

# Use of Predictive Analytics to Inform Integrated Care Programs to Reduce Hospitalizations Among Hemodialysis Patients

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# Disclosures

- KM, AGW, SS, JL, and SMB are employees of DaVita Clinical Research
  - SMB's spouse is an employee of AstraZeneca
- MZ, BB, TB, JS, NL, and DR are employees of DaVita, Inc.

# Background

- Integrated care for dialysis patients could benefit from identification of those who are at high risk for poor outcomes in order to efficiently deploy clinical resources.
- We recently developed a hospitalization risk stratification model to triage hemodialysis (HD) patients for clinician contact and assessment within an integrated care clinical program (ICCP).
- In this analysis, we compared hospitalization rates before and after model implementation for patients enrolled in an ICCP and control patients who were not.

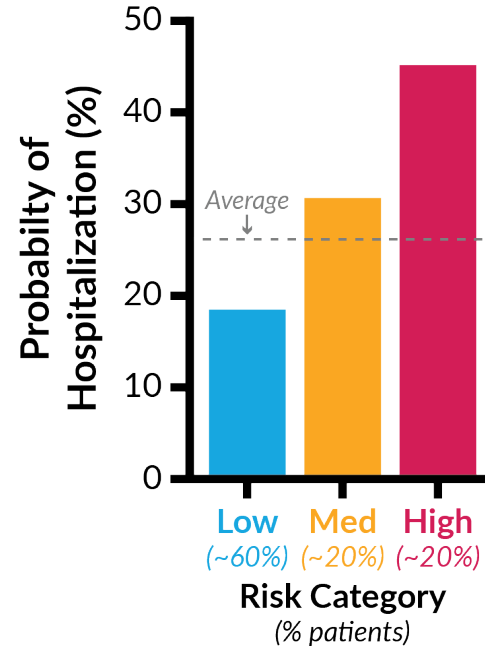
# Methods: Risk Stratification Model

## Inputs and Performance

- The model is based on >100 input terms representing
  - Demographics
  - Comorbidities
  - Laboratory values
  - Hospitalization history
  - Dialysis treatment details
- The model has very good overall performance and ability to discriminate
  - AUC = 0.81

