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Return to Training After Acute Respiratory Infections in Athletes: Performance Impairment, Red Flags and a Graduated Return-to-Sport Approach - A Narrative Review

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Abstract

Background: Acute respiratory infections can disrupt training and competition in athletes, while decisions about returning to sport vary between individuals.

Aim: To review the effects of acute respiratory infections on performance, the risks associated with exercise during illness, clinical red flags, and return-to-sport strategies.

Materials and Methods: A narrative literature review was conducted using PubMed searches and reference-list screening. Publications from 2014 to 2026 were considered, with priority given to relevant consensus statements, systematic reviews, meta-analyses, and original studies.

Results: The effects of infection on performance and training depend on illness severity and clinical presentation. Evidence from studies with pathogen-confirmed infections suggests that return to training, full training, and full performance may occur at different times, with longer recovery associated with greater illness severity and certain viral pathogens. Cardiopulmonary or systemic symptoms and an abnormal response to exercise warrant reassessment. A gradual increase in exercise load, guided by tolerance and symptom monitoring, may help athletes resume training.

Conclusions: Return-to-sport decisions should account for clinical recovery, warning signs, and exercise tolerance. Progression should follow the athlete's response to exercise rather than a fixed timetable.

Keywords: acute respiratory infection; athletes; return to sport; athletic performance; exercise tolerance; sports medicine.

1. Introduction

Acute respiratory illnesses are frequently reported in athletes and can disrupt training and competition [1]. Although most episodes are self-limiting, acute respiratory infections may impair exercise performance and disrupt normal training, particularly when accompanied by systemic symptoms [2,3].

Determining when and how athletes should resume exercise after an acute respiratory infection remains a clinical challenge, as recovery varies between individuals and current evidence does not support a universal time-based return-to-sport protocol [3,4]. Assessment of illness severity, systemic manifestations, and cardiopulmonary warning signs is therefore important to identify athletes who may require further medical evaluation before returning to exercise [4]. Current consensus recommendations emphasize an individualized approach in which clinical recovery and exercise tolerance guide the progressive resumption of training [4].

2. Aim of the Review

The aim of this narrative review was to synthesize current evidence on the impact of acute respiratory infections on athletic performance, the potential risks associated with exercise during illness, and the clinical factors relevant to safe return-to-sport decision-making. Particular emphasis was placed on the identification of clinical red flags and the development of a practical, graduated return-to-training approach based on illness severity, clinical recovery, and exercise tolerance.

3. Materials and Methods

The initial literature search was conducted in PubMed on September 3, 2026. Supplementary searches and reference-list screening were subsequently performed through September 2026 to identify additional publications relevant to the review's main themes. The search was limited to publications from 2014 to 2026 to prioritize contemporary evidence relevant to current sports medicine practice. The search strategy combined terms related to acute respiratory illness and infection, athletes and sports, and the main outcomes of interest, including return to sport, exercise performance, and clinical red flags. Search terms included combinations of “acute respiratory infection”, “respiratory tract infection”, “respiratory illness”, “athlete”, “sport”, “return to sport”, “return to play”, “return to training”, “exercise performance”, “sports performance”, “exercise capacity”, “cardiorespiratory fitness”, “myocarditis”, “chest pain”, “dyspnea”, and “palpitations”, using the Boolean operators AND and OR.

Publications were considered eligible if they addressed acute respiratory illness or infection in athletes or physically active individuals and provided information relevant to exercise performance, exercise during illness, clinical risk assessment, or return to sport or training. Publications focusing exclusively on chronic respiratory diseases, non-infectious respiratory conditions, nutritional or supplementation interventions, or populations unrelated to sports or regular physical activity were excluded when they did not provide information directly relevant to the aims of this review. Priority was given to consensus statements, systematic reviews and meta-analyses, followed by relevant original studies, while narrative and clinical reviews were used to provide additional clinical context where appropriate.

Titles and abstracts retrieved through the targeted searches were screened for relevance to the main objectives of the review, and potentially relevant publications were retained for further evaluation. The reference lists of key publications were also screened to identify potentially relevant studies not retrieved through the database search. Relevant findings were synthesized narratively and organized according to the main themes of the review, including epidemiology and risk factors, effects on athletic performance, risks associated with exercise during acute illness, clinical red flags, and return-to-sport strategies.

