Behavioral Health Bed Optimization Project

Analysis and Recommendations for Improving Patient Flow

San Francisco Health Commission

July 7, 2020

San Francisco Health Network

SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH

Behavioral Health Beds: Optimizing Flow

Project Objective:

Answer the question: *"How many beds are needed in each behavioral health bed category to maintain consistent patient flow for adult clients in San Francisco with zero wait time?"*

Why is this important?

- First quantitative analysis of patient flow in DPH behavioral health beds
- System is currently bottlenecked in certain areas which has negative patient health outcomes and financial impact
- In a system with optimal flow, patients get the care they need when they need it
- Investments are grounded in data to have the greatest impact

Behavioral Health Bed Optimization Methods

- Bed simulation modeling has been used internationally as a risk-free strategy for quantifying demand and identifying the impact of investments on patient flow. Studies conclude this methodology can help identify the appropriate type and number of beds required in public behavioral health systems[1]
- Analyzed data from SFDPH FY1819 and constructed a Discrete Event Simulation (DES) model to analyze the system based on its variability and complexity
- Input data was statistically analyzed and summarized from 25,583 admission entries that spanned 168 unique program names.
- These programs were aggregated to 19 "bed categories" incorporating the utilization of nearly 1,000 behavioral health beds and the admissions of over 7,000 clients.

San Francisco Health Network

SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH

[1] La et al. "Increasing Access to State Psychiatric Hospital Beds: Exploring Supply-Side Solutions." *Psychiatric Services*, 67:5, May 2016, 523-528. Devapriya et al. "StratBAM: A Discrete-Event Simulation Model to Support Strategic Hospital Bed Capacity Decisions." *J Med Syst,* 39:130, 2015, 130. Yin et al. "Applying Simulation Modeling to Quantify the Impact of Population Health and Capacity Interventions on Hospital Bed Demand" *Proceedings of the 2018 IISE Annual Conference*, 2018.

Demographics of Patients Using Behavioral Health System

Characteristic		Number of Unique Patients	Percent of Total Unique Patients
Homelessness	Yes	4,140	68%
	No	1,955	32%
Gender	Male	4,032	66%
	Female	1,763	29%
	Other	300	5%
Race/Ethnicity	White	2,015	33%
	Black/African American	1,434	24%
	Latino/a	720	12%
	Asian/Pacific Islander	359	6%
	Other/Not Stated	1,567	26%
Total		**6,095**	**100%**

