

# LOOKING AFTER THE VEINS

Peter Jones

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World Federation of Hemophilia  
1425 René Lévesque Boulevard West, Suite 1010  
Montréal, Québec H3G 1T7  
CANADA  
Tel. : (514) 875-7944  
Fax : (514) 875-8916  
E-mail: [wfh@wfh.org](mailto:wfh@wfh.org)  
Internet: [www.wfh.org](http://www.wfh.org)

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Series Editor:  
Dr. Sam Schulman

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## Introduction

This monograph has been written primarily for people with hemophilia and their families. With suitable training, the best person to administer clotting factor replacement therapy is the patient himself or his parent or partner. This means that the patient's life does not have to be disrupted beyond the few minutes the treatment takes, and that delays between bleeding and treatment are avoided. Home therapy and prophylaxis become a way of life, and trips to the clinic and medical intervention are infrequent.

While it has always been a dream that one day advances in the science and technology of genetic manipulation will allow clotting factor replacement therapy to be given orally, rectally, by inhalation, via the skin or by subcutaneous injection, that dream is still a dream. The veins remain, literally, the lifelines of someone with hemophilia. Venepuncture and intravenous therapy continue to be the mainstays of hemophilia care. Like any other equipment used frequently in everyday life, the veins need appropriate care and maintenance.

## What veins do

The veins return blood to the heart from the body. They have a bluish colour because the blood flowing through them has lost its bright red, arterial colour by giving up oxygen to the tissues. This bluish colour is visible through the skin because veins have thin walls with little muscular support, and some of them lie just below the surface. Veins are thinner than arteries because they are relatively passive conduits of blood flow. In contrast, arteries must be muscular in order to promote blood flow and to contain pressure exerted on them as the heart pumps blood into the body's circulation system. Because veins lack muscle in their walls, they contain one-way valves to prevent blood pooling, especially in the legs.

Healthy veins are pliable and elastic. They usually have plenty of leeway to move within surrounding tissue, allowing body movement and injury avoidance. As we grow older, these defences falter. The vein walls become more friable and skin bruising is common. With aging, venepuncture is more likely to result in vein rupture and bruising because the tissues are now too lax to contain the spread of blood adequately. While poor vein care in a younger person with hemophilia does not advance these natural changes, it does make life more difficult by causing vein walls to harden or veins to thrombose as they clog up with old clots. In the worst scenario, a surgical cut-down is then needed for venous access, and the vein used is then out of action for life. That is because the vein must be tied off behind the cut made during the procedure in order to introduce the needle so that blood loss is prevented. With modern equipment, cut-down is rarely, if ever, needed and should only be resorted to when the patient's life is threatened and there is no alternative.

## Venepuncture

Venepuncture (sometimes spelt with an i, venipuncture) is the art of introducing a needle into a vein. The two most important factors in learning this skill are the frequency with which the procedure is performed, and the patience of the recipient and his helpers. Practice makes perfect - well, almost perfect, because everyone misses sometimes!

Within the context of a busy hospital department, it is sometimes easy for staff to dismiss venepuncture as a trivial everyday procedure of no particular importance to the patient. In someone with a chronic disorder, such as hemophilia, this is a mistake. Faced with the prospect of repeated venepunctures throughout life, a child experiencing all the consequent pain and distress from multiple botched attempts at entering a vein is hardly likely to trust healthcare workers and become a

willing partner in the promotion of his health. In medical language, bad practice will have a profound negative influence on future compliance. In everyday language, a child who has suffered physical abuse, for reasons he is not ready to understand, is not likely to want to return to the hospital. It is far more comfortable for him to hide bleeding episodes in an attempt to avoid treatment.

So, what are the rules of venepuncture?

They are simple.

**Do:** aim to reduce fear and promote security. Arrange the surroundings for maximum comfort for both patient and practitioner who should be seated whenever possible. Let a parent hold a child on his or her knee rather than trying to restrain him on a bed. The relevant limb should be adequately supported. The site should be well lit.

**Do:** choose the site of venepuncture to provide the minimum of discomfort for the patient. Do not use the limb that is the site of bleeding. If prolonged therapy is anticipated, use the left arm of a right-handed patient.