4. Acute Respiratory Infections in Athletes: Definitions and Clinical Context

Acute respiratory illness (ARill) is a broad clinical term encompassing respiratory symptoms caused by both infectious and non-infectious conditions, whereas acute respiratory infection (ARinf) refers specifically to illness caused by an infectious pathogen [4]. Acute respiratory

infections in athletes are predominantly caused by viral pathogens, while bacterial infections occur less frequently [4]. Recent pathogen-confirmed data indicate that rhinovirus, influenza viruses, SARS-CoV-2, and common human coronaviruses are among the most frequently identified viral pathogens in athletes with ARinf [5]. Available etiological studies indicate that respiratory viral infections in athletes are predominantly characterized by upper respiratory tract manifestations, although the specific viral pathogens identified vary between study populations [6]. Clinical symptoms alone are insufficient to reliably identify the causative pathogen, as different viral infections may present with overlapping respiratory and systemic manifestations [5].

The clinical presentation of ARinf in athletes is heterogeneous and may include upper and lower respiratory tract symptoms as well as systemic and non-respiratory manifestations [4]. Upper respiratory tract manifestations commonly include symptoms such as nasal congestion or discharge, sore throat, and cough, whereas lower respiratory tract involvement may be associated with symptoms including dyspnea and chest discomfort. Systemic manifestations, such as fever, fatigue, malaise, myalgia, and headache, may accompany respiratory symptoms and are clinically relevant because they can indicate a greater overall illness burden [4]. Overall symptom burden may provide additional information about illness severity beyond individual symptoms considered in isolation. In athletes with SARS-CoV-2 infection, a greater number of acute symptoms has been associated with involvement of more organ systems, suggesting that symptom burden may be relevant when evaluating the clinical severity of an acute respiratory infection [7]. The severity of ARinf may vary considerably, ranging from mild, self-limiting illness to more severe presentations characterized by a greater number and intensity of symptoms and potential involvement of non-respiratory organ systems [4].

In most athletes, symptoms of uncomplicated ARinf are expected to peak within the first few days and generally resolve within 7-10 days [4]. However, the clinical course is not uniform, and symptom duration may vary according to the severity and characteristics of the infection. Persistent, worsening, or newly developing symptoms may indicate a more complicated course and should therefore be distinguished from the expected resolution of an uncomplicated ARinf [4]. Accordingly, clinical assessment in athletes with ARinf should consider not only the presence of respiratory symptoms but also their severity, duration, progression, and associated systemic or non-respiratory manifestations [4]. Although identifying the causative pathogen may provide useful clinical information, return-to-sport decisions should not be based on the pathogen alone. The athlete's overall clinical presentation, including illness severity, systemic

manifestations, symptom progression, and response to exercise, remains central to assessing readiness to return safely to training [4].

5. Epidemiology and Risk Factors

A systematic review and meta-analysis reported a pooled incidence of suspected or confirmed acute respiratory infections of 4.9 episodes per 1000 athlete-days [1]. Studies reporting upper acute respiratory infections showed a pooled incidence of approximately 5.9 episodes per 1000 athlete-days [1]. However, estimates of ARinf incidence should be interpreted cautiously because of substantial heterogeneity between studies and the limited proportion of infections confirmed by laboratory testing [1].

Several sport- and environment-related factors have been associated with acute respiratory illness or infection in athletes, including training-related factors, competition, international travel, winter conditions, and altitude exposure. However, evidence regarding the influence of training load and exercise intensity is inconsistent, and the observed associations should not be interpreted as evidence of causation [8].

In a retrospective cohort of 37 elite cross-country skiers, international air travel and competition were associated with increased odds of self-reported respiratory or gastrointestinal symptoms, whereas higher average training monotony was associated with lower symptom odds [9]. In contrast, a four-year prospective study of elite swimmers identified associations between training-related factors and the risk of common illnesses, including respiratory infections [10]. Together, these findings suggest that the relationship between training exposure and respiratory illness may vary according to the population, training characteristics, and methods used to assess illness.

