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FROM CONCEPT TO COMMUNITY: USING SYSTEM DYNAMICS TO STRENGTHEN ADULT ACUTE MENTAL HEALTH CRISIS SYSTEMS

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ABSTRACT

U.S. psychiatric crisis systems often suffer from access to care, delayed care, and overuse of law enforcement. Yet, decision-makers lack tools to evaluate system-wide effects of policy or resource changes. This poster presents a system dynamics model adapted for a regional mental health system based on the Anytown-MH framework developed by an American Psychiatric Association (APA) Task Force. Through stakeholder input and systems mapping, the model simulates population-level service flows across crisis teams, emergency departments, and inpatient facilities. Users interact with a visual dashboard to test strategic scenarios and observe downstream effects on arrests, ED delays, and system congestion. Results highlight trade-offs between reallocating beds and expanding mobile crisis services. This work illustrates how simulation modeling can guide evidence-informed investments in regional mental health systems.

1 INTRODUCTION

U.S. psychiatric crisis systems are under increasing strain from rising rates of avoidable arrests, emergency department (ED) boarding, and delayed access to inpatient care. Decision-makers lack tools that allow them to anticipate how changes in resource allocation or service design will ripple through this complex network of services. System dynamics modeling is well-suited for strategic-level planning across fragmented and interdependent systems. This poster presents the evolution from a generalized system dynamics model, known as the *AnyTown MH* model, developed initially through an American Psychiatric Association Task Force on bed capacity needs (APA Bed Needs), to the development and application in a regional mental health crisis system. The adapted model was developed through stakeholder engagement, community system mapping, and refinement of model structure, leading to a tailored decision support tool capable of scenario testing via an interactive dashboard.

2 MATERIALS AND METHODS

The adaptation process followed the five-stage planning model outlined in our prior conceptual work: (1) systems mapping workshop, (2) data gathering, (3) preliminary model review, (4) finalized stakeholder engagement, and (5) strategic scenario testing. A Kumu-based stakeholder map was used to define the regional crisis care structure, surface interdependencies, and refine the scope of the simulation model. Based on this, a hybrid stock-and-flow diagram (SFD) with feedback loops, shown in Figure 1, was developed to illustrate flows between community settings, EDs, crisis receiving centers, and civil and forensic inpatient care. The figure incorporates system structure and positive and negative reinforcing loops that drive the observable system behavior. Key outputs of interest include ED boarding, arrest rates, inpatient utilization, and system congestion. The tailored dashboard was implemented using isee system's Stella modeling environment to enable real-time scenario analysis. The dashboard facilitates stakeholder collaboration in

strategic planning, leading to a better understanding and improved outcomes through investment prioritization across the entire acute crisis mental health system.

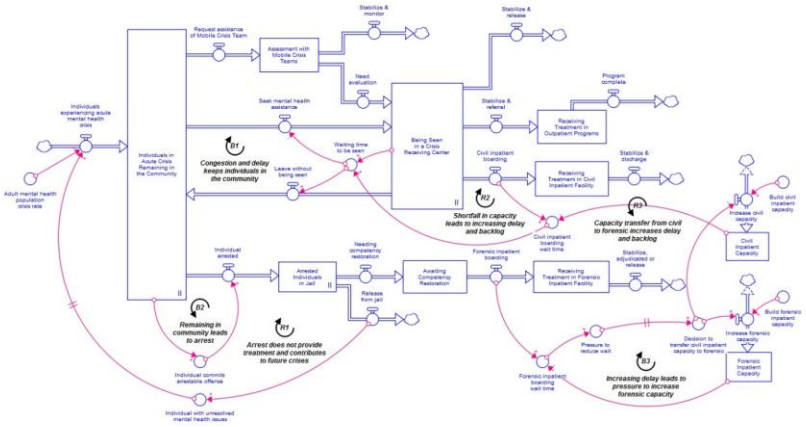

Figure 1: A hybrid SFD illustrating the system structure and feedback in acute psychiatric crisis services.

3 RESULTS AND DISCUSSION

Figure 2 illustrates the interactive dashboard that decision-makers would engage with to perform scenario evaluations. Decision-makers can collaboratively explore potential options specific to their acute crisis system and propose scenarios they think would be possible solutions to the challenges in their community. They would then use the interactive dashboard to simulate the scenario and observe the consequences of the proposed changes. On the left side of the interactive dashboard, users can change input parameters (e.g., capacity and responsiveness). On the right side, users can review the breakdown of the community population at risk of an acute crisis. The center panel allows navigation to several graphs that show and compare the scenario changes over time. Stakeholders can use the dashboard to explore the system dynamics interactively, promoting dialogue and consensus about strategic options.

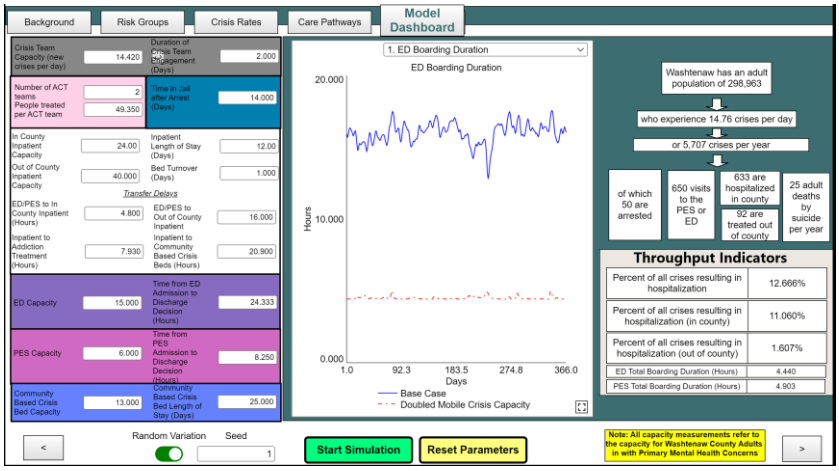

Figure 2: Stakeholders use an interactive dashboard view to explore policy scenarios and system congestion.

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