

ACL Accelerated Rehabilitation Protocol

	Postoperative Weeks				Post-op Months				
	1-2	3-4	5-6	7-8	9-12	4	5	6	7-12
Range of motion minimum goals: 0°-110° 0°-120° 0°-135°	X								
Weight bearing: Assisted weight bear with 2 crutches Full body weight	X								
Patella mobilization	X	X	X						
Modalities: Pain/edema management (cryotherapy)	X	X	X	X	X	X	X	X	X
Stretching: Hamstring, gastroc-soleus, iliotibial band, quadriceps	X	X	X	X	X	X	X	X	X
Strengthening: Quadriceps isometrics, straight leg raises, active knee extension. Closed-chain: gait retraining, toe raises, wall sits, mini-squats. Knee flexion hamstring curls (90°) Knee extension quadriceps (90°-30°) Hip abduction-adduction, multi-hip Leg press (70°-10°)	X X X X X X	X X X X X X	X X X X X X	X X X X X X					
Balance/proprioceptive training: Weight-shifting, Perturbation training, balance board, mini-trampoline	X	X	X	X					
Conditioning: Upper body cycle Bike (stationary) Aquatic program Swimming (kicking) Walking Stair climbing machine Ski machine Elliptical machine	X	X X X	X X X	X X X X					
Running: straight					X	X	X	X	X
Cutting: lateral carioca, figure-8's						X	X	X	X
Plyometric training						X	X	X	X

Modified Noyes accelerated knee ACL rehab protocol. Adapted from Rehabilitation of primary and revision anterior cruciate ligament reconstructions. *Noyes' Knee Disorders: Surgery, Rehabilitation, Clinical Outcomes*, Saunders, Philadelphia, 2009, pp. 306-336.

Phase1: Week 1 & 2

General Observation	Assisted weight bearing with 2 crutches Postoperative pain controlled Hemarthrosis controlled Voluntary quadriceps contraction achieved	Goals
Factors Evaluated	Pain Hemarthrosis Patellar mobility Range of motion (minimum) Quadriceps contraction & patella migration Soft tissue contracture Joint	Controlled Mild Good 0°-110° Good None
Frequency 3-4 x/day 10 minutes	Range of motion Range of motion passive, 0°-90° Patella mobilization Ankle pumps (plantar flexion with resistance band) Hamstring, gastroc-soleus stretches	Duration 5 reps x 30 secs
3 x/day 15 minutes	Strengthening Straight leg raises (flexion, extension, abduction, adduction) Active quadriceps isometrics (full extension) Knee flexion (active, 0°-90°) Knee extension (active-assisted. 90°-30°) Multi-hip exercises (flexion, extension, abduction, adduction) Leg press (70°-10°) Closed-chain - Mini-squats (0°-45°, 1/2 weight bearing)	3 sets x 10 reps 1 set x 10 reps 3 sets x 10 reps 3 sets x 10 reps 3 sets x 10 reps 3 sets x 10 reps 3 sets x 20 reps
3 x/day 5 minutes	Balance training Weight shift side/side and forward/back	5 sets x 10 reps
1-2 x/day 5 minutes	Aerobic conditioning Upper body cycle	
As required	Modalities Cryotherapy- Swelling control	20 minutes

Phase 2: Week 3 & 4

General Observation	Independent ambulate Pain controlled without narcotics Effusion controlled ROM 0°-110° Muscle control throughout ROM	Goals
Evaluation	Pain Effusion Patellar mobility Range of motion minimum Muscle control Inflammatory response	Goals Mild Minimal Good 0°-120° 3/5 None
Frequency 3-4 x/day 10 minutes	Range of motion Range of motion passive, 0°-120° Patella mobilization Ankle pumps (plantar flexion with resistance band) Hamstring, gastroc-soleus stretches	Duration 5 reps x 30 secs
2-3 x/day 20 minutes	Strengthening Straight leg raises (flexion, extension, abduction, adduction) Isometric training: multi-angle (90°, 60°, 30°) Heel raise/toe raise Hamstring curls (active, 0°-90°) Knee extension (active, 90°-30°) Closed-chain -Wall sits -Mini-squats Multi-hip exercises (flexion, extension, abduction, adduction) Leg press (70°-10°)	3 sets x 10 reps 1 set x 10 reps 3 sets x 10 reps 3 sets x 10 reps 3 sets x 10 reps 5 reps 3 sets x 20 reps 3 sets x 10 reps 3 sets x 10 reps
3 x/day 5 minutes	Balance training Weight shift side/side and forward/back Balance board/2 legged	5 sets x 10 reps
1-2 x/day 5 minutes	Single leg stance (level surface)	5 reps
2 x/day 5 minutes As required	Aerobic conditioning Upper body cycle Water walking- pool or hydrotherapy Stationary bicycling (patellofemoral precautions)	20 minutes
	Modalities Cryotherapy- swelling control	20 minutes

