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Understanding the 100 highest users of health and social services in San Francisco

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Health system leaders and clinicians recognize the importance of integrating data that elucidates both the medical and the social needs of patients.[1] Research on frequent emergency department (ED) users—variably defined as patients with four or more annual ED visits[2]—has focused primarily on medical services. Frequent ED users have a high prevalence of mental health and substance use diagnoses, and complex social needs like homelessness, but few studies have examined their service utilization across multiple medical and non-medical domains.[3]

A small subgroup of frequent ED users have ≥18 ED visits per year and account for a disproportionate share of resource use, representing 0.2% of patients, but 4.5% of visits.[4] Most EDs are not designed to provide the needed case management and coordination to best serve this population. A lack of integrated health and social services data prevents clinicians and policymakers from understanding patients' service use, contributing to missed care coordination opportunities.

In 2007, the San Francisco Department of Public Health (SFDPH) implemented the Coordinated Care Management System (CCMS), an integrated data platform linking

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multiple source data sets across San Francisco (SF) County to monitor information about complex and high-cost populations. In addition to elements from medical, mental health, and substance use electronic health records, CCMS collects data on housing, criminal justice system interactions, public benefits, and mortality.[3] The SFDPH used CCMS to develop a High Users of Multiple Systems (HUMS) score to identify and prioritize individuals with the highest and most fragmented use of urgent and emergency medical, mental health, and substance use services for targeted interventions. Below, we describe the HUMS scoring system and the characteristics and service use of the highest scoring 100 individuals.

SFDPH creates a CCMS record for any patient listed as homeless in any SF City agency system; any patient who uses county behavioral health services, homelessness services, or jail health; or any patient who uses urgent or emergency medical, mental health, or substance use services. For members of the San Francisco Health Plan (SFHP), the county managed Medicaid plan, CCMS captures encounters at all medical services whether funded by SFDPH or not. CCMS does not identify all emergency department (ED) visits, so we linked CCMS data with ED information exchange (EDie) encounter data from the University of California San Francisco Medical Center.[5] EDie, used by all but one SF health system, is a technology platform that unifies visit data across EDs regardless of insurance enrollment. We matched individuals based on name, date of birth, and medical record number. We added Edie-captured visits to non-SFDPH hospitals to total annual ED visits for patients.

The HUMS score for ranking the top 100 high utilizers is based on the use of nine urgent and emergency services across medical, mental health, and substance use disorder systems. We defined the three main categories of encounters included in the score as.

- **Medical services:** ED visits from CCMS and EDie, inpatient hospitalizations from CCMS, and urgent care visits within the SFDPH network.
- **Mental health services:** Psychiatric ED visits and hospitalizations from CCMS and SFDPH psychiatric day crisis clinic visits.
- **Substance use disorder services:** From CCMS, sobering center (harm-reduction services for people who are intoxicated) visits and stays at residential detoxification services.

We calculated HUMS scores for all individuals in CCMS based on the annual sum total of visits or stays to the aforementioned services. Each encounter contributed one point; we did not weight services. We identified the cohort of 100 service users with highest HUMS scores during the 2017 to 2018 fiscal year (July 1, 2017–June 30, 2018) to identify the needs of this high priority population.

We used descriptive statistics to portray the (1) sociodemographic characteristics; (2) use of health, social, and housing services; and (3) mortality for the top 100 HUMS patients. To evaluate interactions with the criminal justice system, we analyzed encounters with county jail health services. We tabulated involuntary 72-hour psychiatric holds (a 5150 under the California Welfare and Institutions Code) and placement on a Lanterman–Petris–Short (LPS) Conservatorship (consent for treatment and detention assigned to county Public

Guardian for up to 180 days). We assessed annual visits to primary care and engagement with a SFDPH case management program. We defined the latter as having at least one encounter with a program clinician in the preceding 90 days. We assessed cohort mortality during the study year via California Death Records (embedded in CCMS) and use of urgent/emergent services prior to the study period from CCMS.

The UCSF Institutional Review Board approved the research, which was conducted according to Protected Health Information and Code of Federal Regulations (CFR) 42 part 2 protocols that govern the use of substance use disorder data.

During the 2017 to 2018 fiscal year, there were 47,706 individuals who had used at least one urgent or emergency service. We identified the 100 highest users of multiple systems (HUMS) in SF. Among these, 77% identified as male, 21% as female, and 2% as transgender (Table 1). The cohort was disproportionately male and African American/Black relative to the general population of SF (34% vs. 5.6%).[6] The median age was 47 years (range = 24–85 years). Nearly all (99%) had a history of homelessness in SF. Over half (57%) were unsheltered at their last point of contact. An additional 14% were living in a shelter or navigation center and 15% were permanently housed (Table 1).

