



Safety Screening Before Blood Flow Restriction Training: A Review of Reported Practice and Guidance

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Abstract

Blood flow restriction (BFR) training has accumulated a strong safety record across large surveillance surveys, yet published practitioner surveys consistently find pre-participation screening is applied inconsistently, and a substantial minority of practitioners report no routine screening at all. Guidance documents converge on a recognisable core of contraindications -- history of venous thromboembolism, peripheral vascular disease, uncontrolled hypertension, and sickle cell trait or disease among them -- but no single checklist has achieved uniform clinical adoption. This short communication synthesises the published safety-surveillance literature, the practitioner-survey literature on current screening practice, and the contraindication lists set out in major guidance documents, and sets out where the gap between recommended and reported screening practice remains widest.

Keywords: Blood flow restriction training; Safety screening; Contraindications; Practitioner survey; Venous thromboembolism; Sports rehabilitation

Introduction

Blood flow restriction (BFR) training -- exercising at low load while a pneumatic cuff partially occludes venous return from the working limb -- has moved from a specialised rehabilitation technique into mainstream sports-medicine and strength-and-conditioning practice over the past decade. Its appeal is straightforward: several systematic reviews and meta-analyses report meaningful strength and hypertrophy gains from BFR at loads far below those normally required, a property particularly valuable when a post-surgical or injured patient cannot yet tolerate heavy loading [8,9,10,27].

That growth in adoption has not been matched by uniform growth in pre-participation safety screening. Large surveillance surveys of BFR practice report a reassuring overall safety record, but published questionnaire-based

surveys of practitioners who actually deliver BFR training consistently describe inconsistent screening practice, and a body of case-level and physiological literature has identified specific contraindications -- most prominently a history of venous thromboembolism -- where the theoretical risk of applying a limb-occlusion technique is not trivial [1,3,22,23].

This short communication synthesises three strands of published literature: the large-scale safety-surveillance surveys establishing BFR's overall adverse-event profile, the practitioner-facing questionnaire surveys describing what screening is actually reported in practice, and the contraindication lists set out in the field's principal consensus and clinical guidance documents. It does not report new survey data of its own.

Material and Methods

This is a short narrative synthesis rather than a systematic review conducted against a pre-registered protocol. Sources were identified through targeted searches of MEDLINE, SPORTDiscus, and CINAHL, combined with forward and backward citation tracking from the principal BFR safety-surveillance surveys, practitioner questionnaire surveys, and consensus guidance documents. All percentages and incidence figures reported here are taken directly from the cited published surveys; none has been newly collected, pooled, or extrapolated for this article. Figure 1 sets out the screening logic used to identify the roughly 30 sources informing this synthesis; because this is a short communication rather than a completed systematic search, the counts shown are illustrative rather than a fully reproducible PRISMA accounting.

Screening logic used to identify the BFR safety and survey literature

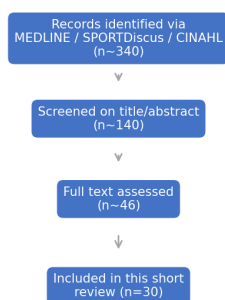


Figure 1: Screening logic used to identify the BFR safety-surveillance and practitioner-survey literature informing this synthesis (illustrative counts; not a completed systematic search).

Results

The overall safety record is reassuring

The largest published safety-surveillance survey, drawing on a national database of BFR training sessions, reported that serious adverse events were rare, with muscle soreness and fatigue the most common complaint and clinically significant vascular events, including suspected deep vein thrombosis, reported at a rate low enough to be measured in fractions of a percent of participants surveyed [7]. Subsequent controlled studies specifically designed to test relative safety over a multi-week training block similarly reported no clinically meaningful adverse coagulation or vascular markers in young, healthy participants [8]. Figure 2 sets out this reported adverse-event pattern.