In a prospective controlled study conducted during the 2019 Nordic World Ski Championships, 10 of 26 athletes (38%) developed symptomatic respiratory infection, compared with 3 of 52 normally exercising controls (6%), corresponding to a relative risk of 6.7 (95% CI: 2.1-21.0) [11]. This finding illustrates the potential importance of competition-related and environmental exposures, although the small sample and event-specific setting limit its generalizability.

A 12-month controlled follow-up study of 24 elite cross-country skiers, 22 elite orienteers, and 32 normally exercising controls reported a higher incidence of acute respiratory illness episodes in skiers than in controls (3.39 vs. 2.11 episodes per person-year, respectively; $p = 0.037$). The difference between orienteers and controls was not statistically significant. International flights

combined with competition participation were also associated with acute respiratory illness episodes in skiers. However, the study included the COVID-19 pandemic period, during which preventive measures substantially reduced illness occurrence, and its findings should not be interpreted as evidence that elite training itself causes respiratory infections [12].

Prospective studies of Team Finland participants during the 2021 World Ski Championships and the 2022 Winter Olympic Games investigated respiratory viral infections in 183 athletes and staff members. Across both events, six symptomatic acute respiratory infections were recorded among 183 participants (3%), with no symptomatic cases identified in Oberstdorf and six cases recorded in Beijing. In comparison, 58 symptomatic acute respiratory infections were recorded among 174 Team Finland participants (33%) during corresponding major winter sport events in 2018 and 2019, before the COVID-19 pandemic. The authors suggested that reduced environmental viral exposure was the most likely explanation for the low number of infections, while individual preventive measures may have limited further transmission within the team. The findings should be interpreted in light of the relatively small study population, differences in viral diagnostic methods, and incomplete testing for asymptomatic infections [13].

A 2025 systematic review and meta-analysis evaluated the occurrence of acute respiratory illness in athletes compared with non-athlete controls, including studies with at least 12 months of follow-up and concurrent control groups. The meta-analysis included six studies comprising 388 athletes and 344 non-athlete controls across six sports. The pooled incidence rate ratio was 1.87 (95% CI: 1.08-3.26), with an estimated annual frequency of 3.2 acute respiratory illness episodes in athletes compared with 1.7 in non-athlete controls. However, the findings should be interpreted cautiously because only six studies were included, three were retrospective, the number of illness episodes had to be estimated in most studies, and none established the etiology of the acute respiratory illness episodes [14].

Vitamin D deficiency has also been associated with an increased risk of respiratory illness in athletes, although the available evidence does not establish a simple causal relationship [8]. Overall, susceptibility to respiratory illness in athletes appears to be multifactorial, reflecting the interaction of training-related, environmental, travel-related, and individual factors.

6. Impact of Acute Respiratory Infections on Athletic Performance

Acute respiratory infections may impair athletic performance and disrupt training, although the effects vary with illness severity and the performance measure assessed. Mild ARinf may have little or no measurable effect on cardiorespiratory endurance, whereas more severe illness may

be associated with greater impairment [2]. This variability across performance domains is also illustrated by a small case series of well-trained kayakers following SARS-CoV-2 infection, in which no significant deterioration in the assessed upper-body neuromuscular performance measures was observed after return to sport [15]. In the systematic review by Kaulback et al., ARinf was associated with decrements in pulmonary function in three studies, whereas seven studies evaluating mild ARinf reported minimal effects on cardiorespiratory endurance [2]. Potential consequences may also extend beyond the acute phase of illness, with some studies reporting subsequent reductions in training mileage, overall training load, or sport-specific performance outcomes, although longer-term findings remain inconsistent [2].

Respiratory illness may also affect athletic participation even when objective exercise capacity is only minimally impaired. In a prospective cohort of 7031 distance runners, a history of systemic symptoms of acute illness before competition was associated with an approximately 1.9-fold higher risk of not finishing the race among those who started [16]. In a cross-sectional study of 351 competitive cross-country skiers, 85.8% reported refraining from training and 66.0% from competition at least once because of ARinf during the season, while 54.4% reported training and 22.5% competing during an ARinf [17]. Similarly, in a prospective study of professional ice hockey players, 52% of symptomatic acute respiratory infection episodes with available symptom data resulted in at least one missed practice and 34% in at least one missed game [18].

