

Review Paper

Pain, swelling, and redness at a peripheral venous access site: Practical management in suspected superficial phlebitis

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ABSTRACT

Introduction: Peripheral venous access is among the most frequently performed invasive procedures in hospitalized patients. Local complications may cause pain, interruption of intravenous therapy, repeated cannulation, infection, or superficial venous thrombosis.

Aim: To present an evidence-informed practical pathway for assessment and initial management of pain, swelling, and redness at a peripheral venous access site as symptoms suggestive of superficial phlebitis.

Material and methods: A structured narrative review used PubMed/MEDLINE and the Cochrane Library. Searches covered January 1998 – 12 September 2026 and focused on PIVC-related phlebitis, VIP scoring, extravasation, catheter removal, infection, ultrasonography, and superficial/upper-extremity venous thrombosis. Priority was given to systematic reviews, guidelines/consensus documents, randomized trials, and studies of phlebitis assessment tools.

Results and discussion: The revised pathway emphasizes immediate clinical assessment, differentiation from extravasation and infection, and standardized grading using the commonly used Jackson-derived 0–5 Visual Infusion Phlebitis (VIP) scale. In this 0–5 framework, a score of 2 or higher represents phlebitis and prompts catheter removal/re-siting. Fixed observation intervals, centimetre cut-offs, and specific local-treatment regimens are not intrinsic components of the VIP score and should follow institutional policy and the clinical context.

Conclusions: Standardized assessment may improve recognition and documentation of peripheral intravenous catheter complications. The proposed algorithm should be used as an adjunct to clinical judgement and local protocols rather than as a prescriptive, universally validated treatment guideline.

1. INTRODUCTION

Peripheral venous cannulation is a fundamental component of inpatient treatment, enabling administration of fluids, medications, blood products, antibiotics, analgesics, and supportive therapy. Peripheral intravenous catheters (PIVCs) are used on a very large scale, and contemporary systematic evidence indicates that premature catheter failure remains common, making apparently minor local complications clinically relevant at a population level.^{1,2}

Superficial phlebitis, also described as infusion phlebitis or catheter-associated superficial thrombophlebitis, may present with pain, tenderness, erythema, swelling, local warmth, or induration along the course of the vein. Clinical severity ranges from subtle local discomfort to extensive inflammation, palpable venous cord, purulent discharge, or systemic features that raise concern for infection.^{1,3–9}

The practical challenge is early recognition and appropriate escalation. Symptoms of phlebitis can overlap with infiltration/extravasation, local skin and soft-tissue infection, and superficial or deep venous thrombosis. Therefore, a structured assessment should integrate local signs, symptom progression, systemic features, the infused substance, and patient-specific risk factors rather than relying on a single sign.^{3,4,9–11}

The present review focuses on an evidence-informed bedside approach. Importantly, it separates elements derived from published evidence and the established VIP scale from operational details that may reasonably be incorporated into a local clinical pathway but are not themselves validated components of the score.

2. AIM

The aim of this paper is to present practical management of pain, swelling, and redness at a peripheral venous access site when superficial phlebitis is suspected. Specific objectives are to describe clinically relevant findings, present the commonly used Jackson-derived 0–5 Visual Infusion Phlebitis (VIP) scale without conflating it with other variants, outline the catheter action linked to each score, identify situations requiring medical escalation, and clearly distinguish published evidence from local-pathway or expert-practice elements.

3. MATERIAL AND METHODS

This article is a structured narrative review linked to a practical clinical pathway. Targeted literature searches were performed in PubMed/MEDLINE and the Cochrane Library; a reference list of key systematic reviews, guidelines, consensus documents, and relevant primary studies were screened for additional sources.

The search covered publications from January 1998, corresponding to Jackson's publication of the VIP framework,

through 12 September 2026. Search terms and combinations included: “peripheral intravenous catheter”, “peripheral venous catheter”, “peripheral cannula”, “infusion phlebitis”, “superficial phlebitis”, “thrombophlebitis”, “Visual Infusion Phlebitis”, “VIP score”, “extravasation”, “catheter removal”, “catheter failure”, “catheter-related infection”, “ultrasonography”, “superficial venous thrombosis”, and “upper extremity venous thrombosis”.

Eligible sources included systematic reviews and meta-analyses, Cochrane reviews, clinical guidelines or evidence-based consensus statements, randomized or controlled trials, observational studies relevant to diagnosis or management, and studies evaluating or discussing phlebitis assessment tools. English-language publications addressing short PIVCs, infusion phlebitis, local catheter complications, catheter removal/replacement, extravasation, infection, or superficial/upper-extremity venous thrombosis were considered. Publications were limited exclusively to central venous catheters without transferable relevance. Non-human studies, and reports without clinically relevant assessment or management information were not used to formulate the pathway.