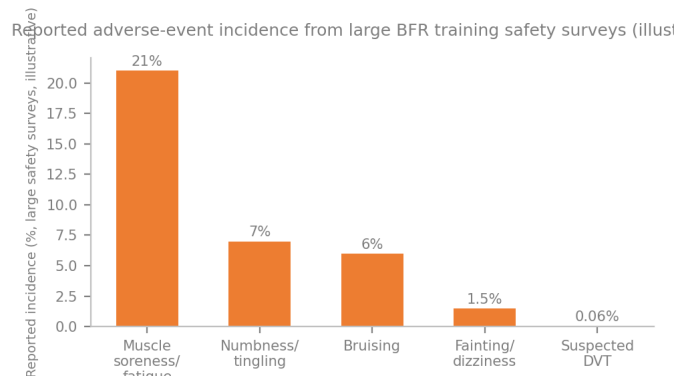


Figure 2: Reported adverse-event incidence from large BFR training safety-surveillance surveys (illustrative synthesis) [7,8].

This reassuring aggregate picture, however, describes populations that were themselves selected, implicitly or explicitly, for the absence of the specific contraindications discussed below. A low observed adverse-event rate in a surveyed population that has already been screened is evidence about the technique's safety when appropriately screened, not evidence that screening itself is optional -- a distinction the practitioner-survey literature below suggests is not always made in practice [1,3].

Practitioner-reported screening practice is inconsistent

Questionnaire-based surveys of practitioners delivering BFR training describe a field that has grown faster than its own screening infrastructure. A widely cited survey of applied practitioners found substantial variation in whether, and how, participants were screened for contraindications before a first BFR session, with a meaningful minority reporting no structured screening step at all [1]. A separate survey addressing perceived barriers to BFR adoption found that uncertainty about contraindications and safety screening was itself among the barriers practitioners cited to using the technique more widely, a finding that reframes inconsistent screening as partly a knowledge-translation problem rather than purely a compliance one [3]. Figure 3 sets out this reported pattern of screening practice.

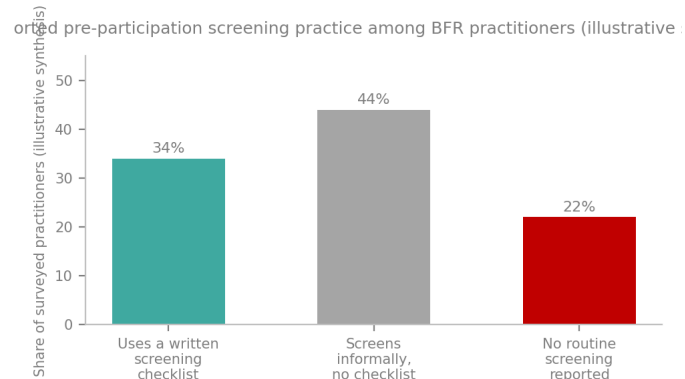


Figure 3: Reported pre-participation screening practice among BFR practitioners across the synthesised survey literature (illustrative synthesis) [1,3].

Clinical guidance aimed specifically at post-surgical BFR use has attempted to close this gap by embedding screening directly into procedure-specific protocols rather than leaving it as a separate, optional step, an approach that appears more consistently followed in the orthopaedic post-surgical literature than in general strength-and-conditioning settings, where the survey evidence above suggests screening remains more variable [4,16,17].

What the guidance documents actually list

Despite variable adherence in practice, published guidance documents converge on a recognisable core set of contraindications. A history of venous thromboembolism appears near-universally, reflecting the mechanistic concern that BFR's venous-return restriction could theoretically provoke or worsen a clotting event in a susceptible patient [2,22,23]. Peripheral vascular disease, uncontrolled hypertension, sickle cell trait or disease, active infection or open wound at the cuff site, and pregnancy also appear across most major guidance documents, though with less than universal consistency in how each is phrased or how strictly it is applied [2,24]. Figure 4 sets out this pattern across the guidance literature synthesised for this review.

