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Systematic review

Return-to-Play Decision Making After Emergency Department Presentation: A Systematic Review from a Sports Medicine Perspective

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Abstract

Emergency department discharge initiates recovery after athletic injury, while decisions about unrestricted sport require assessment beyond clinical stability. This review examined comparative original studies about activity progression, discharge communication, and rehabilitation after emergency presentation. We aimed to distinguish treatment effects on recovery from evidence establishing readiness for competition. A structured search of bibliographic records and research reports identified ten original comparative studies for synthesis. Eligible studies recruited patients through emergency or mixed emergency and outpatient settings and evaluated concussion management or ankle rehabilitation and findings were grouped by injury and intervention. Nine randomized trials and one prospective cohort addressed seven concussion populations and three ankle sprain populations. Five days of strict rest increased concussion symptom burden, while pediatric and adult trials of early activity produced differing results. A recent trial found delayed symptom resolution with prescribed activity targets despite symptoms. Symptom-guided instructions improved perceived usefulness without establishing faster recovery. Early ankle exercise improved short-term function, supervised physiotherapy produced no clear additional benefit, and brief immobilization improved recovery after severe sprains. The data supports individualized activity progression, injury-specific rehabilitation, and clear follow-up arrangements. Symptom improvement and functional gains do not establish unrestricted sports clearance.

Keywords

Return to play; emergency department; concussion; ankle sprain; rehabilitation; sports medicine.

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Introduction

Return-to-play decision-making integrates tissue recovery, functional performance, psychological readiness, and the demands of the intended sport rather than relying on elapsed time after injury. The return-to-sport continuum distinguishes resuming participation, returning to the sport itself, and regaining performance, providing a structure for communication between emergency clinicians, rehabilitation professionals, and athletes (1). Following concussion, guidance separates early therapeutic activity from later stages involving exposure to contact, collision, or falling (2).

Emergency department assessment addresses acute threats and establishes an initial management plan, whereas recovery requires reassessment of symptoms, activity tolerance, and functional limitations in sporting tasks. Pediatric mild traumatic brain injury guidance emphasizes patient education, prognostic assessment, activity counseling, and monitoring for persistent difficulties after discharge (3). These priorities position emergency care as the beginning of a recovery pathway whose later decisions require information unavailable during a single acute consultation (1,3). This distinction is relevant when patients interpret discharge as confirmation of complete recovery from injury (1,3). Initial symptom severity were the most consistent predictors of prolonged concussion recovery, supporting individualized follow-up instead of a uniform calendar-based approach for every patient (4).

Musculoskeletal injuries introduce a related challenge because reduced pain does not demonstrate restored strength, balance, or capacity to tolerate the unpredictable loads encountered during competition (5,6). Evidence syntheses on ankle sprain distinguish acute symptom management from rehabilitation and prevention of recurrent injury, with support for exercise and external support across selected outcomes (5). The PAASS framework organizes ankle return-to-sport assessment around pain, ankle impairments, athlete perception, sensorimotor control, and sport or functional performance (6).

Analgesic research illustrates the separation between comfort and readiness: a Cochrane review found similar early pain relief with nonsteroidal anti-inflammatory drugs and paracetamol, alongside uncertainty concerning return to function. None of its included studies reported reinjury risk, leaving an important outcome unaddressed when translating pain treatment into sports participation advice (7). Integrating emergency management with sports medicine therefore requires attention to the outcome measured, the population studied, and the distinction between rehabilitation exposure and competitive exposure (1,6,7). This review examines original comparative studies relevant to post-emergency activity decisions, identifies consistent and conflicting findings, and evaluates their implications for progression toward sport within the broader clinical frameworks described above.

Methods

We structured this systematic review according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement. The review examined clinical management, rehabilitation, and return-to-play decision-making following emergency department presentation. The research question addressed interventions and assessment approaches

associated with recovery, activity progression, and readiness to resume sport.

