

Guidelines and instructions for venous blood collection.



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To this day, venipuncture is barely dealt with during study courses; however, it is precisely in this area where medical staff are subject to particularly critical evaluation by patients. Therefore, it is important to adopt the best and most stable technique possible for taking blood samples in all situations.

Before taking a blood sample, the top priority is to be fully familiar with the respective collection system and products used. Handling equipment that you are not familiar with not only comes across as unprofessional, but also increases the patient's anxiety, which in turn has a negative effect on the condition of the patient's veins. For training purposes, demo arms are provided so that venipuncture can be practiced as often as necessary.

This guide is intended to help you to correctly perform blood collection and make proper use of the various collection systems. With thorough training, you will soon develop the required skills.

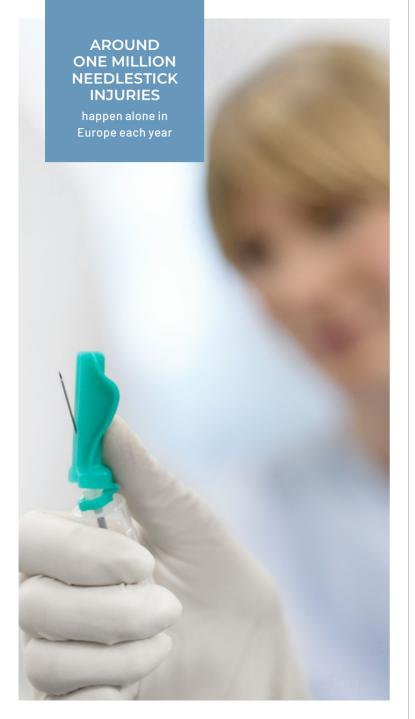
These guidelines are recommended by Greiner Bio-One. The content of the guidelines is based on international standards and current specialist literature. Please comply with the regulations in your facility and in your country.

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THE TOPIC OF HEALTH
AND SAFETY IN THE
WORKPLACE SHOULD BE
IMPORTANT TO ALL PEOPLE
WORKING IN THE HOSPITAL
AND HEALTH SECTOR.

Blood collection is also a potential source of injury to staff and patients. For this reason, a detailed description of each step follows.

The main objective of social policies in the European Union is an improvement in working conditions. For this purpose, COUNCIL DIRECTIVE 2010/32/EU was drawn up for the prevention of injuries from sharp/pointed instruments in the hospital and healthcare sector.



WORKPLACE SAFETY

THE HEALTH AND SAFETY OF EMPLOYEES IS OF UTMOST IMPORTANCE AND IS CLOSELY ASSOCIATED WITH THE HEALTH OF THE PATIENT.

The purpose of the COUNCIL DIRECTIVE 2010/32/EU for the prevention of injuries from sharp/pointed instruments is:

- / to create the safest possible working environment
- / to avoid injuries to employees by sharp/pointed medical instruments (including needlestick injuries)
- / to protect exposed employees

The use of sharp/pointed medical instruments with integrated protection mechanisms is therefore an important point.

The training and instruction of medical staff regarding the correct use of sharp/pointed medical instruments with integrated protection mechanisms is the focus of the EU Directive.

USE OF PLASTIC TUBES

By using plastic (PET) tubes instead of glass, tube breakage - and therefore the risk of injury due to broken glass - is virtually eliminated.

BEFORE BEGINNING
WITH THE BLOOD
COLLECTION,
A NUMBER OF
STEPS ARE TO BE
CARRIED OUT, SUCH
AS PREPARING
THE WORKPLACE,
POSITIONING THE
PATIENT CORRECTLY
AND SELECTING THE
PUNCTURE SITE.

There are a number of things to keep in mind in order to make this as safe and stress-free as possible for both the healthcare staff and the patient.

REQUIREMENTS FOR BLOOD COLLECTION



PATIENT'S RESPONSIBILITIES

- / Many tests require the patient to fast.
- / The patient should not smoke prior to blood collection.
- / No sport or major physical exertion.
- / Consult the doctor before taking any medication.
- / For better comparability with previous laboratory results, blood collections should always be carried out at the same time of day.

Patient preparation may vary depending on requirements.



MEDICAL STAFF RESPONSIBILITIES

- / Making contact
- / Patient identification
- / Documentation of special diets and allergies
- / Explanation and consent
- / Hand disinfection

The next steps are described on the next pages.

