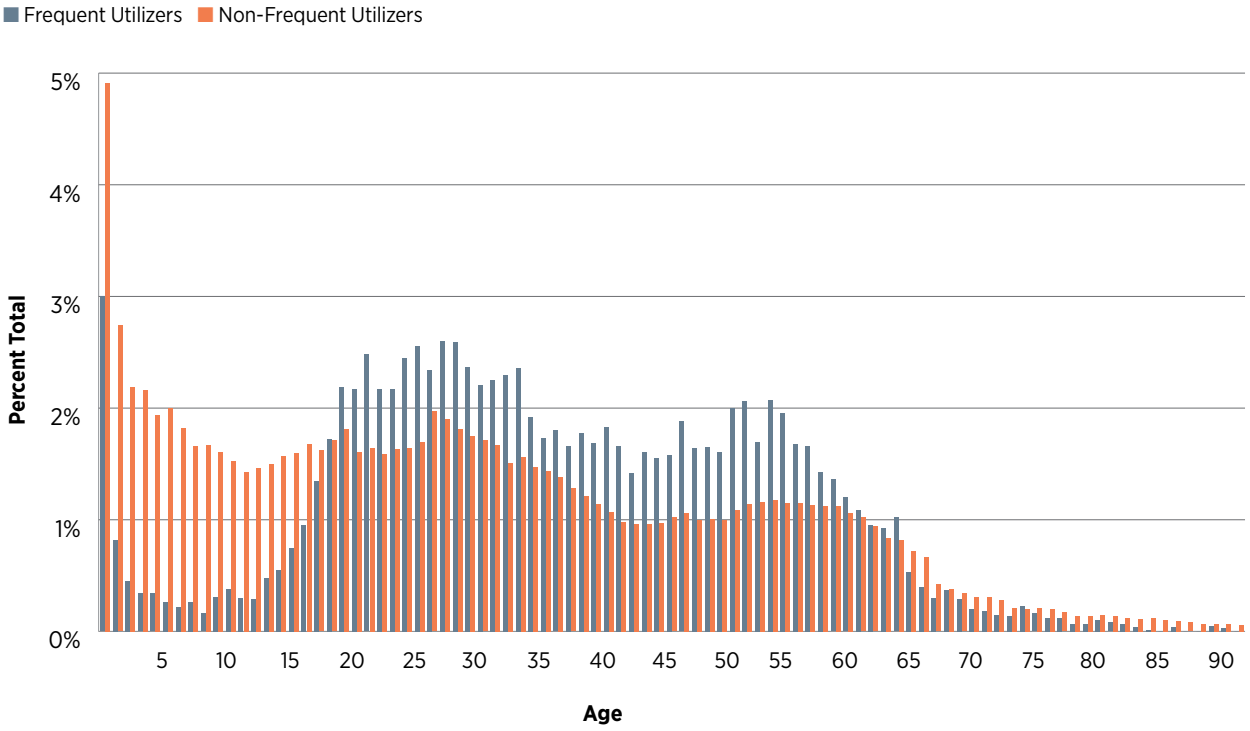
*** Three percent of clients in the 2016-2017 cohort did not have a race identified (3,272) and approximately four percent had "other" as their identified race (4,898).*

**** 1,024 individuals did not have a documented age/date of birth.*

Looking more closely at ages of frequent and non-frequent utilizers, the largest age group for both types of utilizers was infancy, which may be explained by the abundance of caution in response to any baby illness or injury, which leads pediatric practitioners to send families to the emergency department for comprehensive care.

After infancy there were few utilizers in the childhood years. Around age 11 years, both groups demonstrate an increase in ED visits until age 19. The frequent utilizer cohort shows a more dramatic increase and remains higher than non-frequent utilizers for the rest of the ages until an individual's sixth decade at which point there is no difference between frequent utilizers and non-frequent utilizers.

