

TECHNICAL APPENDIX**Model Input Parameters**

Tables 1 and 2 of the technical appendix contain additional details on the person-level and hospital-level input parameters used in the discrete-event simulation model.

Table 1: Person-level discrete-event simulation model input parameters

| Input parameter | Source |
|---|---|
| Patient demographic characteristics (i.e., age, sex, psychiatric diagnosis) and eligibility for high-management unit | Sampled with replacement from HEARTS data (historical pool of actual patient admissions during fiscal year 2012). |
| Patient eligibility for community transition unit | HEARTS data from fiscal year 2011 were used to calculate the proportion of patients with observed stays in the community transition unit, by length of stay (<30 days, 30-59 days, 60-89 days, 90-119 days, 120-179 days, ≥180 days). These data provided a longer follow-up time of patients as compared with the historical pool of patient admissions during fiscal year 2012. |
| Patient length of stay | HEARTS data (predicted from Cox proportional hazards model) |
| Probability of a given patient's being removed from the waitlist (due to finding care elsewhere or no longer needing care) on a given day | <p>Individual-level waitlist data were used to estimate sex-specific probabilities of being removed from the waitlist after waiting for 1 day, 2 days, 3 days, etc. (through 30 days), using the number of days that patients <i>not admitted</i> to state hospitals remained on the waitlist and assuming that patients <i>admitted</i> to state hospitals would have remained on the waitlist for one additional day before being removed.</p> <p>The mean probability of being removed from the waitlist was 0.92 across all 30 days for males and females. Females were more likely to be removed from the waitlist earlier (18% after waiting 1 day, 59% after 2 days, 77% after 3 days, 84% after 4 days, 89% after 5 days, 97% after 6 days, 99% after 7 days, and 100% after 8 days) as compared with males (8% after waiting 1 day, 34% after 2 days, 52% after 3 days, 64% after 4 days, 85% after 5 days, 94% after 6 days, 98% after 7-27 days, 99% after 28-29 days, and 100% after 30 days). These estimates were consistent with stakeholder input, which indicated that male patients were more likely to wait longer for state hospital admission or alternate placement as compared with female patients.</p> |

Table 2: Hospital-level discrete-event simulation model input parameters

| Input parameter | Base-case value | Source |
|---|-----------------|---|
| Number of patients referred to the state hospital waitlist per year | 3,366 | <p>Calculated as the number of state hospital admissions during fiscal year 2012 (from HEARTS data) divided by the proportion of waitlisted patients admitted to the state hospital (from waitlist data), or 1,279/.38.</p> <p>We assumed that referral rates were constant throughout the year (i.e., without seasonality), based on stakeholder input indicating that the state hospital admissions unit received a consistent volume of referrals at all times.</p> <p>We also assumed that the likelihood of admission from the waitlist was constant across all simulated patients based on stakeholder input, which indicated that only patient characteristics <i>unobserved</i> in the data (e.g., level of violence) would result in a higher likelihood of admission.</p> |
| Number of beds in each treatment unit | | HEARTS data (daily average number of beds in use in each unit during the year) |
| Male adult acute unit | 86 | |
| Female adult acute unit | 44 | |
| High-management adult acute unit | 10 | |
| Male community transition unit | 44 | |
| Female community transition unit | 22 | |
| High-management community transition unit | 10 | |

Rules of Patient Processing

To the extent possible, rules about patient processing within the state hospital (i.e., internal transfers between units) were based on HEARTS data. However, stakeholder input was also used to inform patient processing rules since internal transfers were not always captured in the HEARTS data. The patient processing scheme described below represents a simplified version of actual internal transfers within the state hospital; this scheme was needed to route patients through the simulated hospital. All assumptions about patient processing were presented to stakeholders, who noted that the processing rules did not fully capture the true complexity of patient pathways through the hospital but were a reasonable approximation for simulation purposes and produced credible results.

Upon arrival to the simulated state hospital, if an appropriate adult acute unit bed was available, the patient moved into it. If no adult acute bed was available, the patient entered a queue (waiting list). Patients were drawn out of the queue based on length of time waiting (first in, first out) as appropriate beds became available. Each day on the waitlist, patients had a sex-specific, time-varying probability of being removed from the waitlist without being admitted to the state hospital, as described above in Table 1.

Admitted adults followed a number of different paths through the simulated hospital for treatment. From the screening and admissions unit, each patient was first admitted to the regular male or female adult acute unit. The pathway of care then depended on whether the patient was eligible for high-management and community transition unit services, as outlined below.

Patients not eligible for the high-management or community transition unit

Patients not eligible for high-management or community transition unit care spent their entire length of stay in the regular adult acute unit before being discharged from the hospital.

Patients eligible for the high-management unit only

From the regular units, patients eligible for high-management care could potentially transfer to this unit, depending on their assigned length of stay. We assumed that patients with a length of stay less than or equal to four days would stay in the regular adult acute unit for their full length of stay (to minimize any disruptions to care caused by internal transfers). Patients with a length of stay greater than four days stayed in the regular adult acute unit for 25% of their length of stay before being able to transfer to the high-management adult acute unit. To account for patients with a very long hospital stay and ensure that internal transfers occurred in a timely manner, all patients eligible for the high-management unit were able to transfer to this unit after staying 15 days in the regular adult acute unit. If a high-management bed was available and the patient had more than one day left in their assigned length of stay, they moved to the high-management unit until the end of their hospital stay. If a high-management bed was not available or the patient had less than or equal to one day left in their assigned length of stay, they remained in the regular adult acute unit for the rest of their stay.

Patients eligible for the community transition unit only

Patients in the regular adult acute unit who were not high-management eligible, but deemed appropriate for rehabilitative services, were transferred to one of the longer-term community transition units before being discharged back to the community. Patients with a length of stay greater than or equal to 30 days (the majority) stayed 15% of their length of stay in the regular adult acute unit (with a maximum of 30 days) before transferring to the community transition unit. Patients with a length of stay less than 30 days stayed in the regular adult acute unit for 25% of their length of stay before transferring; this exception was made to ensure that patients did not transfer to the community transition unit too quickly upon admission to the hospital. Patients eligible for the community transition unit waited for a bed until one became available in the unit. Once patients were in the community transition unit, stakeholders indicated that they did not transfer back to the adult acute unit before being discharged. We further assumed that patients in the community transition unit were required to stay for a minimum of seven days there (to benefit from the rehabilitative services provided), even if this extended their initially assigned length of stay in the hospital.

Patients eligible for the high-management and community transition units

Patients eligible for both high-management and community transition unit services spent 10% of their assigned length of stay in the regular adult acute unit (with a maximum of 15 days) before potentially transferring to the high-management adult acute unit. If a high-management bed was available and the patient had more than one day left in their assigned length of stay, they moved there and stayed for an additional 15% of their length of stay (with a maximum of 15 days); otherwise, they remained in the regular adult acute unit for an additional 15% of their length of stay (again, with a maximum of 15 days). After completing their stay in the adult acute unit (with a maximum of 30 days), patients were able to transfer to the high-management community transition unit. If a bed was available, patients transferred to this unit and stayed for an additional 25% of their assigned length of stay before returning to the regular community transition unit for the remainder of their stay. Patients who reached the end of their originally assigned length of stay while in the high-management community transition unit (i.e., patients who waited longer for internal transfers between units) were discharged directly from the high-management community transition unit. If a high-management community transition unit bed was not available, patients were transferred to the regular community transition unit for the remainder of their stay. As previously explained, we assumed that patients in the community transition unit were required to stay for a minimum of seven days to receive rehabilitative services.