PREPARED WORKPLACE

Each patient is different and has individual requirements for blood collection.

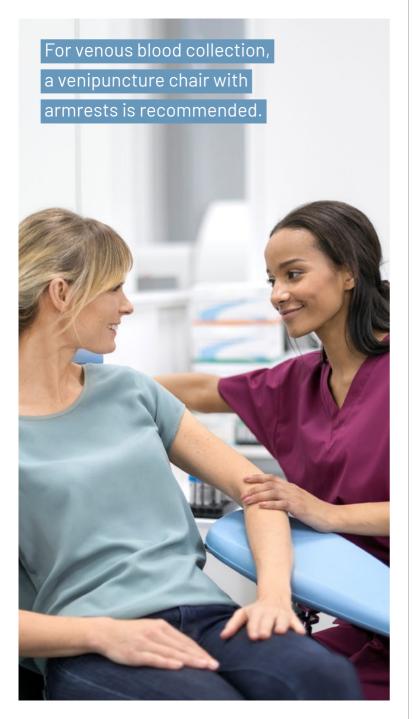
Therefore it is important, that a range of blood collection products are available at the workplace to enable the most appropriate combinations to suit the patient's characteristics as well as to meet the laboratory and test requirements.

REOUIRED MATERIALS

- / Blood collection system: VACUETTE®
- / Tourniquet
- / Gloves
- / Swahs
- Disinfectant
- / Dressing material/sticking plasters
- / Sharps-proof disposal container



Various products should be available at the workplace in order to be able to select them individually.



POSITIONING THE PATIENT

With a venipuncure chair with armrests, it is possible to position the patient in both a sitting and reclining position and thereby ensure the patient's safety.



If a venipuncture chair is not available, the patient can also be placed in a sitting or lying position. In any case, it is important that there is enough space to be able to move the patient in an emergency situation.

It is also important to note that the patient should not make any rapid movements during the few minutes leading up tp blood collection.

PUNCTURE SITES

PRIORITY LIST

Prior to the venipuncture, the puncture site must be selected. The veins on the inside of the elbow are almost always suitable for blood collection; the veins in the back of the hand should be considered as a second choice. Puncture in these regions is successful in about 95% of patients.

The course of the veins can be made visible by using special vein visualization equipment.



1. Inside of the elbow



2. Back of the hand



3. Alternative puncture sites

ROUTINE PUNCTURE SITES

INSIDE OF THE ELBOW

Prior to the puncture, both arms must be examined and one vein selected, if possible on the non-dominant arm. If the patient prefers to have the puncture on a certain arm, this request should be granted.

The inside of the elbow is positioned on a stable support. The elbow joint should not be fully extended. When the elbow is fully extended the veins are suppressed by the meeting of the joint and the skin tension.



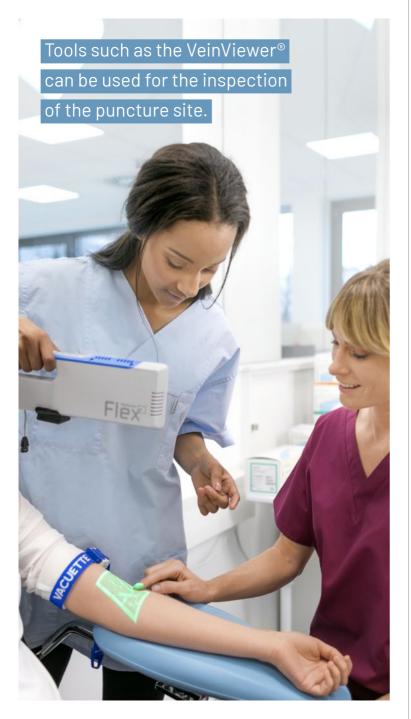
BACK OF THE HAND

As a right-handed person, use your left hand to take the patient's hand to be punctured, which is in a neutral position.
The skin is gently stretched

in a distal direction.



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INSPECTION OF THE PUNCTURE SITE

Before you decide on a puncture site, the limb must be inspected for injuries.

A suitable puncture site is selected on the basis of these criteria.

In this region, an initial palpation (feel) is carried out, as a vein should not be selected solely based on its appearance. The condition of the vein to be punctured is vital when selecting which product to use, the position of the person taking the blood sample and the angle of needle insertion.

EXCLUSION CRITERIA*

include severe scar tissue, haematoma, and lymphatic congestion after mastectomies.