Phase 3: Week 5 & 6

General Observation	Independent ambulate Pain controlled Effusion controlled ROM 0°-120° Muscle control throughout ROM	Goals
Evaluation	Pain Effusion Patellar mobility ROM Muscle control Inflammatory response Gait	Goals No RSD Minimal Good 0°-135° 4/5 None Symmetrical
Frequency	Range of motion Range of motion passive, 0°-135° Patella mobilization Hamstring, gastroc-soleus stretches Strengthening Straight leg raises Straight leg raises, rubber tubing Isometric training: multi-angle (90°, 60°, 30°) Heel raise/toe raise Hamstring curls (active, 0°-90°) Knee extension with resistance (90°-30°) Closed-chain -Wall sits -Mini-squats Multi-hip exercises (flexion, extension, abduction, adduction) Leg press (70°-10°) Balance training Balance board/2 legged Lateral step-ups: 2-4" Aerobic conditioning (patellofemoral precautions) Uper body bicycle Stationary bicycling Water walking- pool, hydrotherapy Stair machine (low resistance, low stroke) Ski machine (short stride, level, low resistance) Elliptical (low resistance) Modalities Cryotherapy	Duration 5 reps x 30 secs 3 sets x 10 reps 3 sets x 10 reps 2 sets x 10 reps 3 sets x 20 reps 3 sets x 10 reps 3 sets x 10 reps 5 reps 3 sets x 20 reps 3 sets x 10 reps 3 sets x 10 reps
3 x/day 10 minutes		
2 x/day 20 minutes		
3 x/day 5 minutes		
2 x/day 10 minutes		
As required		20 minutes

Phase 4: Week 7 & 8

General Observation	No effusion, painless ROM, joint stability Performs activities of daily living, can walk 20 minutes without pain Full weight bearing ROM 0°-135°	Goals Increase strength and endurance
Evaluation	Pain Effusion Patellar mobility Range of motion minimum Muscle control Inflammatory response	Mild Minimal Good 0°-120° 3/5 None
Frequency 3-4 x/day 10 minutes 2-3 x/day 20 minutes 3 x/day 5 minutes 1-2 x/day 5 minutes 2 x/day 5 minutes As required	Range of motion Range of motion passive, 0°-120° Patella mobilization Ankle pumps (plantar flexion with resistance band) Hamstring, gastroc-soleus stretches Strengthening Straight leg raises (flexion, extension, abduction, adduction) Isometric training: multi-angle (90°, 60°, 30°) Heel raise/toe raise Hamstring curls (active, 0°-90°) Knee extension (active, 90°-30°) Closed-chain -Wall sits -Mini-squats Multi-hip exercises (flexion, extension, abduction, adduction) Leg press (70°-10°) Balance training Weight shift side/side and forward/back Balance board/2 legged Single leg stance (level surface) Aerobic conditioning Upper body cycle Water walking- pool or hydrotherapy Stationary bicycling (patellofemoral precautions) Modalities Cryotherapy- swelling control	Duration 5 reps x 30 secs 3 sets x 10 reps 1 set x 10 reps 3 sets x 10 reps 3 sets x 10 reps 3 sets x 10 reps 5 reps 3 sets x 20 reps 3 sets x 10 reps 3 sets x 10 reps 5 sets x 10 reps 5 reps 20 minutes 20 minutes

