

### About the iDREAM Program

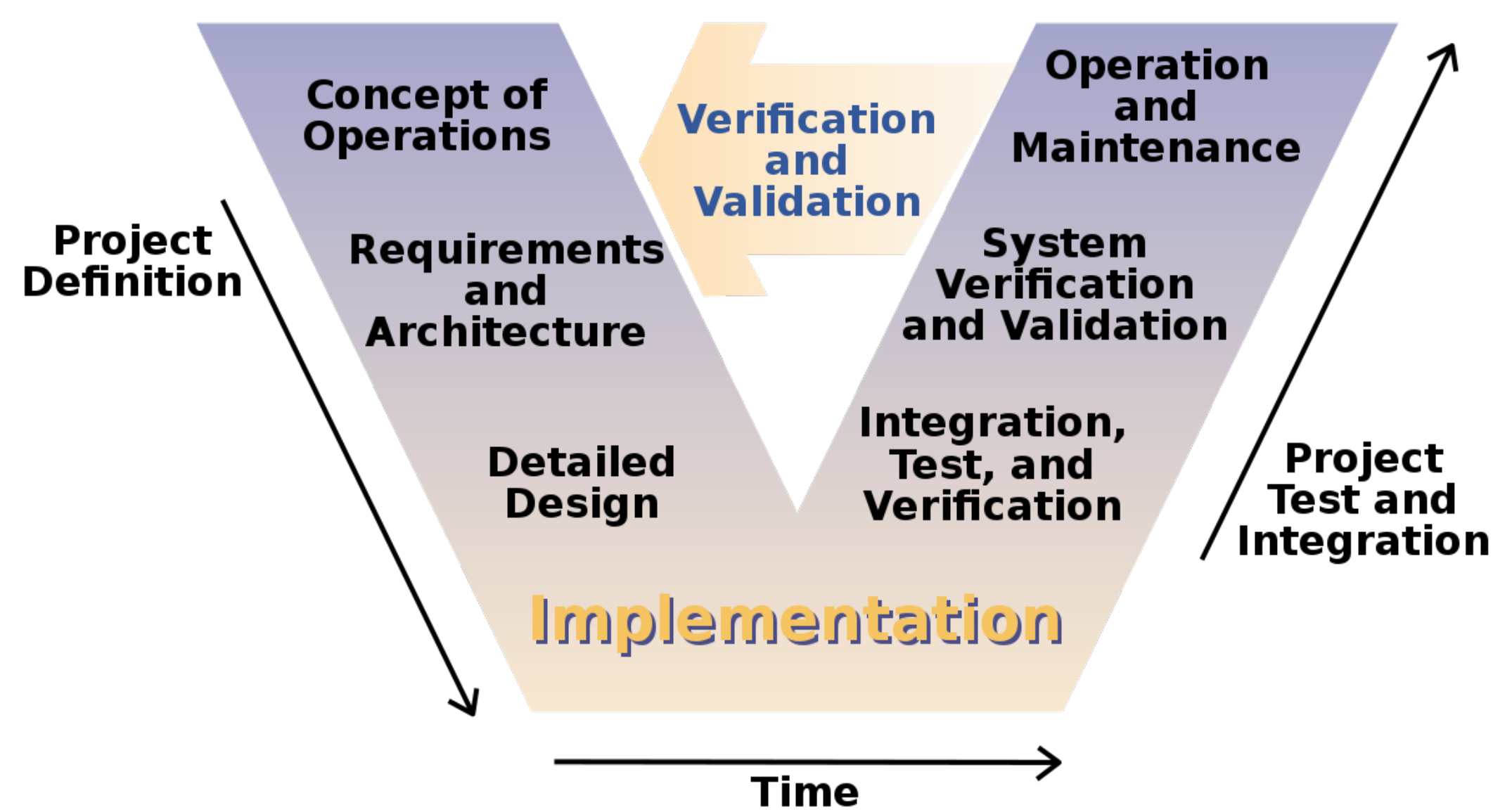


The iDREAM program was started as a unified effort by the Owensboro Health Regional Hospital system to implement a new systems engineering approach to the screening, prevention, treatment, and management of delirium within the inpatient setting

### Applying Systems Engineering



As a part of Owensboro Health and the Family Medicine Residency commitment to the IHI Age-Friendly program, iDREAM used the 4M model of care framework to design a phased intervention strategy for inpatient delirium care according to the systems engineering “V” model of development as below.