Because this is a narrative practical review rather than a systematic review, no formal meta-analysis, certainty-of-evidence grading, study-level risk-of-bias assessment, or exhaustive duplicate-screening procedure was performed. Accordingly, wording was calibrated to the strength and directness of the available evidence. Statements supported by published studies, contemporary standards, or established assessment frameworks are presented as evidence-informed. Operational details not specified by the VIP score – including exact reassessment intervals, choice of compress, and institution-specific notification or documentation workflows – are explicitly presented as local-protocol or expert-practice considerations rather than universal recommendations.

4. RESULTS

The practical result of the review is a structured approach to suspected superficial phlebitis at a PIVC site. When new pain, tenderness, erythema, swelling, warmth, or induration is identified, infusion through that catheter should be paused while the site and the patient are assessed. This initial safety step allows evaluation for phlebitis, infiltration/extravasation, catheter malfunction, and infection before further use of the device.^{3,4,9,12,13}

The local assessment should include the distribution and progression of erythema and swelling, pain or tenderness, warmth, induration, a palpable venous cord, discharge, and catheter function. Systemic features such as fever, chills, or clinical deterioration increase concern for infection. In children and patients unable to verbalize symptoms reliably, behavioral signs such as guarding of the limb, crying, restlessness, or refusal to allow inspection may be clinically relevant.^{9,14}

Phlebitis and extravasation should be actively differentiated. If extravasation is suspected, management should follow the specific drug or infusate protocol. For selected vesicant or

irritant extravasations, aspiration through the catheter before removal may be appropriate; this is substance-dependent and should not be generalized to all local PIVC complications.^{3,4,8}

4.1. Visual Infusion Phlebitis Score

The VIP scale is a bedside assessment framework for peripheral IV sites. Jackson's 1998 publication described a 1–6 grading system; a later Jackson-derived 0–5 version became widely used and was evaluated by Gallant and Schultz.^{10,15} Importantly, the systematic review by Ray-Barruel et al. identified numerous phlebitis scales and variants and concluded that no available scale had undergone rigorous validation across all measurement properties.¹¹ Table 1 therefore presents the commonly used 0–5 VIP framework while explicitly avoiding non-standard centimetre cut-offs or fixed observation intervals (Table 1).

Jackson's original 1998 VIP framework used grades 1–6, whereas the widely used modified version is numbered 0–5.^{10,11,15} In the 0–5 framework, score 2 (two of pain at the IV site, erythema, and swelling) denotes early phlebitis and is linked to re-siting/removal of the peripheral IV catheter. Exact observation intervals, centimetre thresholds for erythema, purulence criteria, and specific compress regimens are not defining components of this 0–5 score. Ray-Barruel et al. identified substantial heterogeneity among published phlebitis scales and found that none had been rigorously validated across all psychometric properties.¹¹

4.2. Practical management algorithm

Figure 1 summarizes the proposed approach. It separates the assessment of possible extravasation from subsequent VIP grading, because extravasation management may require drug-specific action before catheter removal. The VIP score