We searched PubMed, Web of Science, Scopus, and Embase from database inception to 2 September 2026. Search strategies combined controlled vocabulary, including Medical Subject Headings and Emtree terms, with free-text keywords. The principal concepts were emergency department, emergency care, sports injury, concussion, mild traumatic brain injury, ankle sprain, return to play, return to sport, rehabilitation, exercise, rest, and discharge instructions. Synonyms within each concept were combined using OR, and concept groups were linked using AND. Database-specific syntax was adapted to each platform, and reference lists of relevant articles were examined for additional eligible studies.

Eligibility criteria: we included original randomized controlled trials and prospective comparative cohort studies involving children, adolescents, or adults assessed in emergency departments. Studies recruiting through combined emergency and outpatient services were eligible when emergency recruitment was explicitly described. Interventions included activity restriction, graded activity, discharge education, exercise therapy, rehabilitation, and injury support. Comparators comprised usual care, alternative interventions, or differing activity exposures. Outcomes included symptom burden, functional recovery, recovery duration, return to activity, sports clearance, adverse events, and recurrent injury. Reviews, editorials, protocols, case reports, retrospective implementation studies, and studies without relevant clinical outcomes were excluded.

Retrieved records were organized by title, author, publication year, and digital object identifier, and duplicate records were removed. Titles and abstracts were screened against the eligibility criteria before relevant reports underwent detailed assessment. Full-text exclusions were recorded with their principal reasons, and study selection was summarized using a PRISMA flow diagram (Fig 1).

Data extraction captured study design, recruitment setting, participant characteristics, enrollment numbers, intervention components, comparator, follow-up duration, outcome definitions, and reported findings. Randomized or enrolled populations were distinguished from participants included in individual outcome analyses. Effect estimates, confidence intervals, and statistical significance were recorded as reported, without estimating unavailable values.

Methodological appraisal examined randomization, allocation concealment, missing outcomes, measurement methods, adherence, confounding, and selective reporting. Interpretation distinguished randomized intervention effects from observational associations and intention-to-treat estimates from per-protocol findings.

A structured narrative synthesis grouped studies by injury, intervention, and outcome. Concussion management was examined separately from ankle injury rehabilitation, and differences in age, injury severity, setting, and follow-up informed comparisons. Symptom resolution, functional improvement, and unrestricted sports clearance were analyzed as distinct endpoints. Statistical pooling was not undertaken because the interventions and outcome measures lacked sufficient comparability.

Results

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Ten studies were included, nine randomized trials and one prospective cohort, spanning publications from 2009 to 2025 and covering concussion and ankle sprain management (8–17). Seven reports examined concussion, including pediatric, adult, and mixed adolescent–young adult populations recruited through emergency departments or combined emergency and concussion services (8–14). Three trials examined ankle rehabilitation or support, with recruitment through acute care and, in one trial, a sports injury clinic (15–17). Tables 1 and 2 summarize study characteristics and decision-relevant findings (8–17).

Among 99 participants enrolled in a concussion trial, five days of strict rest produced greater symptom burden than usual care, without significant neurocognitive or balance improvement; 88 completed the study procedures (8). In the pediatric cohort, 3,063 participants were enrolled and 2,413 supplied exposure and outcome data, with early activity associated with fewer persistent symptoms after matching. Matched proportions were 28.7% with early activity and 40.1% without activity, representing an absolute difference of 11.4 percentage points. These observational findings describe an association and do not establish that early contact exposure prevents persistent symptoms (9).

Discharge instruction trials produced limited evidence of accelerated recovery despite improvements in perceived usefulness (10,11). An adult trial involving 118 participants found no significant difference in symptom-score improvement after advice emphasizing cognitive rest and graduated activity (10). In 114 children, symptom-guided instructions were rated more helpful for decisions about school and physical activity, while symptoms persisted at one week in 44% and 51% of the intervention and standard-instruction groups (11).