**Figure 1:** The “V” model in systems engineering steps through each of the phases of design development. For the iDREAM program, the development of a concept of operations with specific operational requirements was completed to guide the analysis and implementation of the delirium rounding team structure and screening process

### Baseline Analysis – Establishing the Concept of Operations for iDREAM

#### Program Structure

The iDREAM program targeted the following areas of improvement for Phase I from July 2020 to December 2021.

- **Targeted delirium rounding** on high risk and delirium positive patients
- **Nursing education** regarding screening, non-pharmacologic interventions, and high-risk medications
- **Improved delirium screening** by the transition from bCAM to NuDESC tools.
- **Identification of population-specific pharmacologic risk factors** through a baseline delirium analysis for the hospital system from 2016 until 2021

#### Statistical Analysis

- Odds ratios for medications effects on delirium were calculated and utilized Pearson Chi-Square for significance. A  $p < 0.05$  based on a two-tailed analysis was considered significant.
- Run charts were used to determine special cause variation after the implementation of the new screening process during the transition from bCAM to NuDESC
- All statistical calculations were performed using IBM SPSS v28. Run charts were created and analyzed in excel using QI Macros v2022.
- All data was retrospectively pulled from the EPIC EMR system at Owensboro Health Regional Hospital

#### Inclusion/Exclusion Criteria

- **Inclusion criteria** All patients admitted to the Owensboro Health Regional Hospital between 2016 and 2021 over the age of 65 were included in the analysis. Delirium positive was identified as a positive screen using either the bCAM or NuDESC screening tool in EPIC.
  - **Exclusion criteria** All patients  $< 65$  were excluded from the study.
- #### Pharmacologic Study
- Diphenhydramine, metoclopramide, scopolamine, zolpidem, benzodiazepine, and digoxin were studied
  - Medications were analyzed if ordered in EPIC. Medications were not verified as administered.

### Baseline Delirium Analysis

#### Average Age

| Delirium Status | Number of Patients (N) | Mean Age (±SD) | p-value |
|-----------------|------------------------|----------------|---------|
| Positive        | 5883                   | 77.69±7.8      | <0.001  |
| Negative        | 25511                  | 75.95±7.7      |         |

**Table 1:** A total of 31,372 admissions with a total of 5883 cases of documented delirium occurred between 2016 and 2021. The average age for patients with delirium was 77.7 and without delirium was 76.0 which was statistically significant ( $p < 0.001$ )

#### Length of Stay

| Delirium Status | Number of Patients (N) | Mean LOS (±SD) | Median LOS | p-value |
|-----------------|------------------------|----------------|------------|---------|
| Positive        | 5856                   | 9.8±30         | 6          | <0.001  |
| Negative        | 25489                  | 6±7.8          | 4          |         |