*CLSI GP 41 A7, S. 17

OPTIMAL VIEW OF THE VEINS

USING THE EXAMPLE OF THE INSIDE OF THE ELBOW

There are various ways of making the veins easier to find:



Tourniquet (see next page)



Slightly bent arm



Arm hanging down and positioned on stable support



Stretching the skin



Ball the hand into a fist (do not pump)



Warmth (arm bath or heat cushion)



TOURNIQUET

The use of a tourniquet is recommended to prioritise a vein and select a puncture site for the needle. A tourniquet is not necessary if the vessel is large and easy to feel and, therefore, also easy to puncture.

APPLICATION

The tourniquet is applied with a little pressure 7.5–10 cm above the puncture site. With optimal application of the tourniquet, the pulse should be easy to feel.

DURATION

The tourniquet should not be applied for longer than one minute in total.

If the steps for the vein selection, disinfection and puncture last longer than one minute while a tourniquet is applied, the tourniquet must be released for two minutes to avoid haemoconcentration.

Ideally, the vein blockage should last for the shortest possible amount of time and can be applied with a tourniquet or blood pressure cuff.

Once blood enters the tube following a successful puncture, the tourniquet should be released.

A VEIN BLOCKAGE TIME THAT IS TOO LONG

particularly affects the protein values, cell counts, lipids and other substances associated with proteins. In addition, long vein blockage times can lead to haemolysis and thereby alter the red blood cell indices.

IDEALLY, THE VEIN BLOCKAGE

lasts for the shortest possible amount of time and is 40 mmHg.

TOURNIQUET PRESSURE

The tourniquet pressure should be 40 mmHg. A higher pressure would impair the arterial blood flow to the limb.

A tourniquet pressure of 40 mmHg is higher than the venous vascular pressure, but an almost undisturbed arterial blood flow is still possible.

A low tourniquet pressure is also essential for the differentiation and prioritisation of the vessels. The higher the tourniquet pressure, the shallower the pulsation wave becomes, until it is not palpable at all once it reaches or exceeds the systolic blood pressure.

With an optimal tourniquet pressure, the vein to be punctured will be completely filled by the arterial blood flow. Following a successful puncture, the blood collection tube fills up easily.

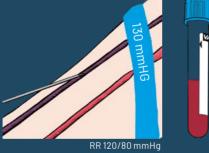
CAUTION - TOO TIGHT A BACKPRESSURE

In the case of poor vein conditions, the tourniquet is often applied too tightly, so that the tourniquet pressure gets close to or exceeds the arterial blood pressure. This leads to problems when collecting venous blood.

If the systolic blood pressure is exceeded, the vein to be punctured can no longer be filled with blood, as a stricture occurs.

If a blood collection tube is used in such a situation, it sucks the vein empty, the vessel collapses and the tip of the needle adheres to the vein wall.





Optimum back pressure: Vein fills, tube is easily filled up to the filling

mark.





TIP TO DEVELOP A GOOD FEEL FOR THE CORRECT PRESSURE:

We recommend applying a tourniquet to one arm and a blood pressure cuff on the opposite side at 40 mmHg.

The blocked veins can now be compared on both arms. The pressure in the arteries is 120/80 mmHg; in the veins it fluctuates between -5 to 20 mmHg.



A fully filled vein feels elastic and has a springy resistance upon palpation.

PALPATION

The vein should be felt with the forefinger and/or middle finger. The thumb is not suitable, as it has its own pulse.

Using a low tourniquet pressure, the vein will be well filled, easily palpable and easy to puncture. A fully filled vein feels elastic and has a springy resistance upon palpation. The vein is normally punctured in the centre of the angular point.

VEIN OR ARTERY?

Arteries can be distinguished because they pulsate when the tourniquet pressure is correct. When the tourniquet pressure exceeds the systolic pressure, the arterial flow is cut off and pulsation stops.

VEIN OR TENDON?

It is often difficult to differentiate the vein from a nearby tendon as tendon tissue feels hard upon palpation. For more accurate differentiation, the patient should move the lower arm and hand. If the right muscles are tensed, the tendon clearly moves with them.

WHY PALPATE?