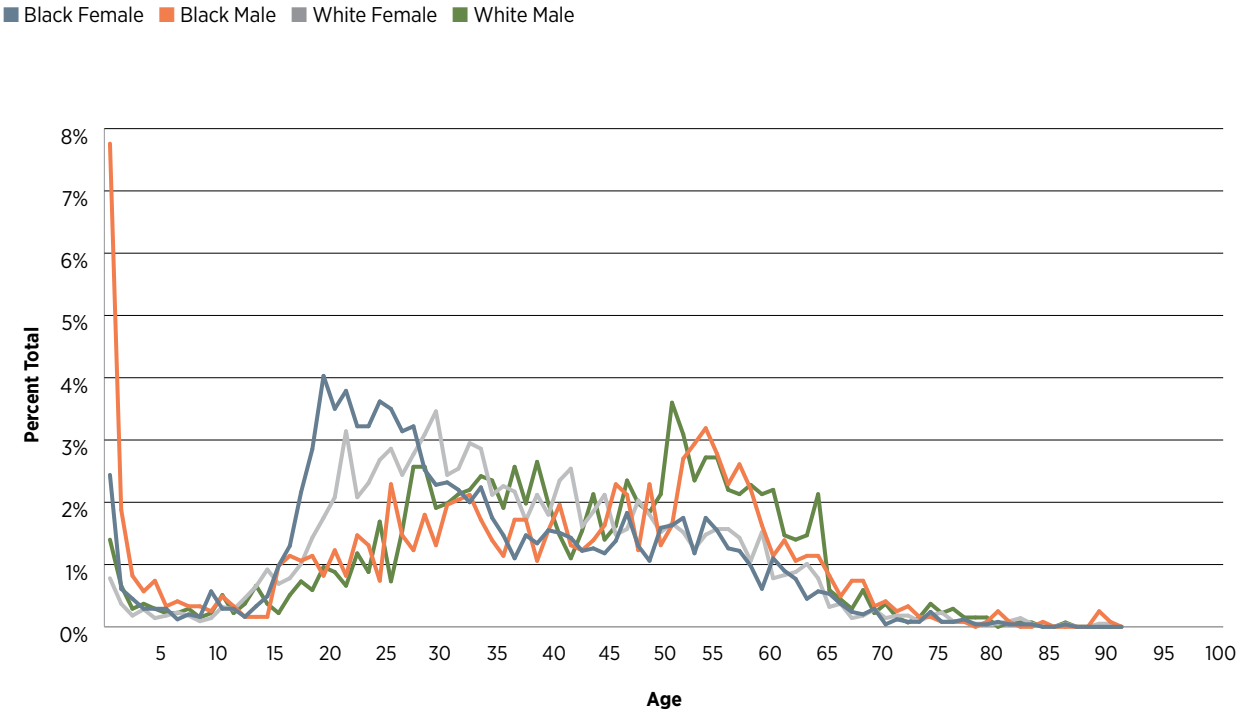
FIGURE 3: Age distribution of frequent and non-frequent utilizers



The age distribution becomes more informative when it is broken out by gender and race, as in **Figure 4**. Black females, followed by White females, are the most represented in the mid-teen to late twenties age group for frequent utilizers. This is an age range of increased reproductive needs, a loss of publicly-funded physical healthcare and possible emergency situations during pregnancy — all of which could drive an increased rate of emergency department visits for this subpopulation.

A second spike in the age distribution by gender and race is seen in the fifth decade of life for both White and Black males. This could represent the typical male onset age for cardiac arrest events and diseases associated with aging. The data patterns indicate an opportunity for emergency departments and healthcare professionals to implement differential responses and follow-up to crisis events based on age, race and gender.

FIGURE 4: Age distribution of frequent utilizers by race and gender



Diagnoses of Emergency Department Utilizers

Any visit to an emergency department generates an administrative claim that contains one or more diagnoses codes used for the purpose of documentation and billing for services. In order to better summarize these data, each diagnosis was grouped into a category defined by the World Health Organization as a part of their grouping in the ICD-10, the 10th revision of the International Statistical Classification of Diseases and Related Health Problems.