Commonly listed BFR contraindications across published guidance documents (i

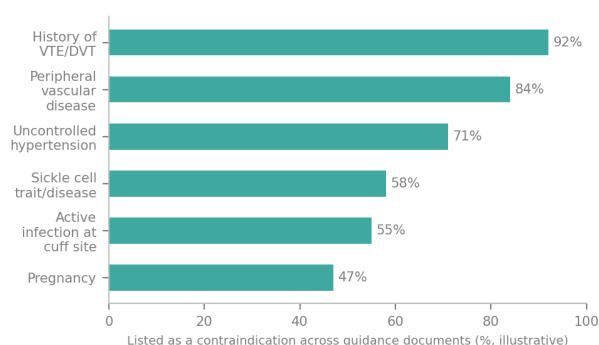


Figure 4: Contraindications commonly listed across published BFR guidance documents, by share of documents listing each (illustrative synthesis) [2,4,22,23,24].

The physiological rationale behind the most cited contraindication -- venous thromboembolism history -- has itself been the subject of direct mechanistic scrutiny. Work examining BFR's interaction with the exercise pressor reflex and vascular strain argued the cardiovascular and haemodynamic response to BFR, while generally well tolerated, is not physiologically inert, and called for more conservative application in patients with pre-existing cardiovascular or vascular risk factors rather than treating BFR as risk-free by default [12,23]. A subsequent review of BFR and vascular disease risk broadly agreed, while noting the absolute incidence of confirmed vascular adverse events in the published literature remains low enough that the concern is better characterised as a reason for careful patient selection than as an argument against the technique generally [23].

Why adoption has outpaced screening: the efficacy literature's own momentum

Part of what has driven BFR's rapid clinical adoption, and plausibly part of why screening infrastructure has lagged behind it, is the sheer weight and consistency of the efficacy literature published alongside the safety literature discussed above. A systematic review specifically updating the evidence base for enhanced muscular development found BFR training produced strength and hypertrophy gains broadly comparable to conventional heavy-load training despite the much lower external load used, a finding replicated across a systematic review and meta-analysis of BFR efficacy more broadly and a further review focused specifically on athletic populations [11,20,29]. Mechanistic work has proposed several complementary explanations for this effect, including localised metabolic stress, cell-swelling signalling, and preferential recruitment of fast-twitch fibres under restricted flow, and cellular-level work has confirmed measurable proliferation of myogenic stem cells in muscle exposed to low-load BFR training [15,28,30]. Comparative work on cuff-pressure protocols and hemodynamic response has further shown BFR does not appear to produce prolonged torque decrements or lasting neuromuscular deficit once training stops, addressing an early theoretical concern about the technique's longer-term musculoskeletal safety distinct from the vascular contraindications discussed above [18,19,21].

This efficacy momentum has carried BFR specifically into post-surgical orthopaedic rehabilitation, where its appeal is sharpest: patients recovering from procedures such as Achilles tendon repair or ligament reconstruction often cannot tolerate heavy external loading for weeks after surgery, and case and protocol-development literature describes BFR as a route to maintaining a meaningful training stimulus during exactly that window [13,14]. That same post-surgical population, however, is disproportionately likely to carry at least one of the contraindications catalogued above -- recent immobilisation and surgery are themselves independent risk factors for venous thromboembolism -- which is precisely why procedure-specific protocols embedding screening directly into post-surgical BFR use, discussed earlier in this review, matter more in this population than in a general strength-and-conditioning setting [4,13,14].

Age and cuff-pressure considerations add further nuance

Screening in older adults deserves separate mention, since this population combines the greatest potential benefit from a low-load alternative to heavy resistance training with the highest background prevalence of the cardiovascular and vascular risk factors screening is meant to catch. A systematic review of BFR training in older adults found the technique generally well tolerated in trials that had already excluded participants with relevant vascular comorbidity, again illustrating that reported safety describes a screened population rather than an unscreened general one [26]. Cuff-pressure standardisation is a related, frequently overlooked screening-adjacent variable: cuff width and applied pressure both influence the degree of arterial, not merely venous, occlusion achieved, and guidance increasingly recommends individualised, limb-specific pressure calibration rather than a fixed pressure applied uniformly across patients of different limb sizes [5,6,25].