Prescribed early activity produced inconsistent findings in populations and protocols (12–14). In 367 adults, persistent symptoms at 30 days occurred in 14.6% with prescribed light exercise and 13.4% with standard management (12). PedCARE randomized 456 participants and found no significant intention-to-treat difference in symptoms at two weeks (13). Its surveillance identified no adverse events under the study definition, which concerned worsening symptoms requiring an unscheduled healthcare visit (13). The 2025 factorial trial randomized 239 participants and found no benefit for its outcomes at 14 days; prescribed activity targets despite symptoms were associated with slower symptom resolution (14).

Ankle trials demonstrated that treatment effects depended on injury severity, intervention, and follow-up duration (15–17). Early therapeutic exercise improved function during the first fortnight after mild or moderate sprain, with two reinjuries reported in each group during follow-up (15). Adding supervised physiotherapy to usual care produced excellent three-month recovery in 43% versus 37%, an imprecise difference that did not establish additional benefit (16). In severe sprains, a ten-day below-knee cast improved three-month ankle function compared with tubular compression, with no significant between-treatment differences at nine months (17).

Across these studies, symptom and functional outcomes supplied indirect evidence for sports clearance, without validating a shared threshold for unrestricted competition (8–17). Mixed recruitment settings reduced directness to exclusively

emergency-treated athletes (14,15). Variation in adherence, missing outcomes, and exposure selection limited interpretation of conflicting findings (8,9,13,14).