In this analysis of the dataset, each visit has been assigned up to nine diagnoses resulting in nearly 300,000 codes associated with the 145,218 individuals who visited an ED during the analysis time period (**Table 2**). Frequent utilizers have a rate of diagnosis four times those of non-frequent utilizers for diagnoses in the grouping of "diseases of the nervous system" and "diseases of the blood and blood-forming organs and certain disorders involving the immune system."

Frequent utilizers often had multiple diagnoses within this timeframe; over 80% had a diagnosis of one of the following:

- Symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified
- Factors influencing health status and contact with health services
- Injury, poisoning and certain other consequences of external causes
- Diseases of the musculoskeletal system and connective tissue
- Mental, behavioral and neurodevelopmental disorders

TABLE 2: Top 20 diagnoses of emergency department utilizers, 2016–2017

TOP ED PRIMARY ICD DIAGNOSIS	FREQUENT		NON-FREQUENT		DISTINCT TOTAL		RATIO (F:N)
R00-R99 Symptoms signs and abnormal clinical and laboratory findings not elsewhere classified	7,306	99.3%	85,774	62.3%	93,080	64.1%	1.6
Z00-Z99 Factors influencing health status and contact with health services	6,905	93.8%	51,628	37.5%	58,533	40.3%	2.5
S00-T88 Injury poisoning and certain other consequences of external causes	6,082	82.7%	59,346	43.1%	65,428	45.1%	1.9
M00-M99 Diseases of the musculoskeletal system and connective tissue	5,964	81.1%	43,354	31.5%	49,318	34.0%	2.6
F01-F99 Mental, Behavioral and Neurodevelopmental disorders	5,887	80.0%	42,134	30.6%	48,021	33.1%	2.6
J00-J99 Diseases of the respiratory system	5,631	76.5%	46,466	33.7%	52,097	35.9%	2.3
K00-K95 Diseases of the digestive system	5,440	73.9%	33,953	24.6%	39,393	27.1%	3.0
G00-G99 Diseases of the nervous system	4,736	64.4%	20,031	14.5%	24,767	17.1%	4.4
N00-N99 Diseases of the genitourinary system	4,601	62.5%	23,239	16.9%	27,840	19.2%	3.7
V00-Y99 External causes of morbidity	4,368	59.4%	35,364	25.7%	39,732	27.4%	2.3
E00-E89 Endocrine, nutritional and metabolic diseases	4,127	56.1%	21,876	15.9%	26,003	17.9%	3.5
I00-I99 Diseases of the circulatory system	41,18	56.0%	25,682	18.6%	29,800	20.5%	3.0
A00-B99 Certain infectious and parasitic diseases	4,033	54.8%	23,598	17.1%	27,631	19.0%	3.2
L00-L99 Diseases of the skin and subcutaneous tissue	3,025	41.1%	18,248	13.2%	21,273	14.7%	3.1
D50-D89 Diseases of the blood and blood-forming organs and certain disorders involving the immune system	2,384	32.4%	9,457	6.9%	11,841	8.2%	4.7
Other	4,543	61.7%	29,769	21.6%	34,312	23.6%	2.9
Distinct Total	7,363		137,855		145,218		

Other System Involvement Before and After Crisis Event

Analysis also explored emergency department frequent and non-frequent utilizers' contact with other human services. Key findings from this analytic review may suggest intervention points for prevention or reduction of physical health emergencies that necessitate the crisis services discussed here.

In general, rates of other service involvement remain consistent over time (one year before and one year after anchor date), but volume of contact between the frequent utilizer cohort and the non-frequent utilizer cohorts is different. Frequent utilizers are typically connecting with other services at a rate twice that of non-frequent utilizers. However, even with this disparity between frequent and non-frequent utilizers, the rate of usage is far

lower than in any other cohort analyses (mental health crisis services, criminal justice and emergency shelter). This may be evidence that the frequent utilizers of emergency department services are qualitatively a different group of people who are accessing the ED for a real mix of needs (physical and emotional), whereas the other cohorts are more traditionally human service users. An alternate conclusion could be that the individuals utilizing the emergency department are lacking in connections to the human services that they might need. Additional analysis would be necessary to tease out evidence to support or refute these hypotheses.

