Background
Improving the ability to predict which patients are at increased risk for acute care services subsequent to hospitalization can lead to more effective interventions and quality care. This study evaluated the performance of risk models to predict unplanned 30-day acute care service utilization among adult inpatients with newly diagnosed hematologic malignancies. The study explored the impact of medical complications on potentially preventable service utilization (defined with specifications for proposed measure OP-33 from the CMS Hospital Outpatient Quality Reporting Program) and focused on social determinants of health.

Methods
The study included 933 unique adult patients admitted to acute care facilities within a non-profit community-based healthcare system in Southern California during calendar years 2012 to 2017. Risk models integrated a comprehensive set of structured data elements (demographics, medical conditions, treatments, services) using clinical information from electronic medical records and facility oncology registries. Predictive models were constructed using a multivariable logistic regression, with calculation of standardized coefficients to rank ordered variables with the greatest impact on unplanned 30-day acute care service utilization. Exploratory data mining techniques were used to augment classification of at-risk patients as follows:

- A decision (classification) tree data mining approach was conducted to explore non-traditional clinical datasets and risk factors, such as lab values.
- Determined subgroups were achieved by probability-based classifications as alternatives to traditional cohorting.
- Nearly stable variables were included in follow-up regression models and odds were weighted.

RESULTS

Cancer Type & Unplanned Acute Care Service Rates

Lymphoma was the most prevalent hematologic malignancy (48.7%), followed by leukemia (35.2%), myeloma (14.0%), and mixed types (2.1%). Approximately one fifth (21.2%) of patients received unplanned acute care within 30 days after the index hospitalization. There were no statistically significant differences in unplanned acute care service utilization by primary type of cancer (p = 0.413).

Social Determinants of Health

- Nearly one-third of all patients reported not having a support person or care partner.
- There were statistically significant differences between cohorts based on past history of counseling/behavorial health medications, history of substance use, and lack of social health consult during the hospital stay.

Predictive Models: Leukemia

- Results were identical for both the standard predictive model and the final model produced using the exploratory data mining approach.
- Lack of social work consultation, medical history of counseling/behavioral health medications, lack of social work consultation, and history of substance use were significant risk predictors for patients with a diagnosis of leukemia.

Predictive Models: Myeloma

- Significant risk predictors for patients with a diagnosis of myeloma included lack of social work consultation and history of substance use.

IMPLICATIONS FOR PRACTICE

This non-interventional, retrospective observational study demonstrated high rates of unplanned acute care service utilization subsequent to index hospitalization for patients with newly diagnosed hematologic malignancies. Results demonstrated differences in risk factors among patients associated with the type of hematologic malignancy. Unplanned acute care utilization was substantially impacted by social determinants of health for patients with a new diagnosis of lymphoma or myeloma. In contrast, other factors contributed to increased risk for patients with leukemia, including shorter length of stay during the index hospitalization and race.

Studying limitations include the retrospective observational design, using data available from electronic medical records and facility oncology registries. Although the five-year study time period increased the overall number of patients, it was beyond the scope to investigate specific usage rates over time. Consistent with recent research, the authors identify the need to further investigate specific usage rates over time, and to identify the importance of specific social determinants of health to improve care delivery.

REFERENCES

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7. Alaina Lee, BSN, RN OCN1
8. Oncology Registrar, for their contributions in extracting and validating the datasets used for analysis.

PATIENT CHARACTERISTICS

- The mean age of all participants was 65 years and 51.5% were male.
- Individuals with self-reported Hispanic/Latino origin accounted for 69% of the “other” race/ethnicity category.
- The most prevalent insurance category was Medicare/supplemental plans.

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