

CRITICAL CARE ORDER SET

Tumor lysis Syndrome

Prevention and treatment of TLS in the ICU. Fluid is the foundation — flush the tubules, lower the uric acid, and chase each electrolyte derangement while watching for the one trap: don't give calcium for asymptomatic hypocalcemia. Know the dialysis triggers and coordinate oncology, nephrology, and pharmacy early. Adapt all thresholds to your protocol.

LABORATORY TLS — CAIRO-BISHOP (≥ 2 within 3 days before to 7 days after cytotoxic therapy)

Uric acid

≥ 8 mg/dL or ↑ 25%

Potassium

≥ 6.0 mEq/L or ↑ 25%

Phosphate

≥ 4.5 mg/dL or ↑ 25%

Calcium

≤ 7 mg/dL or ↓ 25%

CLINICAL TLS Laboratory TLS **plus** one of — AKI (creatinine ↑), cardiac arrhythmia / sudden death, or seizure.

01 General orders

MONITORING / NURSING

- | | |
|---|---|
| ☐ Admit to ICU, telemetry ; continuous cardiac monitoring | ☐ Vitals q1h (more if unstable) |
| ☐ Strict I/O , Foley catheter; hourly UOP | ☐ Daily weight |

LABS — STAT NOW, THEN Q4-6H (SPACE OUT AS STABLE)

- | | |
|---|--|
| ☐ BMP — Na, K, Cl, HCO ₃ ⁻ , BUN, creatinine, glucose | ☐ Ca, phosphate, magnesium |
| ☐ Uric acid ; LDH | ☐ CBC with differential |

☐ ABG/VBG if acidosis / respiratory issues

☐ If indicated — coagulation panel, type & screen, **G6PD** (before rasburicase)

02 IV fluids — the core of TLS management

GOAL High urine output — typically **80–100 mL/m²/h** ($\approx$ 2–3 mL/kg/h) while avoiding volume overload.

Hydration

- ☐ **0.9% NaCl IV at 150–250 mL/h**, titrate to **UOP $\geq$ 2 mL/kg/h**
- ☐ Reduce rate / add diuretics if signs of volume overload; daily balance target **slightly positive** unless overloaded or oliguric/anuric
- ☐ **Avoid potassium- and lactate-containing solutions** — no LR, no KCl in maintenance fluids

Furosemide · optional — only if euvolemic & UOP inadequate

- ☐ Initial **20–40 mg IV once**, may repeat & titrate up (**40–80 mg IV q6–8h**) to target UOP
- ☐ **Hold** if hypotension, intravascular depletion, or rising creatinine with low UOP

NOT ROUTINE Urinary alkalinization is no longer recommended — it promotes calcium-phosphate precipitation and is unnecessary with rasburicase.

03 Uric acid–lowering therapy

Choose by risk & TLS status (prophylaxis vs treatment), uric acid level, renal function, G6PD status, institutional policy.

A · Rasburicase · preferred for established TLS / high uric acid

CONTRAINDICATED **G6PD deficiency** (hemolysis / methemoglobinemia), pregnancy (consult), neonates.

- ☐ **Rasburicase 0.2 mg/kg IV once over 30 min**, OR fixed dose **3–6 mg IV once** (adults); repeat based on uric acid levels

- ☐ **Do not give concurrently with allopurinol**
- ☐ Uric acid samples — **on ice, process promptly** (avoids ex-vivo degradation, falsely low result)

B • Allopurinol · prophylaxis or when rasburicase not indicated / available

- ☐ Normal renal function — **300 mg PO daily** (or 100 mg PO TID)
- ☐ Renal impairment (eGFR < 30) — **100–200 mg PO daily** (or 100 mg PO BID)
- ☐ Start **24–48 h before** cytotoxic therapy when possible; continue through risk period. Avoid combining with rasburicase

04 Electrolyte management

A • Hyperkalemia · trigger K $\geq$ 6.0 (or lower with ECG changes)

STABILIZE MYOCARDIUM

- ☐ **Calcium gluconate 10% 1 g IV** over 5–10 min (if ECG changes or K $\geq$ 6–6.5); may repeat once after 5–10 min

SHIFT INTRACELLULARLY

- ☐ **Regular insulin 10 units IV + dextrose 25 g** (50 mL D50) if glucose < 250
- ☐ Nebulized **albuterol 10–20 mg** over 10 min; **sodium bicarbonate 50 mEq IV** over 5–10 min if concurrent acidosis