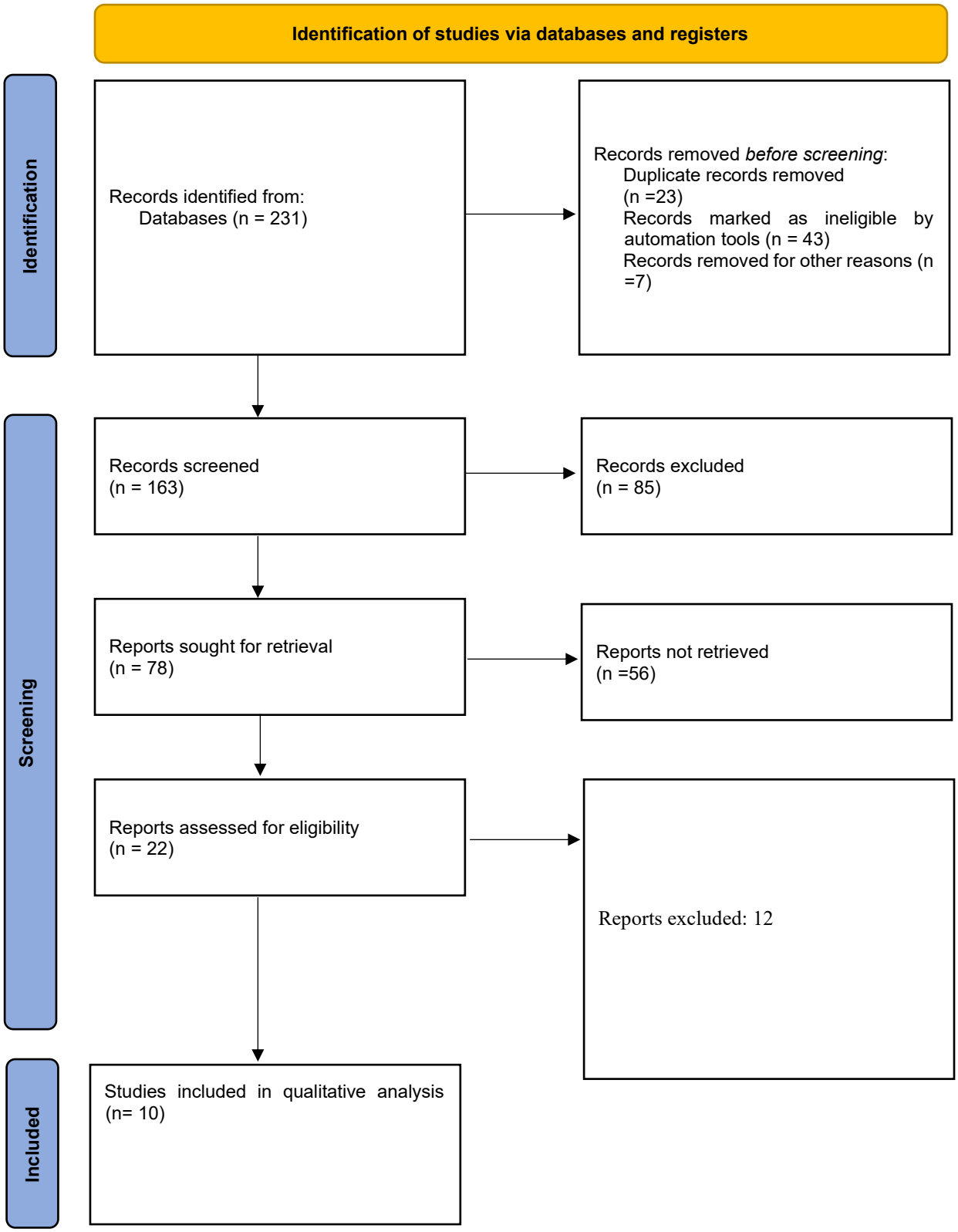

Fig 1: PRISMA flow chart

Table 1. Characteristics of the ten original studies

Study	Design and recruitment	Sample	Comparison
Thomas, 2015 (8)	Randomized; pediatric ED; ages 11–22	99	Five-day strict rest versus usual care.
Grool, 2016 (9)	Prospective cohort; nine pediatric EDs; ages 5–17	3,063	Activity within seven days versus no activity.
Varner, 2017 (10)	Randomized; adult ED; ages 18–64	118	Cognitive rest and graduated activity instructions versus usual instructions.
Brooks, 2017 (11)	Randomized; pediatric ED; ages 7–17	114	Symptom-guided versus standard discharge instructions.
Varner, 2021 (12)	Randomized; three EDs; ages 18–64	367	Daily light exercise versus standard management.
Ledoux, 2022 (13)	Randomized; three pediatric EDs; ages 10–17	456	Activity from 72 hours versus rest until asymptomatic.
Thomas, 2025 (14)	Factorial randomized; 85% ED recruitment, 15% concussion clinic; ages 11–24	239	Early activity and behavioral management versus usual care.
Bleakley, 2010 (15)	Randomized; ED and sports injury clinic	101	Early exercise versus standard protection and symptom management.
Brison, 2016 (16)	Randomized; two acute care settings; ages ≥16	503	Supervised physiotherapy plus usual care versus usual care.
Lamb, 2009 (17)	Randomized; eight EDs; severe ankle sprain	584	Cast, Aircast, or Bledsoe boot versus tubular compression.

Table 2. Principal outcomes and verified findings

Study	Outcome	Finding
Thomas, 2015	Cumulative concussion symptoms; ten days	Scores 187.9 with strict rest versus 131.9 with usual care; P<0.03 (8).
Grool, 2016	Persistent symptoms; 28 days	Matched proportions 28.7% versus 40.1%; absolute difference 11.4 percentage points, 95% CI 5.8–16.9 (9).
Varner, 2017	Symptom improvement; two and four weeks	No significant between-group difference; healthcare visits and absence from work or school were similar (10).
Brooks, 2017	Instructions and symptoms; one week	Greater perceived usefulness; ongoing symptoms in 44% versus 51%, without established recovery superiority (11).

Study	Outcome	Finding
Varner, 2021	Persistent symptoms; 30 days	Exercise 14.6% versus control 13.4%; difference 1.2 percentage points, 95% CI −6.2 to 8.5 (12).
Ledoux, 2022	Symptom burden; two weeks	Adjusted intention-to-treat difference −1.3, 95% CI −3.6 to 1.1; adherent analysis −4.3, 95% CI −8.4 to −0.2 (13).
Thomas, 2025	Symptoms and quality of life; 14 days	No primary-outcome benefit; activity targets despite symptoms accompanied slower symptom resolution (14).
Bleakley, 2010	Ankle function; weeks one and two	Adjusted differences 5.28 and 4.92; corresponding 98.75% CIs 0.31–10.26 and 0.27–9.57 (15).
Brison, 2016	Excellent ankle recovery; three months	Physiotherapy 98/229 versus usual care 79/214; difference 6 percentage points, 95% CI −3 to 15 (16).
Lamb, 2009	Ankle function; three months	Cast advantage 9 percentage points, 95% CI 2.4–15.0; treatment differences absent at nine months (17).