The information obtained from palpation results in the optimal product combinations and recommendations for action:

Position of the vein (course)

- / Optimal position of the person doing the puncture
- / Puncture site (below the elevation of the vein)

Depth of vein

- / Needle length
- / Puncture angle
- / Insertion depth

Size of the vein

- / Needle length
- / Needle size
- / Insertion depth

ANGLE VS NEEDLE LENGTH

The optimal angle can often be achieved with a short needle with a length of 25 mm (1"). For deeper tissue or a wider tube holder, a longer cannula of 38 mm (1.5") can also be used.

DID YOU KNOW?

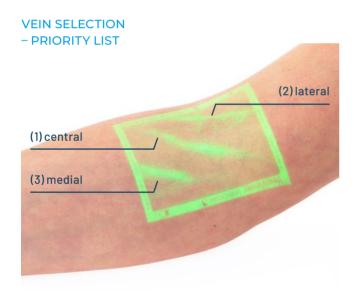
The needle size is also indicated in gauge (G), which means "measuring rod".

The higher the G number, the thinner the outer diameter of the blood collection needle. This, along with the standardized colour coding, helps to quickly identify the correct needle depending on the vein conditions.



VEIN SELECTION

Based on the information obtained through palpation, the most suitable vein for puncture can be identified and the appropriate products and combinations can be selected for blood collection.





DISINFECTION OF THE PUNCTURE SITE

The puncture site must be thoroughly and carefully disinfected immediately prior to the puncture. The skin is wiped with disinfectant in a spiralling motion from the inside towards the outside.

Please note the (minimum) application time in the product description of the skin antiseptic.

Always observe the manufacturer's instructions and the regulations in your facility.

DON'T FORGET!

The wearing of gloves is mandatory for each procedure carried out (caution: hepatitis, HIV).

VENIPUNCTURE

BASED ON
PALPATION, THE
MOST APPROPRIATE
VEIN AND PRODUCTS
WERE SELECTED.
THE VEIN IS NOW
PUNCTURED.

The use of safety products is recommended in order to minimize the risk of needlestick injuries.

The skin and the vein are held in place by being stretched with the thumb. This enables accurate penetration of the skin and prevents the vein from "rolling".



NFFDI F INSFRTION

The needle is inserted at an angle of ≤ 30 degrees with the preferred hand of the person taking the blood. When doing this, the needle tip is facing upwards. The patient should be made aware of the imminent needle insertion.



In a successful puncture, a decrease in resistance is felt when penetrating the vein wall. The insertion depth can vary depending on the patient and the selected vein.

FOR A VISUAL PUNCTURE CHECK

use our VACUETTE® VISIO PLUS cannula with transparent viewing window.





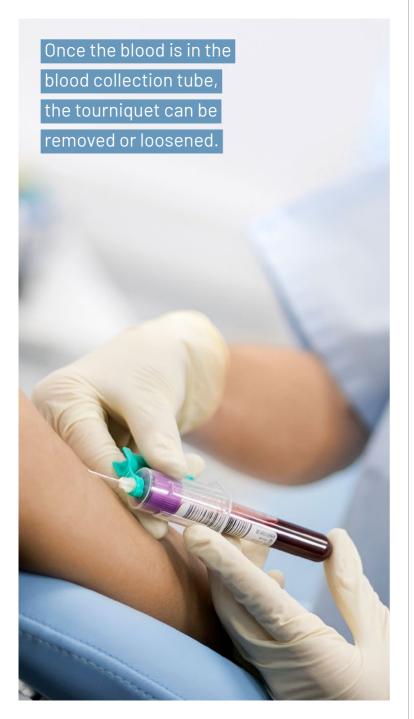
RECOMMENDED HAND POSITION

Hold the tube holder using your preferred technique. However, always ensure that the rear opening and the grips of the tube holder are freely accessible, so that the blood collection tube can be easily inserted and pulled out later.



Hold the tube holder with the thumb and forefinger in the preferred puncturing hand. Using your free fingers, you can support the patient's arm and hold it in place. This way, the tube holder and the cannula can be easily inserted and accurately adjusted.

This avoids making any further movements of the cannula in the vein, which can cause pain and injury.



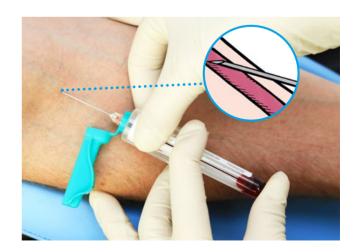
INSERTING THE TUBE

Using your free hand, push the blood collection tube into the holder. Any unnecessary hand changes should be avoided.

