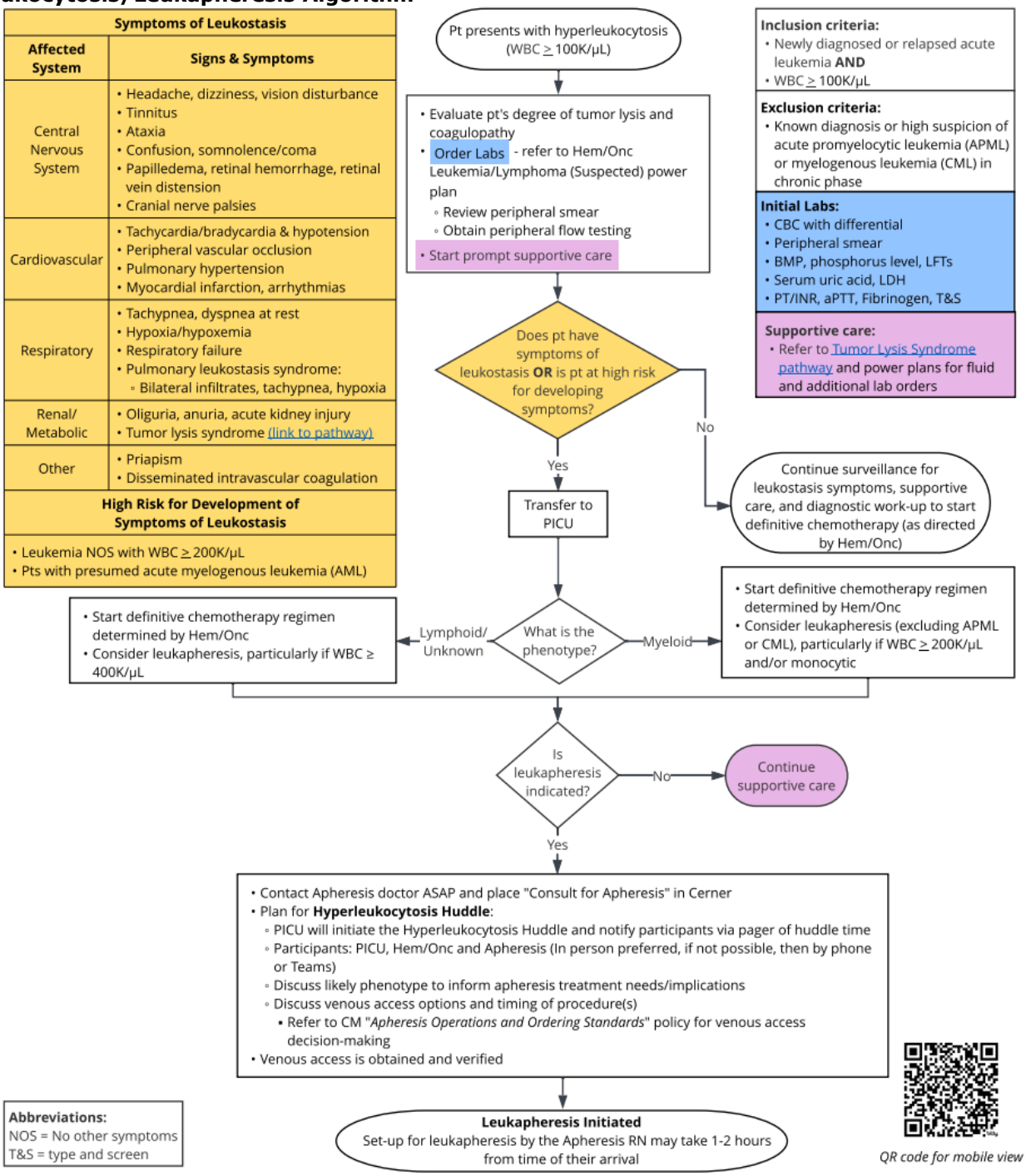
Hyperleukocytosis/Leukapheresis
Clinical Pathway Synopsis