**Do:** go for a vein that allows the minimum of disturbance and secure taping of the needle after venepuncture. Needles or cannulae placed in the forearm or the back of the hand are more likely to survive long-term than those crossing joints such as the elbow or wrist.

**Do:** remember to reward a young child undergoing venepuncture by praising him and saying how brave he is.

**Do not:** hurry the procedure. Even in an emergency, a calm appraisal of the possibilities for venepuncture is more likely to yield success than blind attempts to access a hidden vein.

**Do not:** try to puncture or access jugular (in the neck) or femoral (in the groin) veins. This is dangerous in hemophilia because massive bruising may follow. (When there is no alternative, because life is threatened, these sites are sometimes used, but only under the most careful supervision over several hours).

**Do not:** despair if venepuncture fails for whatever reason. Even the most skilled healthcare worker misses a vein occasionally. Take a break, and then try again. If three attempts at venepuncture fail, someone else should take over.

**Do not:** forget to loosen the tourniquet before injection begins.

## Choice of vein

The most accessible and convenient sites for venepuncture are in the inside creases of the elbows, the forearms, the backs of the hands and, principally in babies, the scalp and feet. The procedure is most painful in the hands and feet; attempts at needling veins in the front (palm side) of a wrist are especially sore. First choice is for a visible vein with no associated bruising or inflammation. If sideways movement of the vein can be minimized, for instance by flexing the hand at the wrist when entering a hand vein, the technique is easier.

When a vein is not visible it can often be felt below the surface at an expected site, even through the protective fat of young children. Typically, a healthy vein has a full and resilient or "bouncy" feel once described by John Lanzon, a man with severe hemophilia, as "a bit like soft spaghetti."

There is no reason why the same vein should not be used repeatedly for venepuncture. Indeed, that is usual practice in hemophilia, as familiarity with and confidence in a particular site make repeated treatment or prophylaxis very easy. Most people with hemophilia prefer to use veins in the elbow region because needle marks are less visible to others than those on the back of the hand. Whichever the choice of site, it should be respected by healthcare workers when events demand hospital treatment by others.

Veins fill out and become more prominent if they are temporally squeezed shut above the site chosen for venepuncture. Either use hand pressure, or a tourniquet applied with the limb hanging down so that gravity helps blood fill the dependent vessel. Gentle stroking, slapping or flicking of the skin over the vein, warmth, and repeatedly making a fist or squeezing a ball

are other maneuvers that help. Some people like to rub a local anaesthetic cream into the skin before venepuncture; others find this unhelpful because it makes underlying veins less obvious.

### Preparation and technique

Careful attention to hygiene is an essential part of venepuncture procedure. The person giving the treatment, including the patient treating himself, should wash their hands with soap and water before laying out equipment on a clean working surface. It is common practice for hemophilia centre staff to advise that surgical/disposable gloves be worn at this stage and while performing the venepuncture. The skin over the chosen site should be swabbed with an antiseptic solution, typically chlorhexidine 70% in spirit. Most of the equipment will be in sterile packaging and this sterility must be maintained until injection is completed and the venepuncture site sealed. The technique involved is called "aseptic"; it simply means that the prepared skin and the exposed needle are never touched and any possible contamination is avoided. The rubber bungs in the tops of the clotting factor concentrate and diluent water bottles are usually sterile, provided they are not touched once their covers have been removed. If in doubt, the bungs should be wiped with antiseptic before puncture.

### Equipment

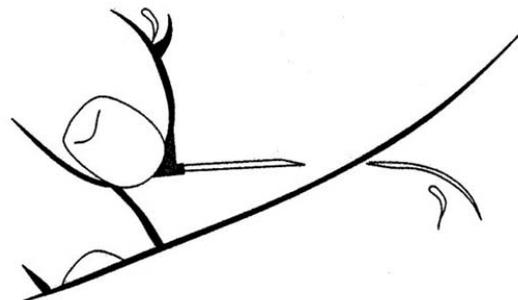
Nowadays, there is a wide choice of disposable equipment for venepuncture and replacement therapy, at least in developed countries. In developing nations, we know that attempts are made to reuse needles, cannulae and syringes. This practice is understandable, given the expense of disposable equipment within the context of a severely limited health budget, but it should be resisted. The attempted sterilization of equipment with small openings contaminated with dried blood is bound to have a high failure rate, and there is a real risk of transmitting infections including HIV and hepatitis. Reusing needles, cannulae and syringes is not a recommended or safe practice in any country.