The forefinger and middle finger are positioned on the gripping strip of the tube holder, while the tube is inserted with the thumb.



The rear end of the cannula pierces the stopper in the cap and the blood flows into the tube. This hand position prevents any cannula movement while inserting and pulling out the blood collection tube.



CORRECTIVE ACTION IN THE EVENT OF **WEAK OR NO BLOOD FLOW**

If blood is only flowing into the tube hesitantly or not at all, there may be various reasons for this. There is no general solution for this problem, it must be responded to individually. Once this has become routine, you will develop a feeling for the varying situations and be able to react intuitively.

Minimal re-positioning of the cannula under suction (with the tube inserted) can often be sufficient to activate the blood flow.



However, in the event of bigger manipulations, it is necessary to remove the tube from the holder. In this way, the suction from the vacuum is interrupted and no longer acts on the cannula opening in the tissue.

The utmost caution is required for any kind of manipulation.

INCORRECT CANNULA POSITIONING AND SOLUTION POSSIBILITIES

Cannula outside the vein Insert the cannula further





Cannula next to vein

Pull the skin taut. hold the vein in place: alter cannula position accordingly

Needle tip not fully inside vein > haematom

Insert the cannula further; possibly stop procedure



Needle tip not fully inside vein > haematoma; possible nerve damaae

Gently withdraw the cannula; possibly stop the procedure

Needle tip completely penetrated through vein

Slowly withdraw cannula (possibly under vacuum)



Needle tip partly outside tissue > loss of vacuum

> Insert cannula further: use a new tube

Needle tip is on the vein wall and is incorrectly Gently alter cannula

facing downwards position; possibly remove tube



Needle tip is on the vein wall

> Gently alter the cannula position; possibly remove



Gently alter the cannula position; possibly remove the tube





Collapsed vein

Loosen tourniquet; remove tube: wait a short time

PULLING OUT THE TUBE

When pulling the tube out of the holder, it must be ensured that the cannula is kept in the same position.

This is achieved by placing the thumb on the grips of the holder and grasping the filled tube with the remaining fingers. The tube is then pushed out of the holder with the thumb.



A steady hand position is also important, as several blood collection tubes are usually used. These should be taken in the following sequence.

ORDER OF DRAW



If a winged blood collection set is used, the first tube in the series will be under-filled. Therefore, if a Sodium Citrate specimen is drawn first, a tube without additive is recommended to be drawn prior to this tube to ensure the proper additive-to-blood ratio.

In addition, even though studies have shown that PT and aPTT tests are not affected if drawn first in a tube series, it is advisable to draw a second tube for other coagulation assays, since it is not known whether or not these tests will be affected. (CLSI GP41-A7 Order of Draw S. 26)

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INVERSIONS

Each tube must be inverted immediately on removal.

Coagulation tubes should be inverted around 180 degrees
4-5 times and all other tubes 5-10 times.

There are a few exceptions, such as FC Mix tubes, which contain a powder and must be inverted 10 times. For anticoagulants or coagulants to be effective, good mixing by "overhead" inverting is necessary - do not shake.

The air bubble should be clearly visible going from top to bottom and vice versa when inverting the tube.



PRACTICAL TIP

Inverting each tube 5 times is correct for most tubes.

REMOVING THE CANNULA

Before the cannula is removed from the vein, the tube must be removed. A clean swab is placed over the puncture site and held in place with a finger. Without applying pressure at the puncture site, the cannula is withdrawn in one smooth movement.



Pressure is only applied once the cannula has been completely removed.



WHILE THE CANNULA IS BEING REMOVED FROM THE VEIN, PRESSURE MUST NOT BE APPLIED ON THE SWAB.

The cannula tip would cut open the rear vein wall and cause pain as well as a large haematoma.

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PLEASE OBSERVE THE INSTRUCTIONS FOR USE

at www.gbo.com

ACTIVATING THE SAFETY MECHANISM

Safety Products can be assigned to two categories:

ACTIVE DEVICES.

WHICH REQUIRE ONE OR TWO-HANDED ACTIVATION OF THE SAFETY MECHANISM.

- / Safety products whereby the safety mechanism is activated manually. (slide/tilt protection)
- / Safety products that have a semiautomatic safety mechanism.



VACUETTE® QUICKSHIELD

PASSIVE DEVICES. WHICH WORK AUTOMATICALLY THROUGHOUT USAGE.