## Patient Stratification

Model classifies patients as high, medium, or low risk

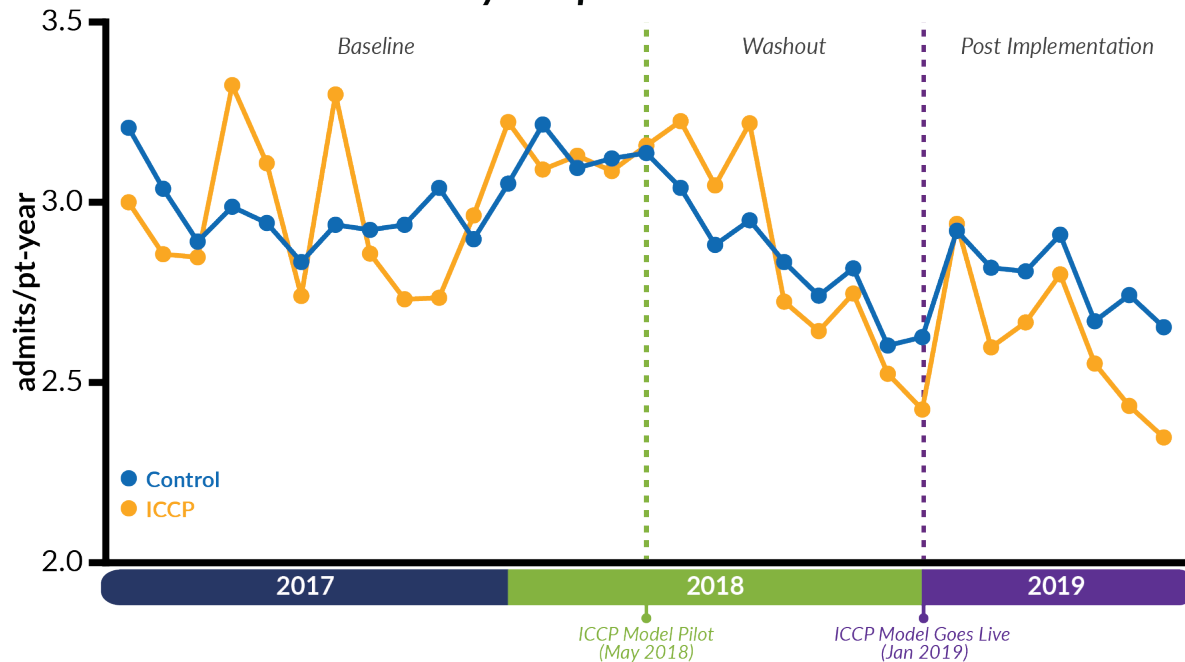


# Methods: Patients and Analysis

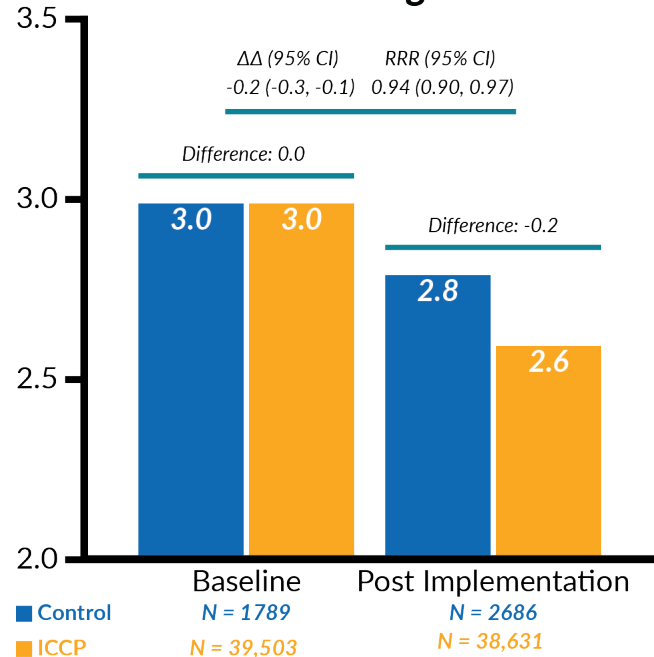
- All patients received our standard level of care consistent with industry best practices and regulations.
  - ICCP patients predicted to be medium and high risk received additional services (eg, telephonic health programs, case management, health screens, resource navigation) proportional to predicted risk level.
- We estimated the change over time from baseline (Feb 2017-April 2018) to the post program intervention (Jan-Aug 2019) for program enrollees and controls, and compare these using relative rate ratios.
  - Comparisons were stratified by predicted risk level.
  - A priori, we anticipated potential effects in the high- and medium-risk groups. The low-risk group was included as a negative control because low-risk status should not have led to differential clinical action based on program design.