Hyperleukocytosis/Leukapheresis Algorithm



** These clinical pathways do not establish a standard of care to be followed in every case. It is recognized that each case is different, and those individuals involved in providing health care are expected to use their judgment in determining what is in the best interests of the patient based on the circumstances existing at the time. It is impossible to anticipate all possible situations that may exist and to prepare a clinical pathway for each. Accordingly, these clinical pathways should guide care with the understanding that departures from them may be required at times.*

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Objective of Clinical Pathway

To provide care standards for the patient diagnosed with acute leukemia experiencing hyperleukocytosis. This clinical pathway provides guidance regarding determination of the need for leukapheresis, and once the need has been established, the process to ensure timely communication and initiation of leukapheresis.

Background

Hyperleukocytosis is a life-threatening oncology emergency, defined as a white blood cell (WBC) count ≥ 100,000/μL and can occur in up to 20% of patients with acute myeloid or lymphoid leukemias (Abla et al., 2016). Hyperleukocytosis may lead to leukostasis and subsequent end organ damage, commonly affecting the central nervous system, respiratory and renal systems, and can also cause tumor lysis syndrome (TLS), another oncology emergency, and lead to metabolic derangements and further renal dysfunction (Porcu et al., 2000). Treatment of hyperleukocytosis includes supportive care, early initiation of chemotherapy and/or leukapheresis (Zhang et al., 2021).

There are no definitive guidelines on the use or efficacy of leukapheresis in hyperleukocytosis. Within published literature there is a lack of consistency in decision to treat and selection biases (as physician discretion was used as an indication for leukapheresis), variability in treatment (whether or not to administer chemotherapy), and differences in outcome measures (Zhang et al., 2021). According to the American Society of Apheresis Guidelines, the indication for use of leukapheresis as treatment for hyperleukocytosis falls under category III, meaning the quality of published evidence has not established the optimum role of leukapheresis and thus decision making should be based on individual cases (Connelly-Smith et al., 2023). Development of a clinical pathway for hyperleukocytosis and leukapheresis will allow for standardized management strategies for patients at Children's Mercy Kansas City (CMKC).

Target Users

- Physicians (Hematology/Oncology, Critical Care, Transfusion Medicine, Apheresis Program)
- Advance Practice Providers
- Nurses

Target Population

Inclusion Criteria

- Patients with newly diagnosed or relapsed acute leukemia and white blood cell count of ≥ 100,000/μL.

Exclusion Criteria

- Patients with a known diagnosis or high suspicion of acute promyelocytic leukemia (APML) or myelogenous leukemia (CML) in chronic phase.

Practice Recommendations

A clinical practice guideline has not been established to address the care process for patients experiencing hyperleukocytosis. The clinical pathway Leukapheresis for Hyperleukocytosis in Acute Leukemia (Children's Hospital Colorado, 2021) was used as a basis for development of this pathway and modified to reflect practices at CMKC. Practice recommendations are based on the expert opinion of providers involved in the interprofessional care of patients diagnosed with leukemia experiencing hyperleukocytosis and the determination of need for leukapheresis.

Additional Questions Posed by the Clinical Pathway Committee

No clinical questions were posed for this review.

Recommendations Specific for Children's Mercy

Practice recommendations, which were based on expert opinion, include:

- Early recognition of hyperleukocytosis and signs/symptoms/laboratory values suggestive of leukostasis
- Early involvement and coordination of a multidisciplinary team (Hematology/Oncology, Pediatric Intensive Care, Apheresis) to determine if leukapheresis is indicated
- Prompt initiation of leukapheresis if it is found to be indicated
- Leukapheresis should not delay the start of definitive chemotherapy

Measures
- Utilization of the Hyperleukocytosis/Leukapheresis Clinical Pathway

Value Implications

The following improvements may increase value by reducing healthcare costs and non-monetary costs (e.g., missed school/work, loss of wages, stress) for patients and families and reducing costs and resource utilization for healthcare facilities.
- Decrease length of stay in the intensive care unit
- Decreased unwarranted variation of care

Organizational Barriers and Facilitators

Potential Barriers
- Variability of acceptable level of risk among providers

Potential Facilitators
- Collaborative engagement across care continuum settings during clinical pathway development
- High rate of use of the clinical pathway

Diversity/Equity/Inclusion

Our aim is to provide equitable care. These issues were discussed with the Committee, reviewed in the literature, and discussed prior to making any practice recommendations.