Phase 5: Week 9-12

General Observations	No effusion, painless ROM, joint stability Performs activities of daily living, can walk 20 minutes without pain. Full weight bearing ROM 0°-135°	Goals Increase strength and endurance
Evaluation	Manual muscle test (Hamstrings, quadriceps, hip abductors/adductors/ flexors/ extensors) Isometric test (12 wks, mean avg torque/% deficit quads & hams) Swelling Patellar mobility Crepitus	4/5 30 None Good None/slight
Frequency 2 x/day 10 minutes 2 x/day 20 minutes 3 x/day 5 minutes 3 x/week 15 -20 minutes 3 x/week10 minutes As required	Range of motion Hamstring, gastroc-soleus, quad, ITB stretches Strengthening Straight leg raises, rubber tubing Hamstring curls (active, 0°-90°) Knee extension with resistance (90°-30°) Leg press (70°-10°) Multi-hip exercises (flexion, extension, abduction, adduction) Closed-chain -Wall sits -Mini-squats -Lateral step-ups (2-4" block) Balance training Balance board/2 legged Single leg stance Resistance band walking Plyoback ball toss Perturbation training Aerobic conditioning (patellofemoral precautions) Stationary bicycling Water walking Swimming (kicking) Walking Stair machine (low resistance, low stroke) Ski machine (short stride, level, low resistance) Elliptical machine (low resistance) Running program (straight) Jog Walk Backward walk Modalities Cryotherapy	Duration 5 reps x 30 secs 3 sets x 30 reps 3 sets x 10 reps 3 sets x 10 reps 3 sets x 10 reps 3 sets x 10 reps 5 reps 3 sets x 20 reps 3 sets x 10 reps 500m 250m 25m 20 minutes

Phase 6: Week 13-26

General Observation	No effusion, painless ROM, joint stability Performs activities of daily living, can walk 20 minutes without pain	Goals Increase strength and endurance
Evaluation	Isokinetic test (isometric + torque 300°/sec, % difference quads & hams, tested monthly) Swelling Patellar mobility Crepitus Single-leg function tests (hop distance, timed hop, % inv/uninv)	20-25% None Good None/slight 75%
Frequency 2 x/day 10 minutes 1 x/day 20-30 minutes 3 x/day 5 minutes 3 x/week 20-30 minutes 3 x/week 15-20 minutes 3 x/week 3 x/week As required	Range of motion Hamstring, gastroc-soleus, quad, ITB stretches Strengthening (patellofemoral precautions) Straight leg raises, rubber tubing (high speed) Hamstring curls (active, 0°-90°) Knee extension with resistance (90°-30°) Leg press (70°-10°) Multi-hip exercises (flexion, extension, abduction, adduction) Balance training Balance board/2 legged transitioning to single leg Single leg stance transitioning to unstable platform Aerobic conditioning (patellofemoral precautions) Stationary bicycling Water walking Swimming (kicking) Walking Stair machine (low resistance, low stroke) Ski machine (short stride, level, low resistance) Elliptical machine (low resistance) Running program (straight) Jog (progression of speed: ½, ¾, full) Walk Backward run Cutting program –lateral, carioca, figure 8’s Functional training Plyometric training: box hops, level, double-leg Sport specific drills Modalities Cryotherapy	Duration 5 reps x 30 secs 3 sets x 30 reps 3 sets x 10 reps 3 sets x 10 reps 3 sets x 10 reps 3 sets x 10 reps 1– 1.5 km 250m 25m 20m 15 secs 4-6 sets 20 minutes

Phase 7. Weeks 27 to 52

General Observation	No effusion, painless ROM, joint stability Performs ADL, can walk 20 minutes without pain	Goals Increase function, strength, endurance Return to previous activity level
Evaluation	Isokinetic test (torque at 180°/sec & 300°/sec, % difference quads &hams, tested quarterly; isometric if symptomatic PF joint Swelling Patellar mobility Crepitus Single-leg function test (hop distance, timed hop, % inv/uninv)	10-15 None Good None/slight 85
Frequency 2 x/day 10 minutes 3-4 x/week 20-30 minutes 3 x/day 5 minutes 3 x/week 20-30 minutes 3 x/week 20 minutes 3 x/week 3 x/week As required	Range of motion Hamstring, gastroc-soleus, quad, ITB stretches Strengthening (patellofemoral precautions) Straight leg raises, rubber tubing (high speed) Hamstring curls (active, 0°-90°) Knee extension with resistance (90°-30°) Leg press (70°-10°) Multi-hip machine (flexion, extension, abduction, adduction) Balance training Balance board/2 legged transition to Single leg Single leg stance - unstable platform w/secondary activity Aerobic conditioning (patellofemoral precautions) Stationary bicycling Water walking Swimming (kicking) Walking Stair machine (low resistance, low stroke) Ski machine (short stride, level, low resistance) Elliptical (low resistance) Running program (straight) Interval training (20, 40, 60, 100 m) Walk/rest phase (3:1 rest: work) Backward run Cutting program – lateral, carioca, figure 8's Functional training Plyometric training: box hops, level, double-leg Sport specific drills Modalities Cryotherapy	Duration 5 reps x 30 secs 3 sets x 30 reps } 1-2 sets 8-12 reps 20m 20m 15 secs, 4-6 sets 20 minutes