Housing Services

Rates of supportive housing service use and homeless shelter stays are low for the emergency department cohort. While frequent utilizers' usage of housing services is two- to three-times higher than non-frequent utilizers', rates for both groups were 10% or less.

TABLE 3: **ED utilizers' usage of housing Services — ever before, one year before, and one year after an ED visit**

INVOLVEMENT	PROGRAM AREA	FREQUENT UTILIZER SERVICE RATE (N=7,363)	NON-FREQUENT UTILIZER SERVICE RATE (N=137,855)
Ever Before Anchor Date	General Housing Supports*	10%	5%
	Homeless Shelter	6%	2%
One Year Before Anchor Date	General Housing Supports	5%	3%
	Homeless Shelter	3%	1%
One Year After Anchor Date	General Housing Supports	8%	3%
	Homeless Shelter	5%	1%

**General housing supports are prevention services, support services and/or housing for individuals and families who are homeless or at risk of becoming homeless. Services include housing assistance, case management, prevention and outreach.*

Family-Related Services

When looking at involvement with the child welfare system, there is little difference between frequent utilizer and non-frequent utilizer rates of involvement for *parents*, at most reflecting a few percentage point discrepancy. However, there are disparate rates of involvement as a *child* for frequent utilizers as compared to non-frequent utilizers. In the year prior to a youth frequent utilizer's (n=940) first visit to the emergency department, as well as the year after (n=817), the youth is twice as likely as non-frequent utilizers to have been active on a child welfare case. The emergency department, with staff designated as mandated reporters, can be a pathway by which a child is referred to child welfare if there is suspicion of abuse or neglect. Thus, frequent ED visits by youth could be linked to a higher chance of involvement with the child welfare system.

Youth frequent utilizers of emergency department services are twice as likely to have ever been under supervision by juvenile probation than non-frequent utilizers (27% versus 14%, **Table 4**). This pattern holds true through the twelve months following an initial emergency department visit, during which frequent utilizers are again two times more likely to be involved with juvenile probation (18% versus 8%).

TABLE 4: ED utilizers' usage of family-related services — ever before, one year before, and one year after an ED visit

INVOLVEMENT	PROGRAM AREA	FREQUENT UTILIZER SERVICE RATE	AGE-ELIGIBLE POPULATION	NON-FREQUENT UTILIZER SERVICE RATE	AGE-ELIGIBLE POPULATION
Ever Before Anchor Date	Child Welfare as Child	12%	3,131 (43%)	10%	81,235 (59%)
	Child Welfare as Parent	12%	6,784 (92%)	7%	97,684 (71%)
	Juvenile Probation	27%	1,870 (25%)	14%	39,379 (29%)
One Year Before Anchor Date	Child Welfare as Child	16%	940 (13%)	7%	50,161 (36%)
	Child Welfare as Parent	6%	6,784 (92%)	3%	97,684 (71%)
	Juvenile Probation	17%	485 (7%)	7%	19,060 (14%)
One Year After Anchor Date	Child Welfare as Child	19%	817 (11%)	9%	47,832 (35%)
	Child Welfare as Parent	7%	6,822 (93%)	3%	99,913 (72%)
	Juvenile Probation	18%	389 (5%)	8%	19,121 (14%)

Behavioral Health Services

Nearly three out of four frequent utilizers had received a mental health service before their emergency department visit (70%, n=5,154), and 40% of eligible frequent utilizers (age 14 or older) had drug and alcohol treatment at some time prior to the emergency department visit in the analysis window.