HUMS scores ranged from 69 to 346 per year. Individuals in this cohort used a median of four distinct facility types (e.g., ED, medical urgent care, psychiatric emergency services, and sobering center) per year. Few used services in a single domain (e.g., medical services alone); 82% of patients used both urgent/emergent medical and mental health or medical and substance use services. The medical ED was the most frequently visited service (median 73 visits per year), nearly all visited it at least once during the fiscal year (99%), and psychiatric ED was the next most commonly used service (Table 1). The sobering center was visited by 39%, and half of these 39 individuals had ≥36 visits/year (max = 293 visits). Most (56%) of the top 100 HUMS population in fiscal year 2017 to 2018 had used urgent or emergency services in SF 5 years earlier and 36% had urgent or emergency service encounters 10 years earlier.

Forty percent had at least one jail day and half had been placed on an involuntary psychiatric hold during the fiscal year. Nine patients had been legally conserved. At the end of the fiscal year, 32% of HUMS patients were enrolled in a SFDPH case management program. However, only 17% of the cohort were actively engaged with the program. Most (71%) had an assigned primary care provider, but only 51% had visited their clinic during the study period. A year after the study period, (June 30, 2019), 10% had died.

Our findings may not be generalizable outside of SF County or to non–safety-net health systems. We lacked access to certain types of information, including financial assistance programs, that could have been useful in understanding potential gaps in care for our study cohort.

Our study describes a novel scoring approach to identify frequent urgent and emergency service users that includes medical, mental health, substance use, and social data via an integrated data set. This scoring system allowed us to isolate the 100 highest users of multiple systems (HUMS) in SF. In this cohort, we found extreme levels of ED use,

a disproportionate number of African American/Black patients (34% vs. 5.6% of SF County), a high rate of mortality, and low levels of contact with case management services, suggesting a disconnect in service provision that must be addressed. In the United States, due to structural racism, African American/Black individuals are overrepresented in people experiencing homelessness threefold; in SF, sevenfold (37% vs 5.4%). HUMS users are a subset of the homeless population who experience the highest needs. Structural racism in the housing, medical, and criminal justice systems contributes to this inequity. Although integrated data systems are recognized as a valuable tool to improve care coordination, they are rarely used to identify high risk individuals such as those described in our study.[1] Factors known to negatively impact health such as homelessness, involuntary psychiatric holds, and interactions with the criminal justice system were common in our cohort.[7,8] Yet, only a small proportion of the study population was engaged with services such as case management, which has been shown to reduce acute care use and improve outcomes.[9]

Our data show that although the ED represents the largest proportion of HUMS service utilization, this population frequently used acute mental health and substance use disorder services and had interactions with the criminal justice system. To identify and care for frequent users in a holistic manner, medical, behavioral health, and social services providers must partner closely and consider the disparate impact of systemic racism. Studies have demonstrated the effectiveness of providing interventions that address social needs alongside clinical care.[10] Given the extremely high use of the ED, our findings support the notion that the ED and other acute care settings be equipped with resources to meet both the medical and the social needs of frequent service users.

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Table 1

Characteristics of high users of multiple systems in San Francisco, July 1 2017, to June 30, 2018

Age (years)	**% (*n*)**
18–30	9 (9)
>30–40	16 (16)
>40–50	30 (30)
>50–60	30 (30)
>60–70	11 (11)
>70	4 (4)
Gender	**% (*n*)**
Female	21 (21)
Male	77 (77)
Transgender	2 (2)
Race/ethnicity	**% (*n*)**
African American/Black	34 (34)
Asian	2 (2)
Latino/a	14 (14)
Mixed, other	4 (4)
White	41 (41)
Declined/not stated	5 (5)
Years of intermittent or continuous homelessness in San Francisco	**(%) *n***
18–30	9 (9)
>30–40	16 (16)
>30–50	30 (30)
>50–60	30 (30)
>60–70	11 (11)
>70	4 (4)
Living situation as of last contact with health or housing services	**% (*n*)**
Outdoors, street, vehicle or encampment	57 (57)
Shelter or navigation center	14 (14)
Permanent supportive housing or SRO	5 (5)
Residential treatment facility	2 (2)

Independently housed	15 (15)
Unknown	7 (7)

Service type	Used at least once per year	Median visits/stays per year	IQR	Max
Medical ED	99%	73	[58,10]	341
Medical inpatient	69%	2	[0,5]	27
Medical urgent care	53%	1	[0,2]	38
Psychiatric emergency services	62%	2.5	[0,13]	59
Psychiatric inpatient	18%	0	[0,0]	7
Psychiatric urgent care	34%	0	[0,1]	19
Sobering center	39%	0	[0,7]	293
Medical detoxification	24%	0	[0,0]	6
Social detoxification	4%	0	[0,0]	2