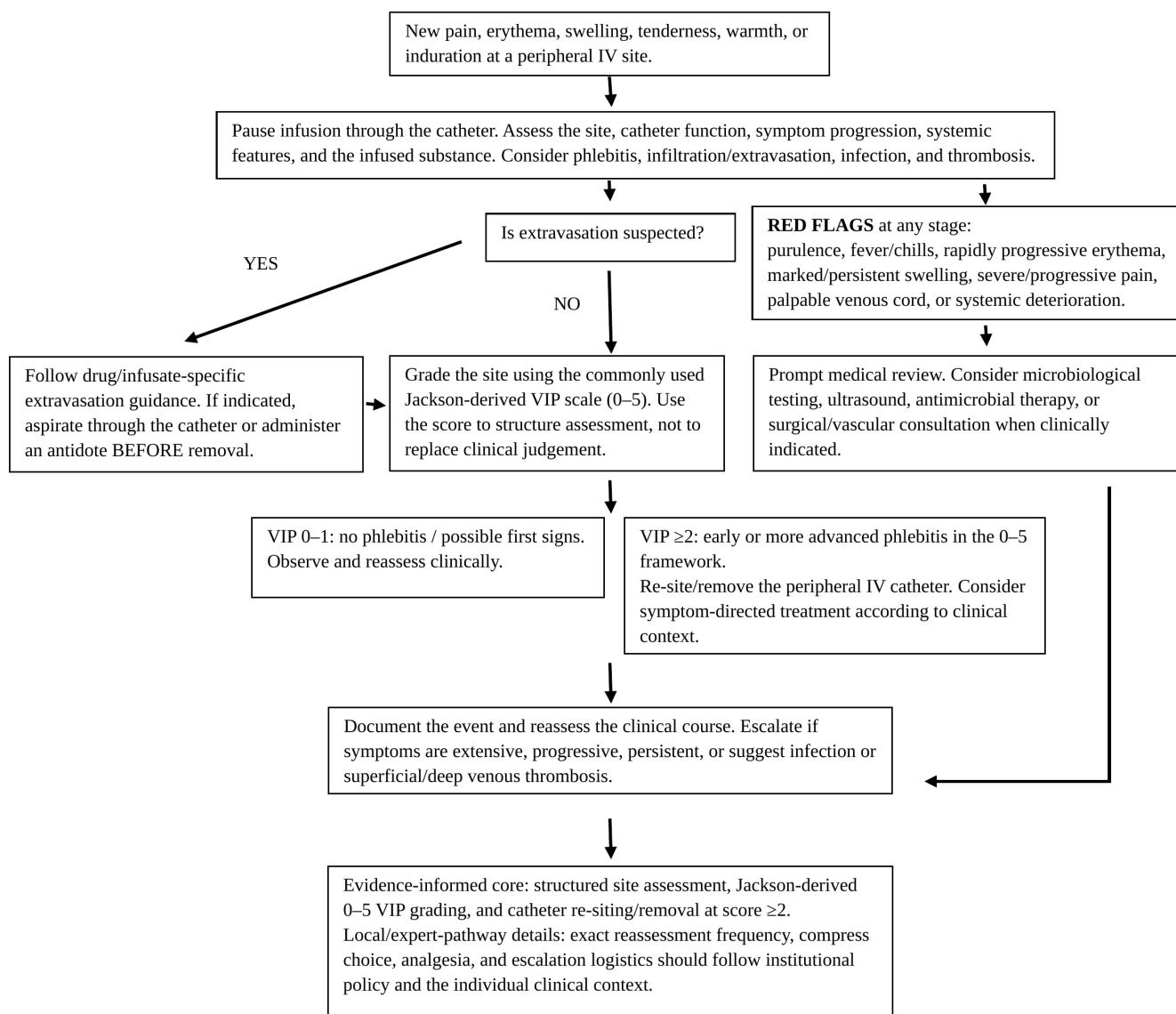


Figure 1. Practical management algorithm for suspected superficial phlebitis at a peripheral intravenous catheter site.

Table 1. Commonly used Jackson-derived 0–5 Visual Infusion Phlebitis (VIP) scale: Clinical findings and linked actions.

VIP score	Clinical findings	Interpretation	Action linked to the VIP framework
0	IV site appears healthy	No signs of phlebitis	Observe the cannula/site
1	One of the following: slight pain near the IV site OR slight redness near the IV site	Possible first signs of phlebitis	Observe the cannula/site and reassess clinically
2	Two of the following: pain at the IV site; erythema; swelling	Early phlebitis	Re-site/remove the peripheral IV catheter
3	All of the following: pain along the path of the cannula; erythema; induration	Medium-stage phlebitis	Re-site/remove the catheter; consider symptom-directed treatment
4	All of the following signs are evident and extensive: pain along the path of the cannula; erythema; induration; palpable venous cord	Advanced phlebitis / start of thrombophlebitis	Re-site/remove the catheter; consider treatment and medical assessment
5	All of the following signs are evident and extensive: pain along the path of the cannula; erythema; induration; palpable venous cord; pyrexia	Advanced thrombophlebitis	Re-site/remove the catheter; initiate/consider treatment and prompt medical assessment according to the clinical context

is then used to structure assessment of phlebitis severity, while clinical judgement determines whether additional evaluation is needed in special populations or when red-flag symptoms are present.

A concise bedside sequence is therefore: pause the infusion and assess the site and patient; determine whether extravasation or another complication is suspected; if extravasation is possible, follow agent-specific guidance before removing the device when aspiration or antidote administration through the catheter may be indicated; otherwise assign the VIP score; in the commonly used 0–5 framework, re-site/remove the catheter at VIP score ≥ 2 ; document the event; and obtain a medical review when findings are extensive, progressive, systemically symptomatic, or suggest infection or thrombosis. Decisions regarding compress type, analgesia/anti-inflammatory therapy, frequency of reassessment, microbiological sampling, and imaging should be individualized and aligned with institutional protocols and the clinical scenario.^{3,4,8,9,12,13,16,17}

4.3. Clinical appearance

Representative clinical photographs may facilitate bedside recognition of superficial phlebitis. Figure 2 presents two author-owned, non-identifying examples. Panel A shows a lower limb with diffuse erythema consistent with superficial phlebitis. Panel B shows an upper limb with linear erythema extending from a peripheral venous catheter site, consistent with catheter-associated superficial phlebitis.