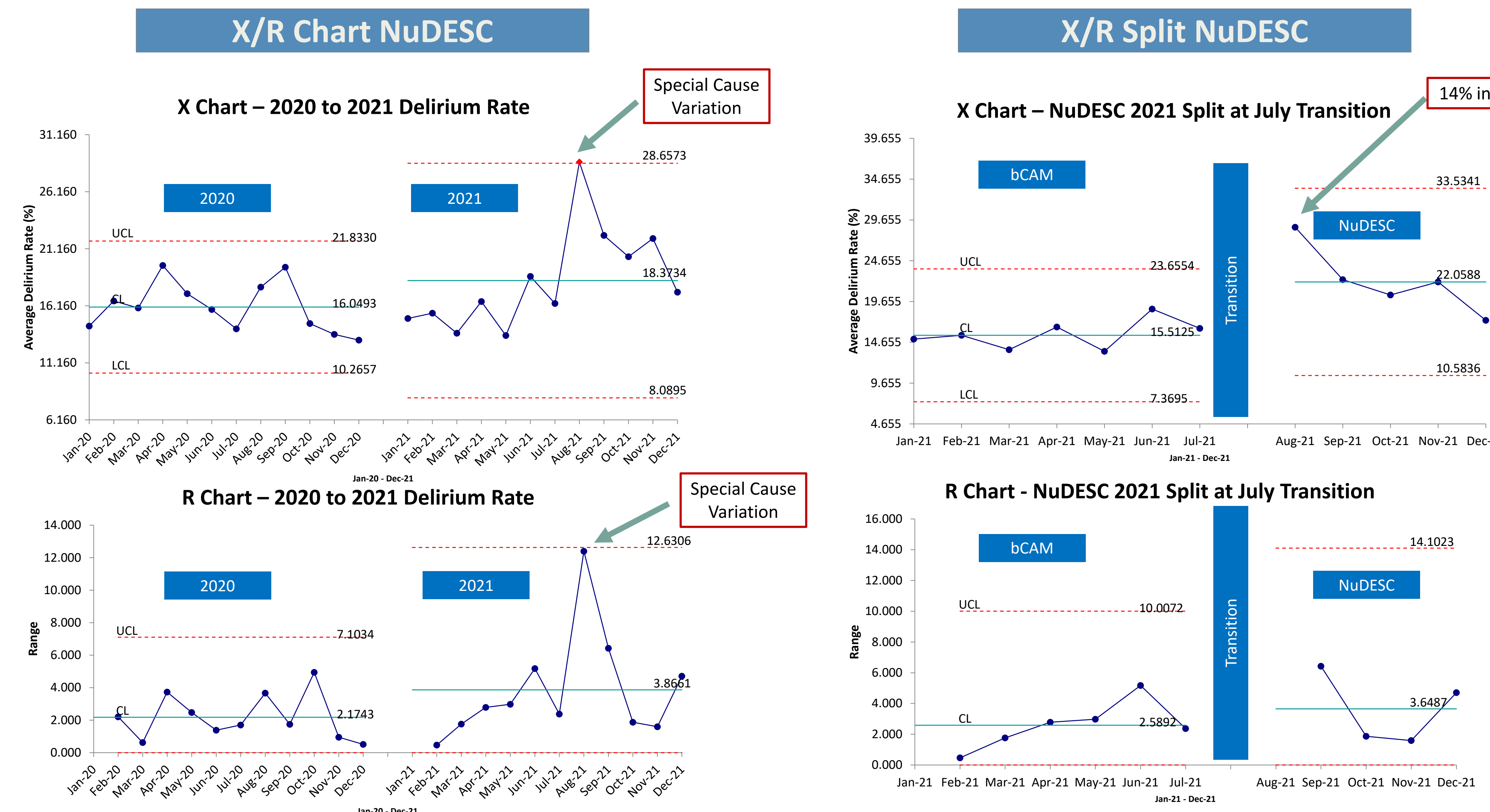
**Table 2:** The median length of stay for delirium positive patients was 6 days over those patients without delirium was 4 days. Having delirium increased the expected median length of stay by 2 days ( $p < 0.001$ )

#### Medications

| Medication      | Odds Ratio | Confidence Interval | p-value (Pearson Chi-Square) |
|-----------------|------------|---------------------|------------------------------|
| Diphenhydramine | 1.078      | 0.973-1.195         | 0.150                        |
| Metoclopramide  | 0.842      | 0.742-0.955         | 0.08                         |
| Scopolamine     | 0.855      | 0.737-0.991         | 0.037                        |
| Zolpidem        | 1.039      | 0.890-1.213         | 0.629                        |
| Benzodiazepine  | 1.390      | 1.298-1.488         | <0.001                       |
| Digoxin         | 1.291      | 1.195-1.394         | <0.001                       |

**Table 3:** Use of Benzodiazepine and Digoxin was found to be statistically significant in increasing the risk for delirium. Scopolamine was found to be statistically significant but was based on a very small sample size ( $< 220$  patients). A more directed research study is required to understand the relationship from our sample data.

### Transition from bCAM to NuDESC – Run Chart Analysis



**Figure 2:** Run chart analysis shows a special cause variation in July/August 2021 at the start of the NuDESC screening program within the hospital. Delirium rate increases were expected given the focused training, use, and monitoring associated with the transition from bCAM to NuDESC

**Figure 3:** The average monthly delirium rate using the bCAM screening tool was 15.5% in the 6 months prior to transition to the NuDESC. After the transition, the rate increased to 22.1% on average for the following 6 months using the NuDESC with an initial increase of 29.7% during the first month of implementation

### Next Phase

The program is moving into Phase II. As part of this effort, a new AWOL risk screening will be implemented with a nurse-driven, best-practice order set for delirium precautions for high-risk patients. Delirium rounds will be expanding with a strong emphasis on prevention and proactive interventions building on Phase I progress.

### References

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### IRB Statement

The iDREAM program has been approved by the University of Louisville IRB as a quality improvement project for data collection, analysis, and implementation. Additionally, the project has been approved by the Owensboro Health Regional Hospital Research Review Committee.

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