While any needle or cannula may be used for hemophilia treatment, the best device for everyday use, both in children and adults, is the disposable small vein or butterfly set. The

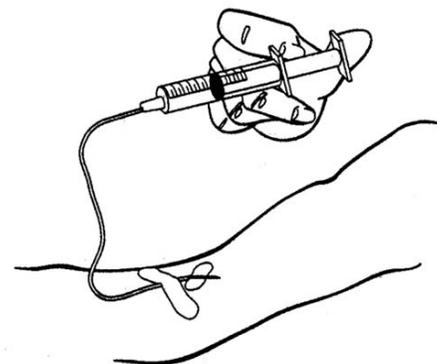
needle is so sharp that introduction through the skin is virtually painless. The wings provide a good grip and allow for precise placement into the vein and, once opened flat, allow for good fixation if they are taped to the skin when prolonged or repeated injection is expected. Once in place, the device is so comfortable that it becomes unnoticeable to the patient. The size of needle chosen depends on the size of the patient. Whatever the decision, hemophilia replacement therapy may be given quickly by syringe, pump or drip, especially when concentrate is used.



With the tourniquet applied and a vein identified, the skin over the vein is wiped with an antiseptic swab.



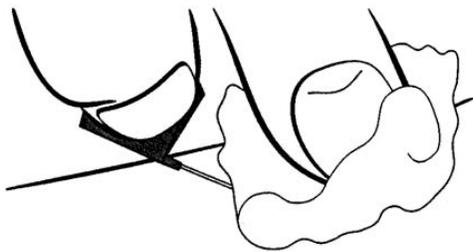
Holding the butterfly wings, the needle is introduced into the vein with the bevel facing upwards.



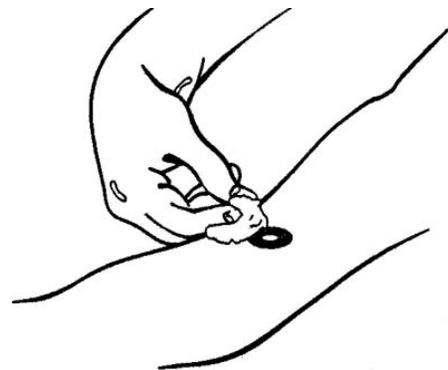
Injecting the reconstituted concentrate. Note that the sticky tape is over the tubing and not over the butterfly itself. This makes for easier withdrawal once the injection has been given. Fixture over the wings of the butterfly is used for more permanent infusions. Note that the tourniquet has been removed before injection.

## Promoting vein health

A controlled, smooth and continuous movement should be used when withdrawing a needle from the vein. No pressure should be placed over the puncture site *during* withdrawal. This is because pressure over the moving needle within the vein may damage its wall or even strip the lining, making early repeat venepuncture impossible. Gentle pressure should be applied immediately the needle is clear of the skin, and maintained for around five minutes to prevent bruising. When an elbow vein has been accessed, the arm should be kept straight while this pressure is applied. The vein may open up again afterwards with resultant bruising if the elbow is bent over a cotton wool swab instead. A clean, non-allergenic dressing should be applied to the site. It can be removed after an hour or two, most comfortably when bathing.



Withdrawing the needle after injection. Once again the butterfly wings are used. As the needle tip leaves the skin, pressure is put on the cotton wool ball.



Pressure is maintained over the vein for 2 or 3 minutes and then a sticky plaster applied. Note that the arm is straight at the elbow. Trying to seal the vein by pressure with the elbow bent does not always work (see text).

The skin over a vein that has been used for repeated venepuncture becomes tough and rough with time. The daily application of a lanoline cream helps keep it smooth and pliant, and makes the injection site less obvious to a casual observer.