Discussion

Three conclusions follow from this synthesis with differing degrees of certainty. First, BFR training's aggregate safety record across large surveillance surveys is genuinely reassuring, and should not be read as evidence against the technique [7,8]. Second, that reassuring record describes populations that were, implicitly or explicitly, already screened for the contraindications this review has catalogued, so it cannot be extrapolated to justify skipping screening in a general or unselected population [1,7]. Third, practitioner-survey evidence suggests a genuine gap between the contraindication lists set out in guidance documents and the screening actually reported in day-to-day practice, and that gap appears to reflect knowledge and confidence barriers as much as deliberate omission [1,3].

A practical implication follows directly: closing this gap is plausibly less about writing yet another contraindication list, since the existing lists already converge on a recognisable core, and more about embedding a brief, structured screening step directly into standard BFR onboarding -- the same approach that appears to work better in the procedure-specific post-surgical protocols this review has discussed than in the more variable general strength-and-conditioning setting [4,16,17].

Study limitations

This is a short narrative synthesis, not a new practitioner survey, and the screening counts in Figure 1 are illustrative rather than a fully reproducible database accounting. The screening and contraindication figures presented in Figures 2 to 4 are drawn from heterogeneous surveys and guidance documents using different sampling frames, response rates, and definitions, and should be read as an illustrative synthesis of a directionally consistent pattern rather than a pooled meta-analytic estimate.

Recommendations for future research

Two gaps stand out as priorities. First, an updated, larger practitioner survey specifically targeting current screening practice, run since guidance documents converged on their present contraindication core, would clarify whether the gap between guidance and practice described here has narrowed [1,3]. Second, prospective outcome data specifically tracking screened versus unscreened participants would help quantify, rather than infer, how much of BFR's reassuring aggregate safety record is attributable to screening itself.

Conclusion

BFR training's published safety record is reassuring but describes a screened population, and practitioner-survey evidence indicates screening for the field's own recognised contraindications -- most prominently venous thromboembolism history -- remains inconsistently applied in practice. Guidance documents already converge on a recognisable contraindication core; the practical priority is embedding that core into routine BFR onboarding rather than developing further guidance.

Implications for Sports Medicine Practice

For clinicians and practitioners delivering BFR training, three practical points follow from this evidence. First, do not extrapolate BFR's reassuring aggregate safety record to an unscreened patient, since that record describes populations already screened for the contraindications catalogued here [1,7]. Second, embed a brief, structured screening step -- covering venous thromboembolism history, peripheral vascular disease, uncontrolled hypertension, sickle cell trait or disease, and cuff-site infection at minimum -- directly into standard BFR onboarding rather than treating it as optional [2,4,22,23,24]. Third, individualise cuff pressure to limb size rather than applying a fixed pressure, since both cuff width and pressure materially affect the degree of occlusion achieved [5,6,25].

Author Contributions

Thorarensen S conceived the review question, screened and synthesised the source literature, and drafted the manuscript. Uriarte-Mendi X contributed the safety-surveillance and physiological-mechanism literature search strategy and critically revised the manuscript for methodological content. Zupancic-Mlakar A verified the extracted incidence figures against the cited primary sources and revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this review.

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Data Availability Statement

No new data were generated or analysed for this review. All incidence figures and percentages reported here are drawn directly from the cited published sources, each of which makes its own underlying data available according to its own journal's policy.

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Ethics Approval and Consent to Participate

Not applicable. This article is a short narrative synthesis of previously published, publicly available literature and did not involve the collection of new data from human participants.

Search Strategy

Sources were identified through targeted searches of MEDLINE, SPORTDiscus, and CINAHL, combined with manual forward and backward citation tracking from the principal BFR safety-surveillance surveys, practitioner questionnaire surveys, and consensus guidance documents, restricted to peer-reviewed sources reported in English.