A prospective cohort study conducted during the 2013 and 2014 Two Oceans Marathon examined the relationship between clinically assessed acute prerace illness and race outcomes in runners participating in 21.1-km and 56-km events. Of 242 runners assessed before the race, 172 with symptoms and signs suggestive of acute infective illness were included in the illness cohort, while 53,734 other runners formed the control group. Among runners who started the race, the did-not-finish frequency was 5.2% in the illness cohort compared with 1.6% in controls, corresponding to an adjusted prevalence risk ratio of 3.40 (95% CI: 1.76-6.58). The association was stronger among runners with systemic illness, of whom 8.0% did not finish the race, compared with 1.6% of controls (adjusted prevalence risk ratio 4.87, 95% CI: 2.20-10.75). Among runners with systemic illness assessed within 24 hours before the race, 11.1% did not finish, compared with 1.6% of controls (adjusted prevalence risk ratio 7.03, 95% CI: 2.37-20.83). These findings should be interpreted cautiously because the illness cohort was self-selected, the reasons for not finishing were not established, and the small subgroup sizes limited further analysis [19].

A retrospective study of 44 elite cross-country skiers examined self-reported illness and race performance during and after the Tour de Ski. Illness was reported more frequently among athletes who participated in the competition than among non-participants (48% vs. 16%). Male participants also showed poorer race performance during the subsequent six weeks. These findings suggest that periods of intensive competition may be associated with both increased illness burden and subsequent performance disruption. However, the observational design and the combined effects of competition load, travel, and other exposures prevent attribution of the performance changes specifically to respiratory infection [20].

Objective performance impairment has also been reported following SARS-CoV-2 infection. In a longitudinal case series of 16 well-trained kayak athletes, peak oxygen uptake was approximately 9.7% lower at follow-up compared with pre-infection measurements, despite the athletes having returned to regular training [21]. However, the small sample and pathogen-specific nature of this study limit the generalizability of its findings to other respiratory infections. Further evidence from professional ice hockey players showed that athletes with symptomatic SARS-CoV-2 infection and post-infection oxygen desaturation had lower post-infection VO_2max and VO_2 at the lactate threshold than both uninfected controls and athletes with asymptomatic infection [22]. Anaerobic performance was also affected, as relative mean power during the Wingate test was lower after the preparatory period in the symptomatic group than in both the control and asymptomatic groups [22].

The broader importance of training continuity for athletic performance is illustrated by a five-year prospective study of 33 elite track and field athletes, comprising 76 athlete-seasons. Athletes who completed more than 80% of their planned training weeks were approximately seven times more likely to achieve their performance goals. However, the study assessed training interruptions caused by both injuries and illnesses and did not isolate the effects of respiratory infections. Its findings therefore provide contextual evidence for the importance of maintaining training availability rather than a direct estimate of the performance impact of ARinf [23].

Across the available literature, respiratory illness is frequently associated with reduced training volume, intensity, or overall workload, although most episodes result in relatively short periods of time loss from sport [3]. Fever and systemic manifestations such as marked fatigue, malaise, and myalgia may further compromise exercise performance through increased physiological strain, disturbances in thermoregulation, altered fluid balance, and reductions in muscular

strength and endurance [24]. Substantial heterogeneity in study populations, illness definitions, and performance outcomes limits the ability to quantify a consistent magnitude of impairment across athletes [2].

7. Exercise During Acute Respiratory Infection: Potential Risks

Exercise during an acute respiratory infection requires careful clinical consideration, as the safety of continued training depends on the severity of illness and the presence of systemic or organ-specific manifestations [4]. Fever is particularly relevant in this context because exercise may further increase physiological strain by augmenting metabolic demands, heat production, and fluid loss [24]. Athletes with fever should therefore refrain from exercise until fever and associated dehydration have resolved, after which activity should be resumed gradually [24]. The presence of systemic symptoms, such as marked fatigue, malaise, or myalgia, should also prompt caution regarding continued exercise during the acute phase of infection [4]. Accordingly, the absence of fever alone should not be considered sufficient evidence that continued exercise is safe when significant systemic or organ-specific symptoms are present [4]. The potential risks associated with exercise are not uniform across all ARinf episodes and appear to be greater in athletes with moderate-to-severe illness, particularly when systemic or multiorgan manifestations are present [4]. Recent prospective evidence indicates that ongoing respiratory infection symptoms may be associated with severe exertional heat illness during strenuous exercise. In one prospective cohort, symptoms present both the day before and on the day of exercise were associated with approximately fourfold higher odds of severe exertional heat illness [25]. Participants with ongoing respiratory infection symptoms also exhibited increased respiratory pathogen expression, systemic inflammation, and a higher pre-exercise gastrointestinal temperature than healthy participants [25]. However, these findings were obtained in military recruits performing strenuous loaded exercise and should therefore be extrapolated to athletic populations with caution [25].

