When considering the generalisability of this early-switch strategy in patients with intermediate-high-risk pulmonary embolism, one should remember that this group of patients in the PEITHO-2 study are patients with relatively non-severe disease, as indicated by the low incidence of early life-threatening events compared with the placebo group of the randomised PEITHO trial assessing thrombolysis in this patient subgroup.[10] In clinical practice, prescribing DOAC regimens with an early switch not consistent with the strategies used in phase 3 trials should therefore not be generalised to all patients with intermediate-risk pulmonary embolism.

However, the main interest of the PEITHO-2 study is not the early switch to a given drug, but rather the proof-of-principle of the possibility of an early switch from parenteral to oral anticoagulation in a large subgroup of patients with intermediate-risk pulmonary embolism. The study provides an illustration of the wide spectrum represented by patients with intermediate-risk pulmonary embolism, from those at intermediate-low risk, who could safely benefit from early switch and early discharge (even if they have a positive biomarker or a dilated right ventricle), to those at intermediate-high risk, who require a more cautious approach. The PEITHO-2 study also highlights the central importance of clinical features included in risk assessment tools, as reflected by the higher risk of the primary outcome in patients with intermediate-high-risk pulmonary embolism who had an sPESI of 1 or higher (five [3%; upper bound of right-sided 95% CI 7] of 159) when compared with the whole cohort. Of particular note, despite its limitations, the PEITHO-2 study paves the way for fine-tuning risk-assessment strategies with a clinically meaningful dynamic assessment of patients admitted to hospital with intermediate-risk pulmonary embolism, which could impact the future management of these patients and their duration of hospital stay.

I declare no competing interests.

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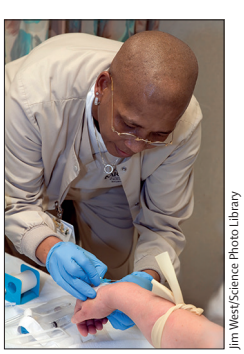
Peripheral intravenous catheter failure—is it us or is it them?

Intravenous therapy for patients with a range of haematological disorders is an essential component of disease treatment. Although central venous access devices are preferred for irritant or vesicant intravenous therapies, the peripheral intravenous catheter (PIVC) has an important role, offering a simple, cost-effective way to deliver short-term, peripherally compatible treatments. Unfortunately, this important device is susceptible to failure, with more than half of all PIVCs in hospitalised patients developing complications such as occlusion, infiltration, phlebitis, dislodgement, and infections that result in device removal.[1,2] Consequently, PIVCs are not reliably doing the task for which they are required. PIVC failure and poor PIVC maintenance practice are a substantial health-care problem. It is often assumed that fixing poor practice will fix failure,[3] but will it? Is the problem poor practice alone, or is it the device itself?

Although there is an urgent need to adopt evidence-based PIVC insertion and maintenance practices to protect patients from avoidable harm, previous research has struggled to find an easy answer.[4] For this reason, Ian Blanco-Mavillard and colleagues' cluster-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randomised, controlled trial[1] in *The Lancet Haematology* is an important contribution to improving PIVC care. Their multimodal intervention resulted in a significant reduction in the proportion of PIVC failures that was sustained at 12 months (37·10% [SD 1·32], HR 0·81 [95% CI 0·72 to 0·92] in the intervention group *vs* 46·49% [2·59], HR 1·23 [1·09 to 1·39] in the control group; mean difference –9·39 [95% CI –11·22 to –7·57]; p<0·0001).

Although educational intervention is only loosely correlated to behaviour change and improved PIVC outcomes,[5] Blanco-Mavillard and colleagues developed an education focus with individual components supported by high level evidence and current clinical practice guidelines.[1] The components of their intervention include selecting the smallest PIVC gauge appropriate for the treatment administered, avoiding placement in the antecubital fossa and preferencing the forearm, educating patients, gentle push-stop-push saline flushing, maintenance of clean, intact, and dry sterile transparent dressings, regular site assessment and documentation, and removal of unnecessary devices.[4,6,7]

However, although reduced compared to the control group, PIVC failure rates remained high for patients in the intervention group in Blanco-Mavillard and colleagues' trial, with more than one in three PIVCs failing before the completion of treatment. In addition, there was no improvement in functional PIVC dwell times, with a significantly longer median dwell time in the control group (90 h [IQR 60–115]) than in the intervention group (75 h [50–110]; p<0·0001).[1] This longer dwell time in the control group might reflect fewer unnecessary status intervention PIVCs at some trial timepoints, although the incidence of unnecessary status was no longer different between the groups at 12 months. So, perhaps future energy should be focused further upstream and consider whether achieving further improvements in PIVC outcomes requires re-evaluating the device itself. Are PIVCs fit for purpose?