# Results: High Risk Patients

## Monthly Hospitalization Rates



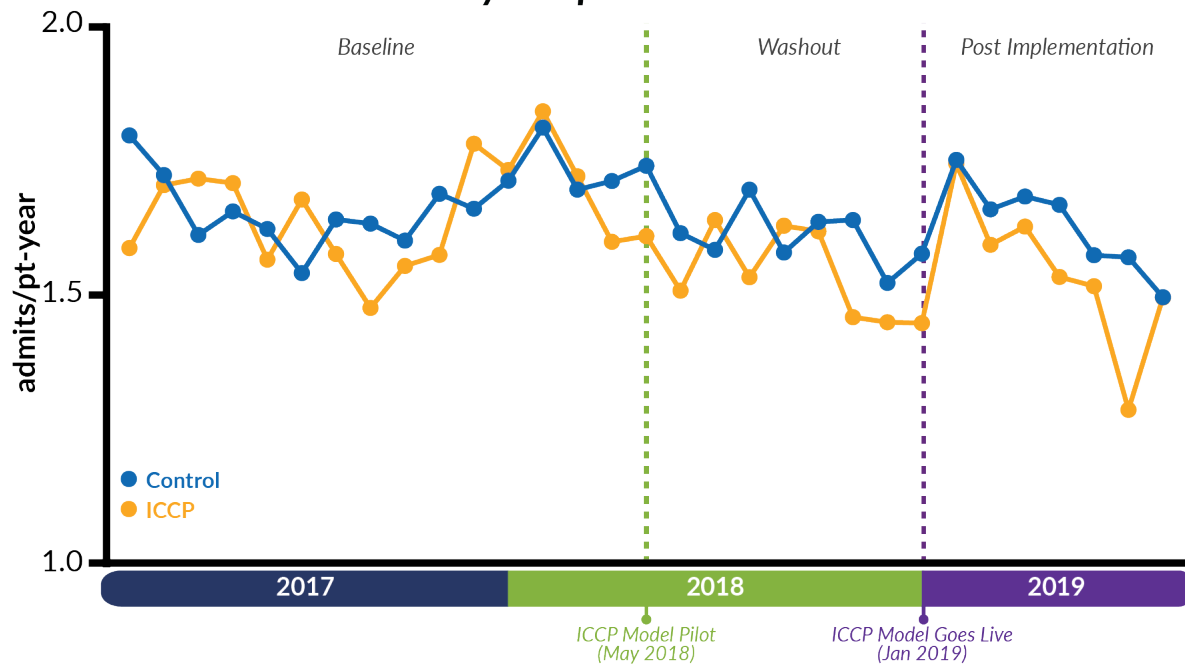
## Period Average Rates



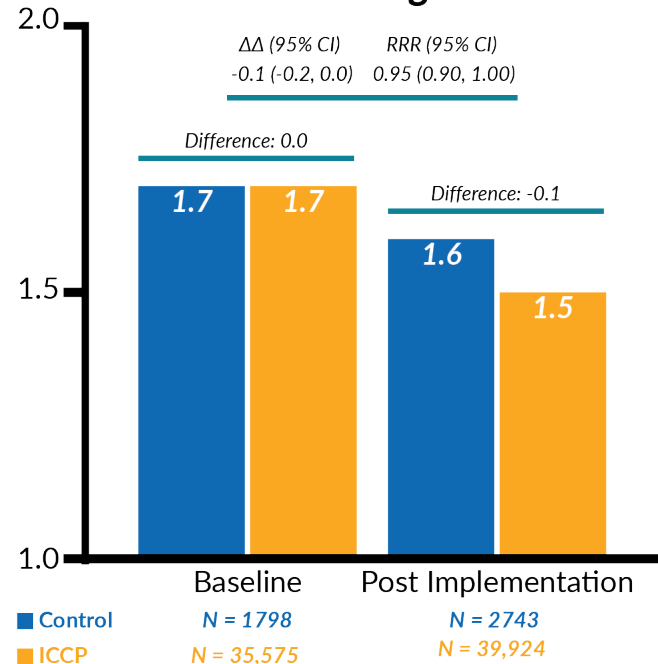
Hospitalization rates decreased from baseline to the post implementation period for all high risk patients. There was a 6% greater relative reduction for ICCP patients compared to control patients, which was equivalent to an additional decrease of 0.2 admits per patient-year.