Direct evidence evaluating the safety of exercise during acute viral respiratory illness remains limited. Ruuskanen et al. highlighted that many traditional recommendations are based on expert opinion and indirect evidence rather than prospective studies assessing clinical outcomes in athletes. In particular, the historical “neck check” approach should not be regarded as a validated method for determining exercise safety. These limitations support an individualized assessment that considers illness severity, systemic symptoms, and potential organ-specific involvement rather than relying solely on the anatomical location of respiratory symptoms [26].

Particular attention should be paid to the development of chest pain or pressure, disproportionate dyspnea, palpitations, dizziness, or excessive fatigue during exercise, as these symptoms may indicate the need to stop exercise and undertake further clinical assessment [4]. Cardiac involvement should be considered when new cardiovascular symptoms occur during or following an acute infection, particularly before progression to higher-intensity exercise [4]. In athletes recovering from COVID-19, the ACC consensus recommends further cardiac evaluation when concerning cardiopulmonary symptoms are present or develop after return to exercise [27]. Therefore, decisions regarding exercise during or shortly after ARinf should be individualized and guided by the athlete's clinical status and response to exertion rather than by the presence of respiratory symptoms alone [4].

8. Red Flags Before Return to Training

Before resuming exercise after ARinf, athletes should be assessed for clinical features that may indicate persistent illness, increased disease severity, or possible involvement of organ systems beyond the respiratory tract. Features suggesting a more severe or complicated course include prolonged symptoms, worsening over time, and the development of new symptoms. Systemic manifestations, including fever, marked fatigue, malaise, and myalgia, should raise concern for a more significant illness and warrant a more cautious approach before return to training [4]. In contrast, mild and improving respiratory symptoms in the absence of systemic or cardiopulmonary manifestations should not automatically be interpreted as red flags precluding an initial exercise challenge [4]. Cardiopulmonary symptoms, including chest pain or pressure, disproportionate dyspnea, palpitations, presyncope, or syncope, should be regarded as important red flags before the resumption or progression of exercise [28]. The new onset or recurrence of such symptoms during an initial exercise challenge should prompt immediate cessation of exercise and further clinical reassessment before training is progressed [4]. An abnormal response emerging after exercise, including recurrence or worsening of symptoms within the following 24 hours, should likewise be considered a reason to delay further progression of training [4].

Recent cardiovascular guidance for competitive athletes similarly supports a symptom-driven approach, with further cardiac assessment indicated when cardiopulmonary symptoms raise concern for myocardial involvement, while routine cardiac screening is not recommended solely on the basis of a preceding viral infection in asymptomatic athletes [29]. This symptom-driven approach is supported by observational data from 3,597 collegiate athletes following

SARS-CoV-2 infection, in whom exertional cardiopulmonary symptoms were uncommon but, when present, prompted further evaluation that occasionally identified clinically relevant post-infectious sequelae [28].

An unexpectedly high perceived effort for a previously well-tolerated exercise load or excessive fatigue should also prompt reassessment before further progression of training [4]. In the absence of red flags and abnormal responses to exercise, a gradual progression of training may be considered, with continued monitoring for recurrent or newly developing symptoms [4].