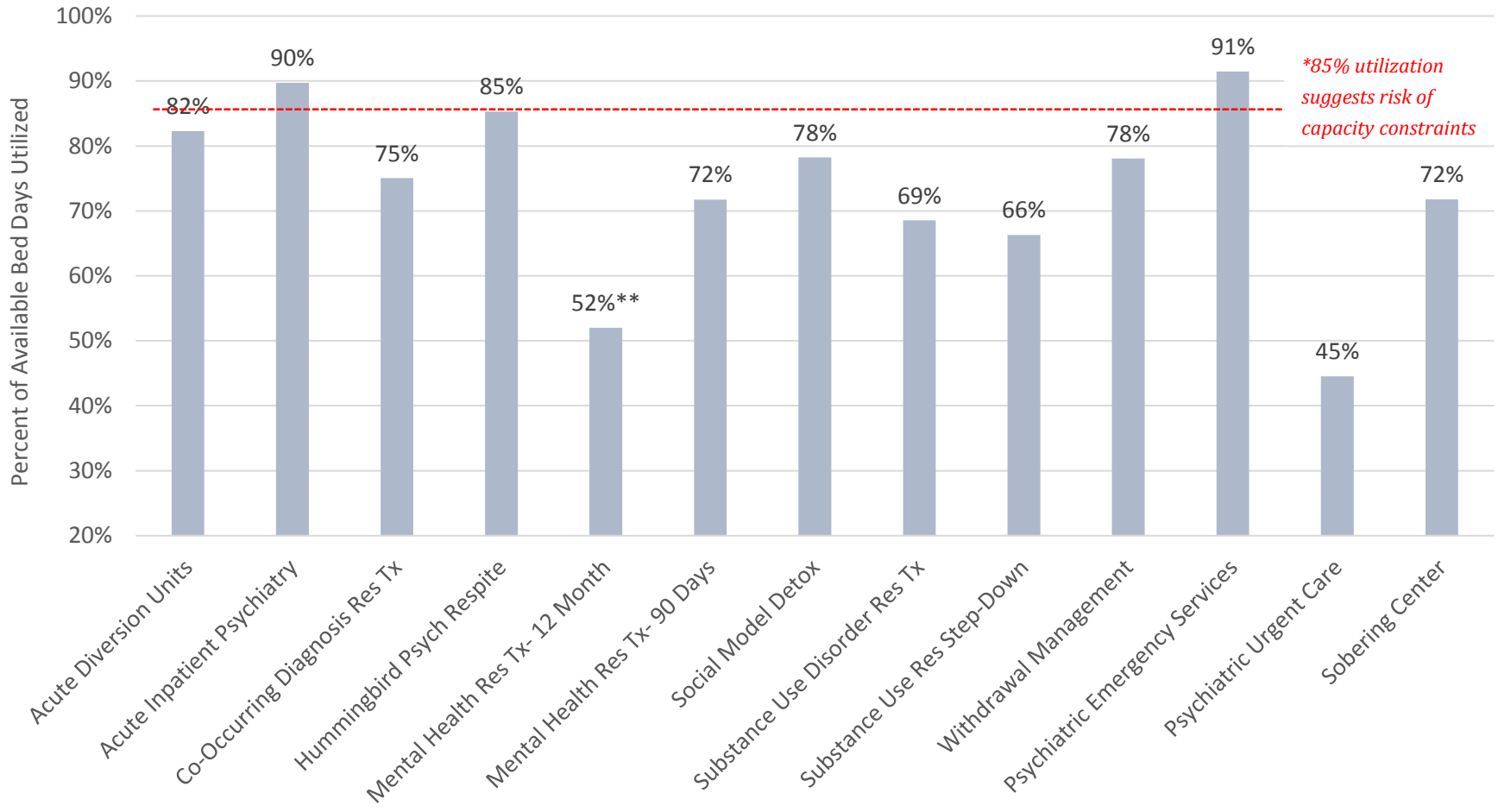
An additional 1,387 identified clients did not have demographic information to include in this analysis.

Homelessness defined by DPH Coordinated Care Management System (CCMS). CCMS defines people as experiencing homelessness in the fiscal year if they either: 1) utilize a City service that indicates housing instability, for example, a City shelter, or 2) self-report homelessness while accessing health care services.

San Francisco Health Network

SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH

Calculated Bed-Day Utilization



San Francisco Health Network

SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH

*Unable to calculate since no fixed bed count: Locked Subacute Treatment, Psychiatric Skilled Nursing Facilities, Residential Care Facility aka Board and Care, Residential Care Facility for the Elderly

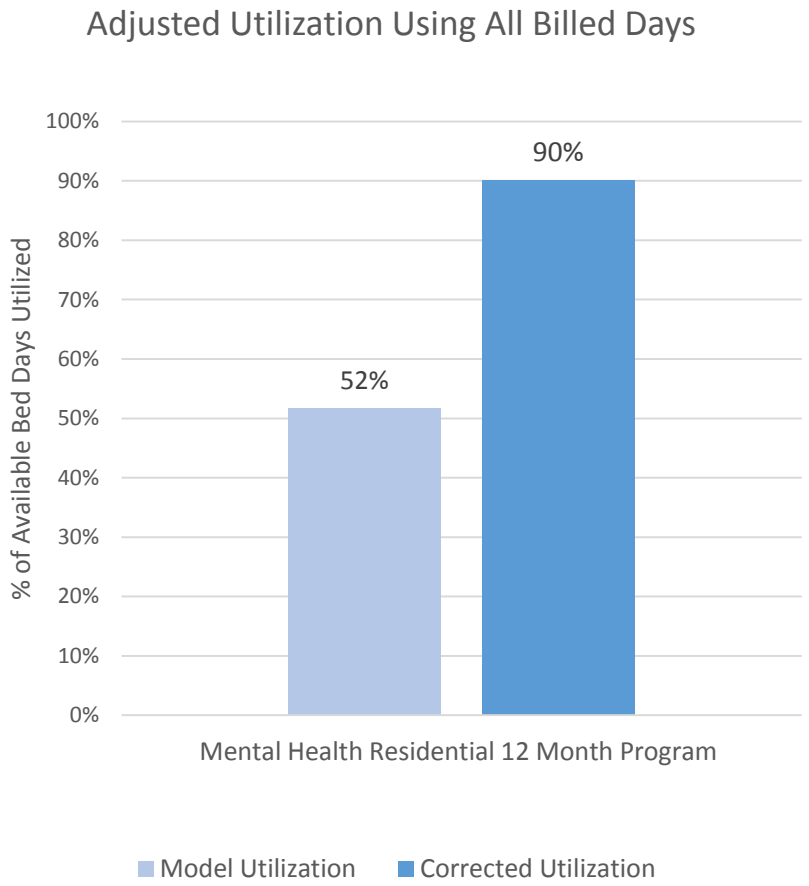
**MH Residential Treatment 12-month program utilization was adjusted to 90% during post-hoc analysis