Veins that are associated with inflammation, reddening of the overlying skin, or are sore to touch should not be used. These signs are suggestive of localized infection and thrombophlebitis. Further injury may result in long-term or even permanent loss of the affected vein for venepuncture. Although the deficit is made up by the gradual development of bypass channels, these are never as good as the original vein for access. Whenever thrombophlebitis occurs, it should be treated energetically with appropriate local pain relief and antibiotics and, when indicated, steroid medicines.

The development of good veins is aided by the development of good supporting muscles. Regular use of a grip exerciser or the repeated squeezing of a rubber ball are simple ways of achieving this.

## Implanted devices

People with severe hemophilia or von Willebrand disease need frequent injections of clotting factor concentrate into their veins, both to treat bleeds and for prophylaxis.

Venepuncture is not always easy or possible, particularly in childhood when the veins are developing and often small and invisible under subcutaneous fat. In adults, the veins are sometimes "worn out" after years of treatment, often following more than the usual replacement therapy, for instance in people with inhibitors on immune tolerance. When veins become too difficult to access on a regular basis it can be very distressing for everyone involved, especially the patient.

There are many reasons why venous access is not possible and another form of access is medically necessary. There are a number of implantable devices that can be used in these situations, one of which is called a Port-A-Cath. This is a type of catheter with a port at one end. Once inserted into a vein the port allows frequent access for treatment without the need for further venepuncture.

In circumstances like these, the medical team may recommend that a Port-A-Cath be fitted. The implications of a port being fitted should be discussed fully, as there is a risk of bleeding and infection. Fitting a port is a surgical procedure

carried out under general anaesthetic. The catheter is inserted into a vein in the neck, with one end threaded close to the heart. The port is fitted to the end of the catheter in the chest. The port opening lies just under the skin at the front of the chest. The patient usually stays in hospital for a number of days following this procedure, both in order to ensure no post-operative bleeding, and to allow the patient or his relatives to learn how to inject into, and care for, the device.

For some parents of young children a port can help them to get used to the idea of injecting treatment into their child. There is nothing more stressful than trying to access the vein of a screaming child who has to be held and restrained whilst treatment is administered. Some parents have said that a port has allowed them the freedom and independence to get on with their lives. The Port-A-Cath should not be seen as a long-term solution for parents who have children on home treatment, as one day they will need to know how to access a vein to treat their child. On average, the device is left in place for up to four years.

It must be appreciated that there are some potential problems associated with the use of these devices. They can become infected if the correct hygienic procedures are not followed. Infusions of factor need to be given with strict aseptic technique, including local disinfection, hand washing and the use of sterile gloves.

If a Port-A-Cath becomes infected it may be necessary to replace it. This means another surgical procedure to remove and replace the port. Other problems include damage to the port or tube with rupture or line fracture, which means that the catheter has separated from the port and treatment cannot be administered. Again, the port needs to be replaced. Finally, thrombosis in the catheter, or within the vein in which it lies, is also being recognized increasingly.

When regular venous access becomes really difficult – typically in a young child on prophylaxis – the use of a long line or implantable device may be necessary. Whilst the detailed use of Port-A-Caths and similar devices is beyond the scope of this article, it is worth noting that they can be lifesaving, of immense

long-term benefit, simple to use, comfortable and easy to live with. They can make regular prophylaxis possible from an early age, and free families from anxiety about inhibitor control and regular venepunctures. On the down side, they can also be associated with local infection, septicaemia and thrombosis. For these reasons, the decision to implant a device should never be taken lightly, and should always be based on an assessment of the patient's individual needs.

In adults with poor venous access, the surgical construction of an arterio-venous shunt is an alternative to the use of indwelling devices. The shunt is formed between a small artery and an adjacent vein in the forearm. The subsequent localized increase in venous pressure presents a readily accessible site for repeated treatment.

## Disposal of equipment

The safe disposal of equipment following venepuncture is essential in order to protect others from transfusion-related disease. Needles should never be resheathed (put back into their original plastic covers) before disposal, because experience has shown that most needle-stick injuries occur when this is attempted. Any sharps used, including needles or small vein sets, must be placed into a rigid disposal box. If the box is large enough, it is easier to discard the attached syringe at the same time. All other equipment, including swabs and used bottles, should be bagged for disposal by the clinic or hospital. Used equipment should never be discarded in the household waste.

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