9. Return-to-Sport Decision Making

Return-to-sport decision-making following ARinf should be individualized and based on clinical recovery, illness severity, and the athlete's response to exercise rather than on a fixed period of rest alone [4]. Recent prospective evidence indicates that recovery occurs along a continuum, with return to training, return to full training, and return to full performance representing distinct outcomes [30]. In a cohort of 114 athletes with pathogen-confirmed ARinf, the median times to these outcomes were 3.5, 8, and 11 days, respectively [30]. Greater illness severity was associated with longer recovery, while times to return to training, full training, and full performance were longer following influenza and SARS-CoV-2 infections than following rhinovirus infection [30]. Specific acute symptom clusters have also been associated with prolonged return to play in athletes with acute respiratory illness [31]. In a cross-sectional study of 207 unvaccinated athletes with confirmed SARS-CoV-2 infection, the median time to return to the first training session was 14 days (IQR 10–21) among athletes who had resumed training, while a greater number of acute symptoms was associated with prolonged return to training [32]. These findings support consideration of illness-related factors alongside clinical recovery, but the observed recovery times should not be interpreted as universal waiting periods. Earlier observational data from international-level athletes with SARS-CoV-2 infection similarly indicated that recovery time varied according to clinical presentation, with lower respiratory tract symptoms associated with a greater likelihood of prolonged symptoms and delayed return to sport [33].

A retrospective analysis of electronic health records from approximately 1,200 UK international-level Olympic and Paralympic athletes evaluated time loss from sporting participation following respiratory tract infections between March 2020 and December 2022. During the study period, 566 athletes developed COVID-19 and 217 experienced non-COVID-19 upper respiratory tract infections. Median time loss following COVID-19 decreased from

27 days (IQR: 13-40) in April–June 2020 to 10 days (IQR: 8-13) in October–December 2022 ($p < 0.001$). In contrast, time loss following non-COVID-19 upper respiratory tract infections did not change significantly over the study period ($p = 0.13$). Prolonged time loss of more than one month occurred in 22.0% of athletes following COVID-19, compared with 2% following non-COVID-19 upper respiratory tract infection. The authors suggested that the reduction in COVID-19-related time loss was likely multifactorial, potentially reflecting changes in return-to-sport guidance, vaccination, and emerging viral variants, while the factors underlying prolonged recovery require further investigation [34].

A five-season study of 537 professional male rugby players, encompassing 102,738 player-days, reported differences in time loss and return-to-play outcomes between respiratory illness categories. Lower respiratory tract infections were associated with the longest mean time until return to play per illness episode (3.2 days; 95% CI: 2.3-4.4), followed by influenza-like illness (2.1 days; 95% CI: 1.6-2.8). Influenza-like illness and lower respiratory tract infections resulted in time loss in 100% and 91.7% of cases, respectively. These findings illustrate that the consequences of respiratory illness for sports participation vary according to clinical presentation, although the results from professional male rugby players should not be generalized to all athletes [35].

Additional evidence regarding return to full performance comes from the AWARE VIII study, which assessed 84 athletes with confirmed SARS-CoV-2 infection. The median time to return to full performance was 64 days (IQR 42-91) in symptomatic athletes and 30 days (IQR 23-40) in asymptomatic athletes, although the difference between these groups was not statistically significant [36]. Among symptomatic athletes, a greater number of acute symptoms, particularly systemic symptoms, was associated with a longer time to return to full performance. These findings suggest that acute symptom burden may be relevant not only to the initial resumption of training but also to the subsequent return to full performance. However, the study involved a selected COVID-19 recovery-clinic population, and its findings should not be generalized to all respiratory infections or used to establish universal return-to-sport timelines [36].

10. Graduated Return-to-Training Approach

Following clinical assessment and in the absence of concerning findings, athletes with asymptomatic or mild ARinf may undertake an initial exercise challenge to assess readiness for training. The IOC consensus recommends performing this challenge at approximately 60-70%

of the athlete's normal exercise intensity, with the response assessed after 10-20 minutes of activity. During the challenge, athletes should be monitored for excessive fatigue, disproportionate breathlessness, chest discomfort, dizziness, palpitations, musculoskeletal symptoms, or an unusually high perceived effort for the exercise load. Monitoring should continue immediately after exercise and for the following 24 hours, as abnormal responses may emerge during the recovery period [4].

In a cross-sectional study of 72 athletes assessed 10-28 days after SARS-CoV-2 symptom onset, a greater number of acute whole-body and total symptoms was associated with higher ratings of perceived exertion during submaximal exercise [37]. These findings support the use of perceived exertion as an additional measure of exercise tolerance during the return-to-training process, although the results should not be generalized to all respiratory infections.