Model Results: Recommended Bed Counts to Decrease Patient Wait Due to Capacity Constraints

Bed Category	Average Wait Due to Capacity (Days)*	Recommended Bed Count Increase (Zero Wait)	Bed Count Increase for 50% Wait Time Reduction
Locked Subacute Treatment	62	31	20
Psychiatric Skilled Nursing Facilities	121	13	8
Residential Care Facility Aka Board and Care	60	31	13
Residential Care Facility for the Elderly	44	22	9

*The model identified wait directly associated with the patient arrivals per day against the bed capacity. The model is not able to account for waiting time associated with processing and other operational barriers that DPH clients often encounter.

Post Hoc Analysis - Mental Health Residential Treatment



- Post hoc analysis found significant under-representation of Mental Health Residential – 12 month programs
- Recommendation: amend model results to include this bed category to list for investments due to high utilization rates and downstream location from LSAT

San Francisco Health Network

SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH

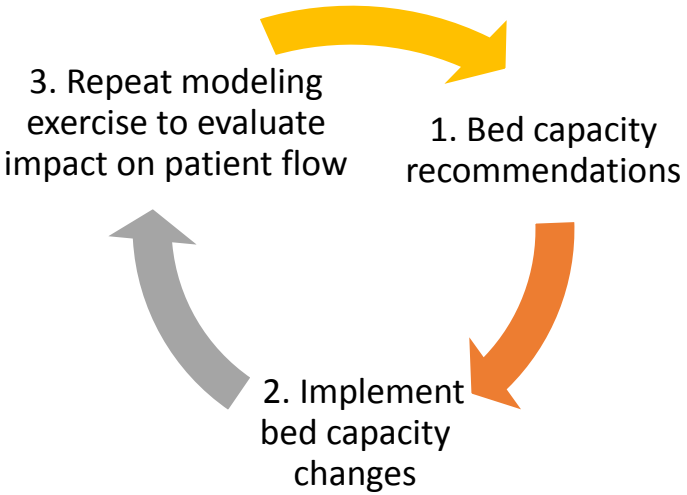
Limitations Summary

1. Data quality issues due to lack of uniform data system
2. We do not have data that captures the true demand for services
    - Unable to calculate “processing” wait time
    - Did not capture patients who were not placed
3. Using only one fiscal year of data affected quality of information on long stay programs e.g. Mental Health Residential 12 month programs

Behavioral Health Investment Recommendations

Bed Category	Recommended Bed Increase	Annual Cost of Recommended Bed Increase*
Locked Subacute Treatment	31	$5,493,433
Psychiatric Skilled Nursing Facility	13	$1,385,540
Residential Care Facilities aka Board and Care	31	$973,090
Residential Care Facilities for the Elderly	22	$855,195
Mental Health Residential Treatment (12-month)	20	$1,942,530
Total	**117**	**$10,649,788**

**cost calculated using BH Bed Inventory median cost per bed per day*



… and for each new bed investment, create one long-term housing placement.

San Francisco Health Network

SAN FRANCISCO DEPARTMENT OF PUBLIC HEALTH

Thank you