REMOVE FROM BODY

- ☐ Loop diuretic if nonoliguric; **sodium zirconium cyclosilicate 10 g PO TID $\times$ 48h** then 10 g daily (avoid in bowel obstruction); **nephrology for dialysis** (Section 05)
- ☐ **Avoid** — all K-containing fluids, K-sparing diuretics, ACEi/ARB, NSAIDs

B • Hyperphosphatemia

- ☐ Low-phosphate diet / NPO as appropriate
- ☐ **Sevelamer carbonate 800–1600 mg PO TID** with meals (or calcium acetate if not hypercalcemic)
- ☐ Avoid phosphate-containing enemas / laxatives. Dialysis if refractory / severe AKI, esp. **Ca $\times$ P > 55–70**

C • Hypocalcemia

KEY Do NOT give calcium for asymptomatic hypocalcemia — it worsens Ca-phosphate precipitation.

- ☐ Asymptomatic — no replacement; treat phosphate & underlying TLS
- ☐ Symptomatic / severe (tetany, seizures, arrhythmia, prolonged QT) — **calcium gluconate 10% 1–2 g IV** over 10–20 min, repeat with ECG monitoring

D • Metabolic acidosis

- ☐ Mild–moderate — optimize volume & treat underlying TLS
- ☐ Severe with hemodynamic compromise — **sodium bicarbonate 50–100 mEq IV over 1–2 h** or infusion (caution: volume / Na load); dialysis if refractory with AKI / hyperkalemia / overload

05 Renal replacement therapy

NEPHROLOGY STAT IF Refractory hyperkalemia or **K $\geq$ 6.0–6.5** despite temporizing · oliguric/anuric AKI with overload / pulmonary edema · **pH < 7.1** unresponsive · symptomatic uremia · severe hyperphosphatemia or high Ca $\times$ P with hypocalcemic symptoms.

- ☐ “Nephrology consult STAT for emergent dialysis in TLS”
- ☐ Modality — **intermittent HD vs CRRT** per nephrology / ICU (TLS has high solute generation; CRRT or hybrid often used to prevent rapid rebound)

06 Medication review & avoidance

HOLD / AVOID — PLACE EHR ALERTS

- ☐ ACEi / ARB; NSAIDs
- ☐ Nephrotoxic antibiotics (aminoglycosides) if alternatives exist
- ☐ IV contrast unless absolutely necessary
- ☐ K-sparing diuretics; oral / IV potassium supplements
- ☐ **Review all chemotherapy protocols with oncology** — timing, dosing, adequacy of TLS prophylaxis

07 Prophylactic orders — high-risk patients, before cytotoxic therapy

HIGH RISK Burkitt lymphoma, ALL with high WBC, bulky / rapidly proliferating disease, elevated baseline uric acid / LDH, pre-existing renal dysfunction.

- ☐ **IV fluids** — 0.9% NaCl 150–200 mL/h starting 12–24 h pre-chemotherapy
- ☐ Very high risk / elevated baseline uric acid / renal dysfunction — **rasburicase 3–6 mg IV once** prior to chemo
- ☐ Otherwise — **allopurinol 300 mg PO daily**, started 24–48 h before therapy, renally adjusted
- ☐ **Baseline & q6–8h TLS labs** for at least 24–72 h after chemotherapy initiation

08 Symptom management & supportive care

- ☐ Antiemetics per chemo protocol — ondansetron 4–8 mg IV/PO q8h PRN
- ☐ Pain control — opioids titrated, with a bowel regimen
- ☐ **DVT prophylaxis** — enoxaparin 40 mg SC daily if not contraindicated; mechanical if thrombocytopenic / bleeding risk
- ☐ GI prophylaxis if indicated — PPI or H2 blocker

09 Documentation & communication

DAILY NOTE

- TLS status — clinical vs laboratory; spontaneous vs therapy-induced
- Lab trends — K, phosphate, Ca, uric acid, creatinine
- Fluid balance & urine output
- Need for escalation (dialysis, ICU interventions)

COORDINATE EARLY & ONGOING

- Oncology / hematology
- Nephrology
- Pharmacy
- Problem list: “Tumor lysis syndrome”

EDUCATIONAL USE ONLY

Not a substitute for clinical judgement. Do not give calcium for asymptomatic hypocalcemia. Check G6PD before rasburicase. Verify doses, allergies, renal function, and contraindications. Adapt all thresholds and agents to your institutional protocol and the individual patient.

Spreading knowledge
Improving outcomes