- / Safety products whereby the safety mechanism is activated after the needle is removed from the vein.
- / Safety products whereby the safety mechanism is activated while the cannula is still inside the vein.



VACUETTE® EVOPROTECT



DISPOSAL

Needlestick injuries are a particular risk during the disposal of sharp or pointed objects. To reduce the risk for the user to a minimum, only containers specifically for this purpose should be used.

Furthermore, the safety mechanism of the safety product should be activated prior to disposal.



CARING FOR THE INSERTION SITE

The patient can normally take over the compression themselves. The pressure should be maintained for 3–5 minutes – or until the bleeding has stopped. If the patient is too weak, the person carrying out the puncture or an assistant must ensure appropriate compression is maintained.



When doing this, the arm is extended and may be positioned facing upwards. Bending the arm may lead to blockage of the vessel again and cause a haematoma to form. The formation of a haematoma after blood collection is unpleasant for both the patient as well as the person taking the blood and is a complication that can generally be avoided. The wound dressing is only applied once bleeding has stopped.

For patients receiving anticoagulation treatment, good manual compression is vital. One minute too many is better than one minute too few!

ATTENTION!

Physical exertion or strain on the affected limb too soon can cause bleeding or bruising.



BLOOD COLLECTION FROM VENOUS CATHETERS

Blood collection directly from an IV catheter is an option as long as the intended use of the catheter allows this.

Accessories with Luer lock or Luer slip connectors are recommended for this.



Luer-Lock on the example of the VACUETTE® SAFELINK



Luer-Slip on the example of the HOLDEX® Single-Use Holder

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TUBE LABELLING AND SAMPLE TRANSPORT

Clear labelling with the patient's reference data and the information required for the laboratory is essential. In order to avoid mix-ups, you should try to label the tube in the presence of the patient.



If a tube is labelled with an adhesive label, it must be applied in such a way that the blood flow remains visible and the filling level can be checked.



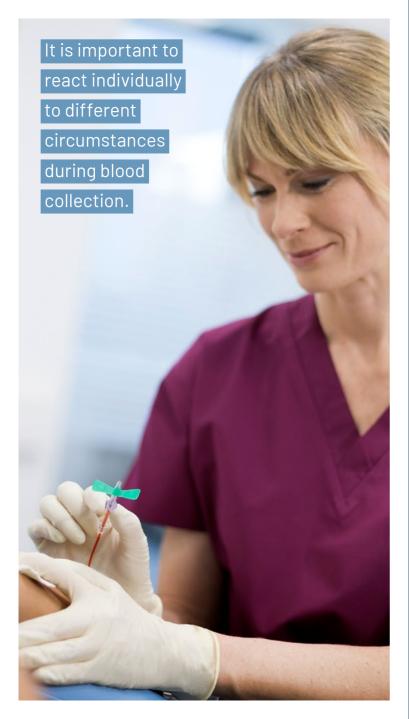
AS AN ALTERNATIVE TO STICKING A LABEL ON THE TUBE, PRE-BARCODED **BLOOD COLLECTION TUBES** CAN BE USED.

In conjunction with the corresponding software, all the necessary information for the laboratory is automatically documented. Errors are reduced, working steps are reduced and complete traceability is ensured.

SEVERAL FACTORS
INFLUENCE BLOOD
COLLECTION. FOR
EXAMPLE, POOR
VEIN CONDITIONS,
COLD, OR SHOCK
CAN MAKE THINGS
MORE DIFFICULT.

It is therefore important to create a pleasant atmosphere for the patient and to have a wide range of different products to choose from in order to be able to react individually to different circumstances.

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COMPLICATING FACTORS FOR VENIPUNCTURE

There are many unfavourable factors which negatively impact on blood collection.

Stress can lead to vasoconstriction in anxious patients. It is therefore important to create a pleasant atmosphere.

Even if just the room temperature is too low, there could be a negative effect on venipuncture.