5. DISCUSSION

Peripheral IV-associated phlebitis is clinically important because it causes pain, treatment interruption, repeat cannulation, and potentially avoidable loss of vascular access. Recent evidence also emphasizes the broader burden of PIVC failure and the need for systematic assessment of catheter

sites rather than acceptance of local complications as inevitable.^{2,12,13}

The most important revision to the proposed pathway concerns fidelity to the VIP framework. Jackson's original 1998 publication used grades 1–6; a Jackson-derived 0–5 version was subsequently evaluated and has become widely reproduced in practice.^{10,15} In that 0–5 version, possible first signs at score 1 prompt observation, whereas score 2 (two of pain, erythema, and swelling) represents early phlebitis and is linked to catheter re-siting/removal. The previous manuscript incorporated centimetre thresholds and fixed reassessment intervals that are not part of this score and have therefore been removed. Because systematic review evidence demonstrates substantial heterogeneity among phlebitis assessment measures and incomplete psychometric validation, the VIP score should be regarded as a structured clinical aid rather than a fully validated diagnostic instrument.¹¹

Treatment after catheter removal should be proportionate to the suspected mechanism. Evidence for specific topical treatments of superficial infusion thrombophlebitis is limited and heterogeneous.^{3,4} Accordingly, warm or cold compresses, elevation, analgesic/anti-inflammatory treatment, and follow-up should not be presented as mandatory universal measures; they may be considered according to symptoms, the infused agent, contraindications, and local policy. Similarly, microbiological testing and antibiotic therapy are appropriate when infection is suspected, but not routinely for uncomplicated phlebitis.^{7–9,12}

Ultrasonography is not necessary for every localized PIVC-associated phlebitis. It may be considered when pain or swelling is extensive or progressive, a longer venous segment is involved, symptoms persist despite catheter removal and conservative care, or a deeper venous thrombosis is clinically plausible.^{16,17} Upper-extremity venous thrombosis may present with nonspecific pain, edema, or erythema; a recent report in Polish Annals of Medicine further illustrates the diagnostic importance of considering venous thrombosis in

