

Methods appendix

We excluded admissions to psychiatric units within five hours of previous hospital discharge time. These psychiatric admissions represented transfers from medical to psychiatric beds and not true readmissions. All other readmissions were eligible for chart review. Demographic characteristics of children were obtained through our administrative data. Race and ethnicity at our institution is obtained by asking the child's parent/caregiver the child's race and ethnicity. The Cincinnati Children's Hospital Medical Center Institutional Review Board approved this study.

The abstraction tool was an integral part of the quality improvement initiative that resulted in the creation of a readmission learning system. Review teams consisted of at least 3 reviewers (one physician, nurse, and quality manager/consultant). Review teams were specialty-specific and reviewed teams from their specialty. Disagreements were discussed between the 3 reviewers, and if they persisted were discussed among the entire subspecialty team, which consisted of up to 10 people. Reviews were performed weekly or bi-weekly to reduce recall bias from the multidisciplinary care team.

The abstraction tool consisted of basic patient demographic and clinical information relevant to the index hospitalization and readmission hospitalization, including attendings of record, diagnosis, and length of stay. The teams reviewed the patient's medical record including history and physical, progress notes, and discharge summaries. Feedback from the attending physician who directly cared for the patient was included in the review process. Additionally, any

documented communications in the electronic health record during the time period in between hospitalizations were reviewed.

For each readmission, the review team made separate determinations to capture preventable or not preventable and planned or unplanned. First, one of ten overall readmission categories were assigned. The readmission categories were adapted for pediatrics from the American Case Management Association Compare Readmission categories. Among these ten categories is a category for “Scheduled Readmission,” which was defined as “a readmission that was scheduled or expected at the time of the previous discharge” and for the purpose of this analysis was used synonymously with “planned” readmission. Second, each team would then determine the preventability of each readmission using a previously described Likert scale with high inter-rater reliability for preventability assessment.¹ For these analyses, readmissions were considered preventable if the reviewing team rated them as either “more likely preventable” or “preventable in most circumstances.” The data from the standardized reviews were captured in REDCap.

Matching reviewed readmissions to PPR and PACR algorithms

By algorithm rules, additional exclusions applied for both the PACR and PPR metrics. Once those exclusions removed index admissions, some readmission events did not match the readmission event which had been assessed through medical record review. For example, the PPR algorithm matched the inpatient index event with an inpatient readmission event; however, if there was an observation event between the two inpatient readmission events, the observation event was eligible for medical record review and thus could not be matched to the readmission event.

Calculating Positive and Negative Predictive Value (PPV and NPV)

Since negative and positive predictive value vary with prevalence, we calculated PPV and NPV over a prevalence range while holding sensitivity and specificity constant. For potentially preventable, we present PPV and NPV at a prevalence of 10%, 20%, and 30% as the published range of percentage of readmissions is between 6 and 30% (generally closer to 20%) of all pediatric readmissions.¹⁻⁴ For unplanned readmission, we present PPV and NPV at a prevalence of 60%, 65%, and 70% as unplanned readmissions are 60-69% of all pediatric readmissions.⁵

1. Hain PD, Gay JC, Berutti TW, Whitney GM, Wang W, Saville BR. Preventability of early readmissions at a children's hospital. *Pediatrics*. 2013;131(1):e171-181.
2. Toomey SL, Peltz A, Loren S, et al. Potentially Preventable 30-Day Hospital Readmissions at a Children's Hospital. *Pediatrics*. 2016;138(2).
3. Wallace SS, Keller SL, Falco CN, et al. An Examination of Physician-, Caregiver-, and Disease-Related Factors Associated With Readmission From a Pediatric Hospital Medicine Service. *Hosp Pediatr*. 2015;5(11):566-573.
4. Jonas JA, Devon EP, Ronan JC, et al. Determining preventability of pediatric readmissions using fault tree analysis. *J Hosp Med*. 2016;11(5):329-335.
5. Auger KA, Mueller EL, Weinberg SH, et al. A Validated Method for Identifying Unplanned Pediatric Readmission. *J Pediatr*. 2016;170:105-112 e102.