

RETURN-TO-THROWING PROTOCOL

Return to Throwing — Pediatric

Interval Throwing Program · Ages 9–17 · Age-Scaled with Pitch-Count Limits

FOR THE PHYSICAL THERAPIST

How to Use This Program

This is the pediatric version of the KMR interval throwing program (ITP), for athletes ages 9–17 returning from shoulder or elbow injury, surgery, or rest (little leaguer's elbow, little league shoulder, UCL injury, or post-operative recovery). It follows the same progressive-loading principles as the adult program but with **shorter distances, lower throw volumes, and strict adherence to age-based pitch-count limits**. The Axe data-based Little League program on which the youngest brackets are built was validated with a 0.92 correlation between predicted and actual maximal throwing distance.^{6,7,20}

DO NOT BEGIN UNTIL ENTRY CRITERIA ARE MET AND DR. ROTH HAS CLEARED THROWING

The entry criteria below must be satisfied before the first throw. In skeletally immature athletes, the priority is protecting the growth plates — pitch-count discipline and mandatory rest days are not optional. The week at which a young athlete becomes eligible is set by the source injury's rehabilitation protocol.

Universal Entry Criteria — Before the First Throw

Every athlete should meet all of the following before beginning the program.^{2,3}

Domain	Requirement
Range of motion	Full, pain-free shoulder and elbow ROM equal to the contralateral side (attention to shoulder ER/IR and elbow extension)
Strength	Rotator cuff and scapular stabilizer strength $\geq 80\%$ of contralateral side
Symptoms	No pain or tenderness at the injury site with provocative testing; no shoulder or elbow effusion
Scapular mechanics	Normalized scapular mechanics — no scapular dyskinesis on clinical exam
Plyometric phase	Successful completion of a plyometric progression before the first throw
Mechanics	Throwing-mechanics evaluation completed, with kinetic-chain deficits addressed — emphasized by the ACSM adolescent-athlete consensus

Rules of Progression

- **Throwing days only, with rest between.** One rest day minimum between sessions; the pediatric arm needs more recovery than the adult arm.
- **Advance on two clean sessions.** Advance only after completing the current step pain-free on two consecutive sessions.

- **No breaking balls early.** Curveballs are generally deferred until age 14+, sliders until 16+. Fastball and changeup are established first.
- **Pitch counts are mandatory.** On return to games, the MLB Pitch Smart limits (final table) are hard ceilings, not targets.

Phase 1 — Flat-Ground Long Toss

Weeks 1–5 of the program. Two age brackets scale the distances. Throws begin at ~50% effort. Ages 9–12 cap long toss at 90 ft (Axe Little League data); ages 13–17 progress to 120 ft.^{6,7,18}

STEP	AGES 9–12	AGES 13–17	THROWS	EFFORT
1	30 ft (9.1 m)	45 ft (13.7 m)	15–20	50%
2	45 ft (13.7 m)	60 ft (18.3 m)	15–20	50%
3	60 ft (18.3 m)	75 ft (22.9 m)	20	50–60%
4	75 ft (22.9 m)	90 ft (27.4 m)	20	60%
5	90 ft (27.4 m)	105 ft (32 m)	20–25	60–70%
6	—	120 ft (36.6 m)	20–25	70%

Phase 2 — Pull-Down / Line-Drive Throws

Weeks 5–7 of the program. Same principles as the adult pull-down phase but at reduced volume: 15–20 throws at 60–75 ft, effort 70–75%, thrown on a line to simulate game mechanics.⁶

Phase 3 — Flat-Ground Pitching

Weeks 7–9 of the program. Pitching distance is age-based: ages 9–12 at 46 ft (Little League distance); ages 13+ at 54–60 ft 6 in per league. Begin with fastballs only — 15 pitches at 50% effort — progressing to 20–25 fastballs at 70%. Introduce the changeup when the fastball is pain-free at 70%. **No curveballs for ages 9–12**; introduce gradually for ages 13+ only after fastball and changeup are established.⁶

Phase 4 — Mound Progression (Pitchers)

Weeks 9–12 of the program. Pitchers only. Pitch counts scale by age bracket.^{6,7,20}

STEP	PITCHES (9–12)	PITCHES (13–17)	EFFORT	REST
1	15	15–20	50–60%	2 days
2	20–25	25–30	60–70%	2 days
3	30–35	35–40	70–75%	3 days
4	40–45	45–55	75%	3–4 days
5	—	55–65	75–80%	4 days

Phase 5 — Return to Competition

Return to game play must adhere to the MLB Pitch Smart / USA Baseball daily-maximum and rest-day pitch-count limits below. These are the single most important modifiable factor in preventing re-injury in youth throwers.²⁰

AGE	DAILY MAX	0 DAYS	1 DAY	2 DAYS	3 DAYS	4 DAYS
9–10	75	1–20	21–35	36–50	51–65	66+
11–12	85	1–20	21–35	36–50	51–65	66+
13–14	95	1–20	21–35	36–50	51–65	66+
15–16	95	1–30	31–45	46–60	61–75	76+
17–18	105	1–30	31–45	46–60	61–80	81+

How to read this table: the number of pitches thrown in an outing determines the required rest before the next pitching appearance. For example, a 13-year-old who throws 40 pitches (in the 36–50 band) needs 2 full days of rest before pitching again.

Setback Protocol

Setbacks are managed the same way as in the adult program — with a lower threshold for stopping and re-evaluating in the growing athlete.⁸

- **Pain during throwing:** Stop immediately. Rest 2–3 days. Drop back two steps. If pain recurs at the reduced step, stop and re-evaluate clinically.
- **Soreness resolving within 24 hours:** Acceptable. Repeat the same step before advancing.
- **Soreness persisting beyond 24 hours:** Rest until symptom-free, then drop back one step.
- **Mechanical breakdown:** Do not advance. Address with mechanics work and plyometric re-conditioning before resuming.

Arm Care and Concurrent Training

Every session is bracketed by arm care, and workload is managed across the whole season, not just the return period.^{3,17}

- **Pre-throwing:** dynamic warm-up; band work (rotator cuff ER/IR, scapular retraction); plyometric ball progression.
- **Post-throwing:** posterior shoulder stretching (sleeper, cross-body); ice if needed.
- **Season-long workload:** limit the number of teams and simultaneous seasons, avoid year-round throwing, and honor off-season rest. Excessive pitch counts and year-round play are the dominant risk factors for youth throwing injury.

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Glossary

ER / IR — External rotation / internal rotation (of the shoulder).

ITP — Interval throwing program; the structured throwing progression in this document.

Long toss — Progressive-distance flat-ground throwing on an arc, used to build arm strength and endurance.

Pitch Smart — MLB / USA Baseball guidelines setting age-based daily pitch-count maximums and required rest days.

Pull-down — Line-drive throws at shortened distance and higher effort, transitioning long-toss conditioning toward game mechanics.

Scapular dyskinesis — Abnormal scapular position or motion during arm movement, associated with shoulder and elbow overload.



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