Power Plans
- Hem/Onc Leukemia/Lymphoma (Suspected)
- Tumor Lysis Pathway
- Leukacytapheresis Depletion

Associated Policies
- Apheresis Operations and Ordering Standards

Education Materials
- No educational materials are associated with this clinical pathway.

Clinical Pathway Preparation

This pathway was prepared by the Evidence Based Practice (EBP) Department in collaboration with the Hyperleukocytosis/Leukapheresis Clinical Pathway Committee composed of content experts at Children's Mercy Kansas City. The development of this pathway supports the Quality Excellence and Safety Division's initiative to promote care standardization that is evidenced by measured outcomes. If a conflict of interest is identified, the conflict will be disclosed next to the committee member's name.

Hyperleukocytosis/Leukapheresis Clinical Pathway Committee Members and Representation
- Amy Johnson, MD, MBA | Hematology/Oncology/BMT, Pediatric Fellow | Committee Co-Chair
- Meagan Vacek, DO| Hematology/Oncology/BMT, Pediatric Fellow | Committee Co-Chair
- Keith August, MD, MS| Hematology/Oncology/BMT | Committee Member
- Cherie Burroughs-Scanlon, RN, BSN, CPN | Apheresis Program | Committee Member
- Lejla Music Aplenc, MD | Pathology and Laboratory Medicine | Committee Member
- Jay Rilinger, MD | Critical Care Medicine | Committee Member
- Alyssa Stoner, DO, MS | Critical Care Medicine | Committee Member
- Nikki Wood, DO | Hematology/Oncology/BMT, Apheresis Program | Committee Member

EBP Committee Members
- Todd Glenski, MD, MSHA, FASA | Anesthesiology, Evidence Based Practice
- Megan Gripka, MT (ASCP) SM | Evidence Based Practice

Clinical Pathway Development Funding

The development of this clinical pathway was underwritten by the following departments/divisions:

- Hematology/Oncology
- Critical Care Medicine
- Transfusion Medicine
- Apheresis
- Evidence Based Practice

Conflict of Interest

The contributors to the Hyperleukocytosis/Leukapheresis Clinical Pathway have no conflicts of interest to disclose related to the subject matter or materials discussed.

Approval Process

- This pathway was reviewed and approved by the Hyperleukocytosis/Leukapheresis Committee, Content Expert Departments/Divisions, and the EBP Department; after which they were approved by the Medical Executive Committee.
- Pathways are reviewed and updated as necessary every 3 years within the EBP Department at CMKC. Content expert teams are involved with every review and update.

Review Requested

Department/Unit	Date Obtained
Hematology/Oncology	November 2023
Critical Care Medicine	November 2023
Transfusion Medicine	November 2023
Apheresis Program	November 2023
Evidence Based Practice	November 2023

Version History

Date	Comments
November 2023	Version one – Development of clinical pathway

Date for Next Review

- November 2026

Implementation & Follow-Up

- Once approved, the pathway was presented to appropriate care teams and implemented. Care measurements will be assessed and shared with appropriate care teams to determine if changes need to occur.
- Education was provided to all stakeholders:
  - Department of Hematology/Oncology, Critical Care Medicine, Transfusion Medicine, and Apheresis Program
- Additional institution-wide announcements were made via email, hospital website, and relevant huddles.
- Metrics will be assessed and shared with appropriate care teams to determine if changes need to occur.

Disclaimer

When evidence is lacking or inconclusive, options in care are provided in the supporting documents and the power plan(s) that accompany the clinical pathway.

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