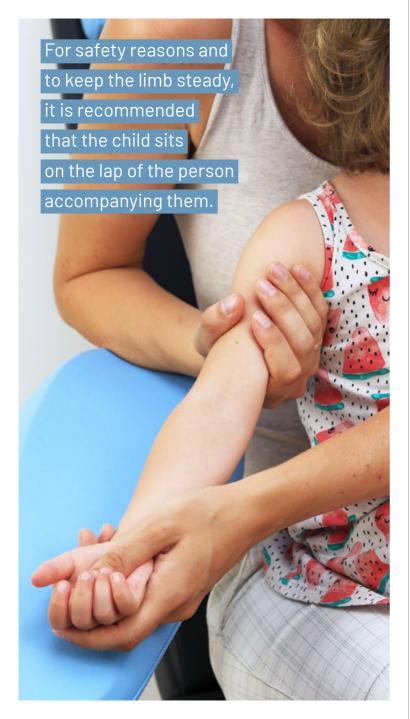
ADDITIONAL FACTORS:

- / thin veins
- / delicate veins in children
- / veins punctured multiple times
- / rolling veins
- / anxiety
- / cold temperature
- / vasoconstriction
- / volume deficiency
- / pre-shock/shock
- / long-term treatment with steroids
- / cachexia

THERE IS BARELY
ANY TECHNICAL
DIFFERENCE IN
BLOOD COLLECTION
IN SMALL CHILDREN
AGED FROM ABOUT
TWO YEARS OF AGE
IN COMPARISON TO
THE PROCEDURE
FOR ADULTS.

However, it is especially challenging in small children and requires experience and sensitivity.

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Principally, a quiet and friendly atmosphere is important for very young patients. Children cooperate much better when they are given an explanation of what is going to happen to them.

POSITIONING OF THE PATIENT

For safety reasons and to keep the limb steady, it is recommended that the child sits on the lap of the person accompanying them. Reflex movements can be counterbalanced in this way.

TOOLS AND PRODUCT SELECTION

The use of local anaesthetics and agents to stimulate the blood flow can make the procedure easier.

The collection system must be adapted to the small size of the vessels. The puncture is made using a fine safety blood collection set or safety tube holder.

The use of thin cannulas from 22G with viewing window and blood collection tubes with a reduced volume is recommended. In order to avoid iatrogenic anaemia, the blood volume taken should be kept low and documented.

If required, a children's tourniquet or a child-sized blood pressure cuff can be used.

PRACTICAL TIP

Inform the young patient about the forthcoming "stick".

ROUTINE PUNCTURE SITES IN SMALL CHILDREN

PUNCTURE ON THE INSIDE OF THE ELBOW

When puncturing the inside of the elbow, the accompanying person holds down the child's arm. The cannula is inserted into the vein at a maximum angle of 30 degrees. VACUETTE® blood collection tubes are then used in the recommended order of draw. The accompanying person closely observes the child during the blood collection and reacts to spontaneous movements.



PUNCTURE ON THE BACK OF THE HAND

The puncture hardly differs at all from the procedure with adults, except that the accompanying person keeps the child's lower arm steady during the whole procedure. As a right-handed person, the person taking the blood uses their left hand to take the hand to be punctured, which is in a neutral position. The skin is gently stretched in a distal direction.



PUNCTURE ON THE BACK OF THE FOOT

The accompanying person keeps the child's leg steady during the whole procedure. As a right-handed person, the person taking the blood uses their left hand to hold the foot to be punctured. The toes are gently pulled downwards. This provides the required skin tension for optimal needle insertion.



IN ADDITION TO
CAPILLARY BLOOD
COLLECTION IN
NEWBORNS OR
INFANTS, VENOUS
PUNCTURE MAY ALSO
BE NECESSARY.

This can prove difficult due to the condition of the veins. The usual puncture sites are scalp veins which are easily visible.

Just like with small children, the blood collection system must be adapted to the small size of the vessels. The puncture is made using a fine safety blood collection set or safety tube holder.

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Needle insertion on the head may be perceived as dangerous by the parents, which is why it is helpful to explain the procedure to them in a sensitive manner.

ROUTINE PUNCTURE SITES IN NEWBORNS AND INFANTS

HEAD VEIN PUNCTURE

The baby's head can be positioned and restrained by an accompanying person in various ways and depends on the venipuncture site. When doing this, it is important that the head is well restrained, but spontaneous body movements are also prevented.

By "combing", the head hairs can be parted and the best vein for puncture can be selected. Fine hairs can be fixed in place during disinfection. In the case of a thick head of hair, it is recommended that the puncture site is shaved.

The skin under the puncture site is stretched with one finger on the free hand.





FURTHER INFORMATION ON OUR PRODUCTS

can be found on our corporate website www.gbo.com.

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