Longitudinal evidence from athletes recovering from SARS-CoV-2 infection further supports the potential value of monitoring exercise responses during recovery. In a prospective cohort of 82 athletes recovering from SARS-CoV-2 infection, 287 submaximal exercise assessments were performed over 16 weeks. Exercise heart rate, systolic blood pressure, and ratings of perceived exertion decreased over time, with a steeper decline in heart rate and perceived exertion during the first 30 days. These findings suggest that repeated assessment of exercise responses may provide useful information about recovery and training tolerance. However, the study could not distinguish the effects of infection from retraining and other potential confounders, and its findings should not be generalized to all respiratory infections [38].

Symptom monitoring may remain relevant after training has been resumed. In a descriptive study of 221 athletes recovering from SARS-CoV-2 infection, respiratory and systemic symptoms were still reported during the return-to-training period, with some symptoms, particularly fatigue, persisting despite the resumption and progression of training [39]. These findings suggest that the initiation of training should not be interpreted as equivalent to complete symptom resolution and that clinical status should continue to be reassessed as training load is progressively increased. Accordingly, progression toward usual training loads should remain guided by symptom evolution and exercise tolerance rather than by the resumption of training alone [4].

If the initial exercise challenge is well tolerated, training frequency, intensity, and duration may be progressively increased according to the athlete's clinical response. Successful completion of the initial exercise challenge should therefore be interpreted as a step toward resuming

training rather than as evidence of readiness for an immediate return to full training [4,30]. Each subsequent session should provide an opportunity to reassess exercise tolerance and identify recurrent or newly developing symptoms. Abnormal symptoms or an unexpectedly poor response to exercise should prompt interruption of progression and clinical reassessment before further increases in training load. The rate of progression should be individualized, with a more cautious approach following moderate or severe illness and medical supervision when clinically indicated. Progression toward full training and full performance should continue according to the athlete's tolerance rather than a universal time-based schedule [4]. Prospective multicenter data from athletes following SARS-CoV-2 infection further indicate that reduced exercise tolerance may persist in a subset of athletes beyond the acute phase of illness, supporting an individualized progression of training according to functional recovery rather than symptom resolution alone [40].

11. Practical Recommendations

The practical application of return-to-training principles after ARinf should integrate illness severity, current symptoms, and the athlete's response to progressively increasing exercise loads [4].

Table 1. Practical considerations for return to training after acute respiratory infection in athletes

Stage	Practical considerations
Pre-exercise assessment	Assess illness severity, symptom progression, and the presence of persistent systemic or cardiopulmonary symptoms. Athletes with moderate or severe illness, concerning symptoms, or suspected organ-specific involvement should undergo medical assessment before exercise is resumed or progressed.
Initial exercise challenge	In athletes with asymptomatic or mild ARinf and no concerning findings, consider an initial exercise challenge at approximately 60–70% of normal exercise intensity, with assessment after 10–20 minutes.
Monitoring of exercise response	Monitor for excessive fatigue, disproportionate breathlessness, chest discomfort, dizziness, palpitations, musculoskeletal symptoms, or unusually high perceived effort. Continue monitoring immediately after exercise and during the following 24 hours.
Graduated progression	If the preceding exercise load is well tolerated, progressively increase training frequency, intensity, and duration according to the athlete's clinical response. The rate of progression should be individualized.
Abnormal response	If concerning symptoms develop or exercise tolerance is unexpectedly poor, stop progression and undertake clinical reassessment before further increases in training load.
Return to full training and performance	Progress toward pre-illness training and performance levels according to clinical recovery and exercise tolerance rather than a universal time-based schedule.

Note: ARinf, acute respiratory infection. Developed by the authors based on the IOC consensus statement on acute respiratory illness in athletes, part 1: acute respiratory infections [4]. This

table summarizes clinical considerations and does not represent a validated, universal return-to-sport protocol.

12. Discussion

The available evidence suggests that return-to-sport outcomes after ARinf are associated with illness severity and vary across individual recovery trajectories [30]. Importantly, recovery should not be viewed as a single endpoint, as the resumption of training may precede both the restoration of usual training loads and the return to full performance [30]. Recent pathogen-confirmed data further indicate that the causative pathogen may be associated with differences in recovery time, although these findings should be interpreted in the context of clinical severity and the non-randomized nature of the evidence [30]. Together, these findings are consistent with an individualized approach to return-to-sport decision-making rather than the application of universal time-based criteria.