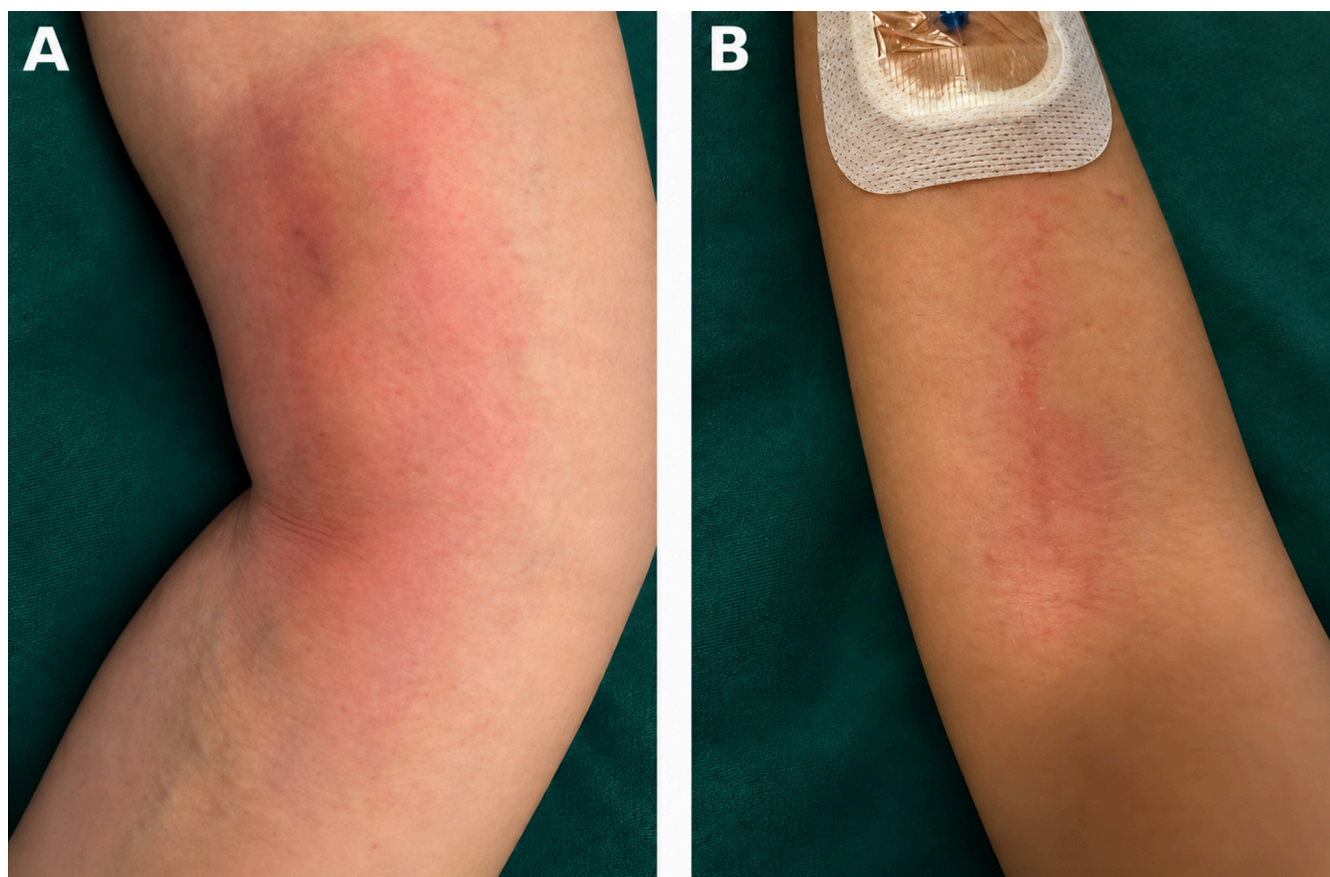


Figure 2. Representative clinical appearance of superficial phlebitis. (A) Lower limb with erythema consistent with superficial phlebitis. (B) Upper limb with superficial phlebitis at the peripheral venous catheter site.

patients with atypical or extensive upper-limb findings.¹⁸ Evidence and treatment recommendations for lower-limb superficial venous thrombosis, including anticoagulation trials, should not be directly extrapolated to uncomplicated short-PIVC-associated upper-limb phlebitis.^{19–21}

This review has several limitations. It is a narrative, clinically oriented review rather than a systematic review and therefore does not provide an exhaustive evidence map, duplicate screening, formal risk-of-bias assessment, or GRADE certainty ratings. The proposed algorithm itself has not been prospectively validated as a bundle. In addition, the VIP literature is methodologically heterogeneous: multiple versions of the scale have circulated, and a systematic review found that no phlebitis assessment scale had been rigorously validated across all relevant measurement properties.¹¹ Some components of the pathway are supported by contemporary evidence or standards, whereas others remain expert-practice or local-pathway considerations. The evidence base is dominated by adult studies, so pediatric, oncology, immunocompromised, and other high-risk populations may require earlier escalation and individualized management. Consequently, the pathway should support – not replace – institutional policies, drug-specific extravasation guidance, infection-control standards, and bedside clinical judgement.

6. CONCLUSIONS

- (1) Pain, erythema, swelling, tenderness, warmth, or induration at a peripheral IV site should prompt immediate assessment for phlebitis and competing diagnoses such as extravasation, infection, or thrombosis.
- (2) The commonly used Jackson-derived 0–5 VIP scale can standardize bedside assessment; in this framework, score 2 or higher is linked to catheter removal/re-siting. The scale should be used as a structured clinical aid, recognizing that published variants exist and that psychometric validation remains incomplete.
- (3) Fixed observation intervals, centimetre-based erythema thresholds, purulence criteria, and specific local-treatment regimens should not be presented as intrinsic or validated components of the 0–5 VIP score; when used, they should be labeled as local-protocol or expert-practice elements.
- (4) Purulence, fever/chills, rapidly progressive erythema, marked or persistent swelling, severe pain, a palpable venous cord, or systemic deterioration warrant medical assessment and consideration of additional diagnostics.
- (5) The proposed pathway is an evidence-informed clinical aid and requires local adaptation; prospective validation

of the complete algorithm would strengthen future recommendations.

LIST OF ABBREVIATIONS

DVT – deep venous thrombosis

PIVC – peripheral intravenous catheter

SVT – superficial venous thrombosis

VIP – Visual Infusion Phlebitis Score

Informed consent

Not applicable to the review itself. Written informed consent for publication of the clinical photographs presented in Figure 2 was obtained.

Conflict of interest

None declared.

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Author contributions

Study design: PS-S, DJ-L

Data collection: PS-S, DJ-L

Data interpretation: PS-S, DJ-L

Manuscript preparation: PS-S, DJ-L

Literature search: PS-S, DJ-L

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