# Results: Medium Risk

## Monthly Hospitalization Rates



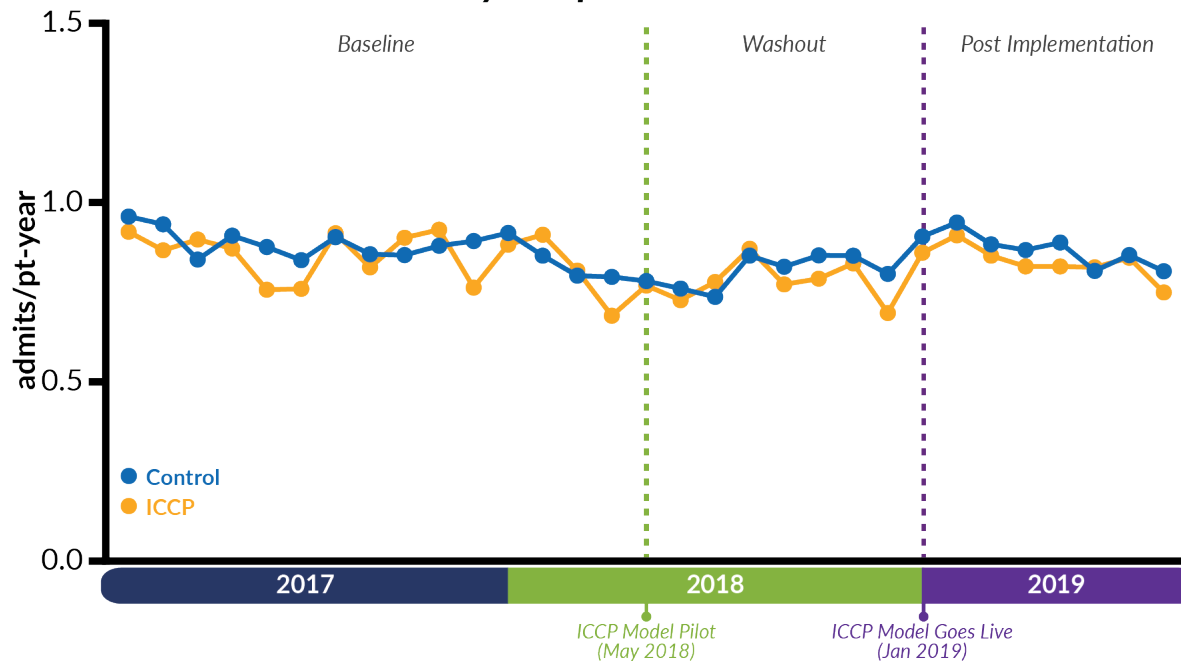
## Period Average Rates



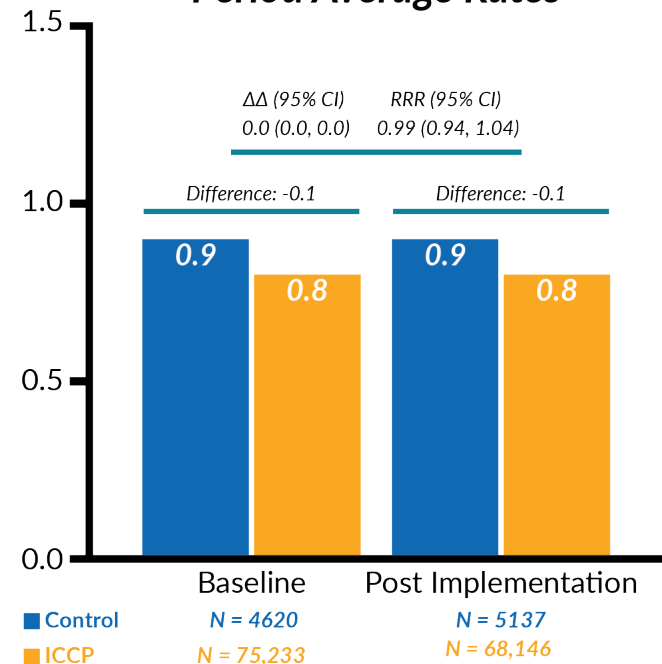
Hospitalization rates decreased from baseline to the post implementation period for all medium risk patients. There was a 5% greater relative reduction for ICCP patients compared to control patients, which was equivalent to an additional decrease of 0.1 admits per patient-year.

# Results: Low Risk

## Monthly Hospitalization Rates



## Period Average Rates



Hospitalization rates did not change from baseline to the post implementation period for low risk patients. There were no significant differences observed between ICCP patients compared to control patients.



# Conclusions

- Implementation of a risk-level based integrated care program seems to have reduced hospitalization rates among high- and medium-risk patients.
- No significant difference in temporal hospitalization reduction was seen among low-risk patients.
  - This is reassuring that greater levels of care directed at high- and medium-risk patients seemingly did not detract from the care of lower risk patients and is also reassuring regarding concerns of potential selection bias.
- These results support the potential utility of predictive analytics to support programs aimed at improving clinical outcomes among HD patients.

# Limitations

- Analyses were not adjusted for differences between exposure groups
- The effect of any specific interventions that were employed based on the model output cannot be determined or inferred based on these results