Frequent utilizers of the ED used mental health crisis services at four times the rate of non-frequent ED utilizers. In the year prior to the anchor ED event, 12% of frequent utilizers accessed a crisis mental health service, while only three percent of non-frequent utilizers did. Similarly, in the year after the anchor emergency department visit, 16% of frequent utilizers received a crisis mental health service, while only four percent of non-frequent utilizers received such a service.

TABLE 5: ED utilizers' usage of behavioral health services — ever before, one year before, and one year after an ED visit

INVOLVEMENT	PROGRAM AREA	FREQUENT UTILIZER (N=7,363) SERVICE RATE	AGE-ELIGIBLE POPULATION	NON-FREQUENT UTILIZER (N=137,855) SERVICE RATE	AGE-ELIGIBLE POPULATION
Ever Before Anchor Date	Drug and Alcohol Treatment	40%	6,784 (92%)	23%	97,684 (71%)
	Mental Health Treatment	70%	-	42%	-
	Mental Health Crisis	34%	-	12%	-
One Year Before Anchor Date	Drug and Alcohol Treatment	15%	6,784 (92%)	8%	97,684 (71%)
	Mental Health Treatment	39%	-	20%	-
	Mental Health Crisis	12%	-	3%	-
One Year After Anchor Date	Drug and Alcohol	20%	6,822 (93%)	10%	99,913 (72%)
	Mental Health Treatment	47%	-	22%	-
	Mental Health Crisis	16%	-	4%	-

Criminal Justice System

Criminal justice involvement rates for both frequent and non-frequent utilizers is lower for the emergency department cohort than either the crisis mental health or the emergency shelter cohorts. This may be another sign that the individuals accessing the emergency department are a different population than those using human services, and thus it is not a population that requires connection to those services.

Higher rates of involvement for both frequent utilizers and non-frequent utilizers in the ever-before timeframe but not in the one-year-before timeframe indicate that criminal justice system involvement was typically farther in the past for most individuals.

TABLE 6: ED utilizers' contact with the criminal justice system — ever before, one year before, and one year after an ED visit

INVOLVEMENT	PROGRAM AREA	FREQUENT UTILIZER (N=7,363) SERVICE RATE	AGE-ELIGIBLE POPULATION	NON-FREQUENT UTILIZER (N=137,855) SERVICE RATE	AGE-ELIGIBLE POPULATION
Ever Before Anchor Date	Jail Booking	40%	6,516 (88%)	26%	88,832 (64%)
	Criminal Filing	48%	-	25%	-
One Year Before Anchor Date	Jail Booking	10%	6,516 (88%)	6%	88,832 (64%)
	Criminal Filing	14%	-	5%	-
One Year After Anchor Date	Jail Booking	11%	6,623 (90%)	6%	91,247 (66%)
	Criminal Filing	16%	-	6%	-

DISCUSSION

Our analysis suggests that frequent utilizers of Allegheny County emergency departments are more likely to be female and more likely to be older than non-frequent utilizers of EDs. We also found that many ED utilizers were infants or ages 20 to 30, which was true for both frequent and non-frequent utilizers, with frequent utilizers even more likely to be in the 20 to 30 age group. Black females, followed by White females, are the most represented in the mid-teen to late twenties age group for frequent utilizers. A second spike in the age distribution by gender and race is seen in the fifth decade of life for both White and Black males. This demographic information can help Allegheny County understand this cohort of frequent utilizers better and target preventative services where they can be most effective.

Analysis of ED utilizers' usage of other services in the County suggests that frequent utilizers are more likely than non-frequent utilizers to receive housing services and homeless shelter services, though this type of service was not used frequently by either group. Frequent ED utilizers were also more likely to use mental health and drug and alcohol services, have involvement with the child welfare system, and have contact with the criminal justice system.

On the other hand, the rate of service usage by ED frequent utilizers is far lower than that of other frequent utilizers in this report series (mental health crisis services, criminal justice and emergency shelter). This suggests that frequent utilizers of emergency department services may be qualitatively a different population, while the other cohorts are more traditionally human service users. An alternate conclusion could be that the individuals utilizing the emergency department are lacking in connections to the human services that they might need.