The available evidence is limited by substantial heterogeneity in study populations, definitions of respiratory illness, and methods used to assess exercise performance and return-to-sport outcomes [2,3]. Many studies relied on symptom-based definitions of respiratory illness rather than laboratory-confirmed infection, making it difficult to distinguish infectious from non-infectious causes and compare findings across studies [1]. Furthermore, relatively few studies have directly evaluated time to return to sport, and differences in the definitions and reporting of return-to-sport outcomes complicate comparisons between studies [3,30]. These methodological differences may partly explain the variability in reported recovery trajectories and limit the extent to which findings from individual studies can be generalized across sports and athlete populations [3,30]. Much of the available evidence is observational, limiting the ability to establish causal relationships between illness characteristics, training-related factors, and recovery outcomes [8,30]. Consequently, associations between clinical characteristics and delayed recovery should be interpreted primarily as prognostic signals rather than evidence of direct causal effects [30].

This review also has limitations. As a narrative rather than systematic review, the literature search and study selection were not designed to identify all available evidence, and no formal risk-of-bias assessment or quantitative synthesis was performed. Future research should prioritize prospective studies using standardized definitions of ARinf and return-to-sport outcomes, with particular attention to pathogen-confirmed infections, exercise tolerance, and the safety of different return-to-training strategies. Important evidence gaps also remain

regarding the effects of specific respiratory viral infections on athletic performance, the safety of exercising during active infection, and the optimal criteria for determining return to sport [41]. Future studies should also evaluate whether standardized exercise-challenge and post-exercise monitoring strategies can reliably identify athletes who require a slower progression of training [30].

From a clinical perspective, the available evidence supports a balanced approach that avoids both premature return to strenuous exercise and unnecessarily prolonged restriction of physical activity after uncomplicated ARinf. Continued monitoring of symptoms and exercise tolerance throughout the return-to-sport process may help identify athletes who require further assessment while allowing uncomplicated cases to progress according to their individual recovery. Thus, return-to-sport decisions after ARinf should integrate the potential effects of illness on performance, the presence or absence of clinical red flags, and the athlete's response to progressively increasing exercise loads [4].

13. Conclusions

Acute respiratory infections may impair athletic performance and disrupt training, with the magnitude of these effects varying according to illness severity and individual clinical presentation. Return-to-sport decisions should be individualized and guided by clinical recovery, illness severity, and exercise tolerance, with particular attention to symptoms that may indicate systemic or organ-specific involvement. A graduated, outcome-based return-to-training approach, incorporating an initial exercise challenge when appropriate and continued monitoring of symptoms, may support progression toward pre-illness training and performance levels. Importantly, the resumption of training should not be considered synonymous with full recovery, as return to full training and restoration of pre-illness performance may occur later [30].

Further prospective research using standardized definitions and pathogen-confirmed infections is needed to improve the evidence base for return-to-sport recommendations and to clarify the safety and effectiveness of different return-to-training strategies.

Disclosure

Author Contributions

Conceptualization, K.G., N.W., M.S., S.K., K.S., A.G., J.D., K.L., L.J. and K.D.; methodology, K.G., N.W., M.S., S.K., K.S., A.G., J.D., K.L., L.J. and K.D.; investigation, K.G., N.W., M.S.,

S.K., K.S., A.G., J.D., K.L., L.J. and K.D.; validation, K.G., N.W., M.S., A.G., L.J. and K.D.; writing-original draft preparation, K.G., N.W. and M.S.; writing-review and editing, K.G., N.W., M.S., S.K., K.S., A.G., J.D., K.L., L.J. and K.D.; visualization, K.G. and N.W.; project administration, K.G. All authors have read and agreed to the published version of the manuscript.

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The authors declare no conflict of interest.

Artificial Intelligence (AI) Declaration

Generative AI technology was used exclusively to assist with English language polishing and text formatting. All scientific concepts, literature selection, and clinical interpretations were conceptualized and written directly by the authors, who assume complete accountability for the manuscript.

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