In our hospitals in Australia, there are growing numbers of patients with difficult vascular access, often reflecting ageing veins, extremes of weight, or multiple failed PIVC insertion attempts, which damage the patient's vasculature.[2,8] These patients are not only difficult to cannulate, but are at higher risk of their PIVC failing.[6] Emerging evidence supports the use of alternative peripheral vascular devices, such as longer PIVCs (4·5–6·3 cm in adults), or midline catheters (catheter tip at the level of the axilla) to improve patient outcomes.[7] A longer catheter length supports cannulation of deeper vessels and allows greater catheter length to reside within the vein, which has been linked to decreased PIVC failure.[9]

In addition, consideration of new technologies in catheter design and materials should be a priority. Blanco-Mallivard and colleagues reported that approximately 18% of PIVCs in the intervention group failed from obstruction or phlebitis in their study.[1] Should different PIVC materials be considered that might be less irritant to the vein, such as antithrombotic materials developed for use in peripherally inserted central catheters?[10] Perhaps more consideration should be given to catheter design? Would winged, low profile PIVCs that sit closer to the skin improve PIVC outcomes?[3] Blanco-Mallivard and colleagues showed that, even after the study intervention, 3·63% (SD 3·11) of PIVCs failed from catheter dislodgement and 15·93% (2·84) had entered the tissue causing extravasation. A poorly secured catheter is not only at risk of falling out of the patient altogether or entering tissue but can also lead to movement irritating the vessel wall, potentiating phlebitis and obstruction. Do different types of securement need to be considered? Although evidence to date is not convincing, is there a place for targeted use of tissue adhesive or external fixation devices for PIVCs?[4]

To improve PIVC outcomes for patients, we should keep trying to advance practice and compliance with the same accepted practices, such as clean, dry, and intact dressings, but radical research and development of new devices is also needed, as well as their adoption into clinical practice. PIVCs constitute a massive global market and are worthy of investment in new generation products that are fit for purpose in the decades ahead.

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The role of autologous haematopoietic stem-cell transplantation in mantle cell lymphoma

The consolidation with high-dose chemotherapy and autologous haematopoietic stem-cell transplantation (HSCT) followed by rituximab maintenance therapy after an induction of chemoimmunotherapy (rituximab plus dexamethasone, cytarabine, and cisplatin [R-DHAP] alternated to an anthracycline-containing regimen, rituximab plus cyclophosphamide, doxorubicin, vincristine, and prednisone [R-CHOP]) is the standard of care in the first-line treatment of patients affected by mantle cell lymphoma who are eligible to receive high-dose therapy.[1] This approach can induce durable treatment responses and ameliorate progression-free survival compared with standard chemotherapy. Despite the improvement in efficacy, the elevated risk of long-term adverse events and secondary malignancies related to high-dose chemotherapy and autologous HSCT remains a matter of debate. On the basis of these concerns, the long-term analyses of previously reported clinical studies are important to improve the knowledge in this field.

In *The Lancet Haematology*, Anna-Katharina Zoellner and colleagues[2] reported their analysis of the first randomised study of the European Mantle Cell Lymphoma Network. This study had a median follow-up of 14 years (IQR 10–16) and compared consolidation with myeloablative radiochemotherapy followed by autologous HSCT with interferon alfa maintenance therapy among patients with mantle cell lymphoma in first remission. The aim of the study was to do post-hoc comparisons of progression-free survival and overall survival between the two randomised groups (the autologous HSCT group and the interferon alfa maintenance group) among responding patients and to look at subgroups by quality of remission or induction treatment. In total, 269 patients were enrolled; of which, 174 (93 [53%] were in the autologous HSCT group and 81 [47%] were in the interferon alfa maintenance group) were evaluable. The role of consolidation autologous HSCT in the pre-rituximab era was supported by Zoellner and colleagues' findings: the median progression-free survival was 3·3 years (95% CI 2·5–4·3) in the autologous HSCT group versus 1·5 years (1·2–2·0) in the interferon alfa maintenance group (log-rank p<0·0001; adjusted hazard ratio [aHR] 0·50 [95% CI 0·36–0·69]), and the median overall survival was 7·5 years (5·7–12·0) in the autologous HSCT group versus 4·8 years (4·0–6·6) in the interferon alfa maintenance group (log-rank p=0·019; aHR 0·66 [95% CI 0·46–0·95]). In the minority of patients exposed to rituximab (n=68), progression-free survival was not significantly different between the autologous HSCT group and the interferon alfa maintenance therapy group (3·4 years [95% CI 2·4–6·8] *vs* 1·7 years [1·4–5·9]; log-rank p=0·087; aHR 0·72 [95% CI 0·42–1·24]). Furthermore, the study reported no clear effect of autologous HSCT versus interferon alfa therapy on the risk of secondary myelodysplastic

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