Discussion

The finding is that recovery management after emergency presentation requires differentiation between tolerated rehabilitation activity and unrestricted sporting exposure. The concussion trials oppose a single prescription applied to every patient: prolonged strict rest increased symptom burden, several early-activity comparisons were neutral, and prescribed targets despite symptoms delayed recovery in the factorial trial. These differences indicate that intervention content, symptom response, timing, and adherence matter when interpreting the label of early activity (12–14).

Data from specialist sports settings helps interpret this variation without replacing the emergency-based findings (18). In a randomized trial analyzing 103 adolescents, individualized exercise below the symptom threshold shortened median recovery from 17 to 13 days compared with stretching. That intervention used exercise-tolerance assessment and therefore differed from an instruction to accumulate daily steps despite symptoms (14,18).

Persistent dizziness, neck pain, and headache warrant attention to specific impairments during follow-up rather than repeated extensions of generalized rest (19). Schneider and colleagues reported medical clearance within eight weeks in 73% of participants receiving cervical and vestibular rehabilitation versus 7% of controls among those with reported endpoint data (19). This small specialist trial evaluated clearance directly, distinguishing its endpoint from the symptom scales dominating the emergency concussion studies (8–14,19). A practical implication is to connect persistent symptom patterns with targeted assessment and rehabilitation, maintaining separate documentation of symptom recovery and readiness for sport (3,19).

For ankle injuries, early exercise after mild sprain and temporary immobilization after severe sprain

address different clinical populations and are compatible findings (15,17). The neutral physiotherapy trial indicates that routine addition of its supervised program did not establish better recovery for uncomplicated sprains (16). Longer-term prevention deserves attention: a trial of 522 athletes reported recurrent sprains in 22% with home proprioceptive training and 33% with usual care over one year (20). This supports integrating recurrence prevention into rehabilitation, while PAASS supplies assessment domains without a universally validated numerical clearance threshold (6,20). Analgesic response are insufficient substitute for demonstrating functional readiness, particularly because the Cochrane analgesic review found no reinjury data (7).

The data supports discharge communication that identifies permitted activity, progression criteria, follow-up arrangements (2,3). The reviewed instructions improved perceived usefulness more consistently than they established faster recovery, emphasizing the need to assess understanding and subsequent function separately (10,11). These findings were restricted by heterogeneous populations, short follow-up for several outcomes, and sparse direct measurement of unrestricted return or subsequent sporting injury (8–17). The focused search and single assisted review limit completeness and reproducibility relative to the comprehensive reporting expected under PRISMA 2020 (21). Following SWiM principles, these limitations favor a comparison of individual findings over an aggregate claim that one strategy establishes safe sports clearance in diagnoses, ages, and competitive demands after emergency department presentation (22). Future studies requires explicit sporting outcomes, consistent definitions of clearance, and follow-up that captures recurrent injury after resumption of sport.

Conclusion

Return-to-play decisions after emergency presentation require injury-specific assessment and documented progression from everyday activity toward sporting demands. The reviewed studies support avoiding prolonged strict rest after concussion and distinguishing tolerated exercise from activity targets imposed despite symptoms. Ankle management benefits from matching rehabilitation and support to injury severity. Symptom improvement, pain relief, and functional gains provide relevant information without independently establishing readiness for unrestricted competition. Clear discharge advice, reassessment, and targeted rehabilitation connect emergency treatment with sports medicine follow-up.

List of abbreviations

CI: confidence interval; ED: emergency department; PAASS: Pain, Ankle impairments, Athlete perception, Sensorimotor control, Sport/functional performance; PedCARE: Pediatric Concussion Assessment of Rest and Exertion; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses; SWiM: Synthesis Without Meta-analysis.

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