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Nursing Guide

Port Care and Port Access Procedure

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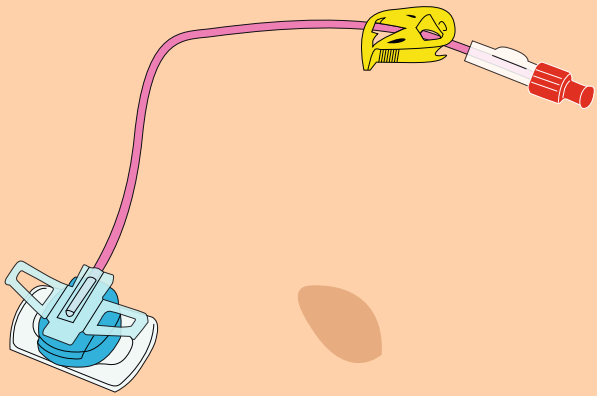

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Dear nurses, dear physicians,

for **long-term intravenous treatment of patients** (e. g. in oncology or nutritional medicine), safe, long-lasting intravenous access for the **administration of drugs, nutrition, transfusions or for blood sampling** is critical. Totally implanted port systems have been used reliably for many years for these purposes. Port systems offer caregivers and physicians several advantages and can significantly improve the quality of life of patients[1].

This brochure is designed to educate caregivers on the **design, indications as well as care and maintenance** of this port system. Additional information on the proper use of this port system during infusion therapy will also be provided in order to educate both caregivers and patients.

This nursing guide utilizes current **best practice guidelines and clinical literature** to supplement facility-based protocols and instructions.

Your pfmmedical team

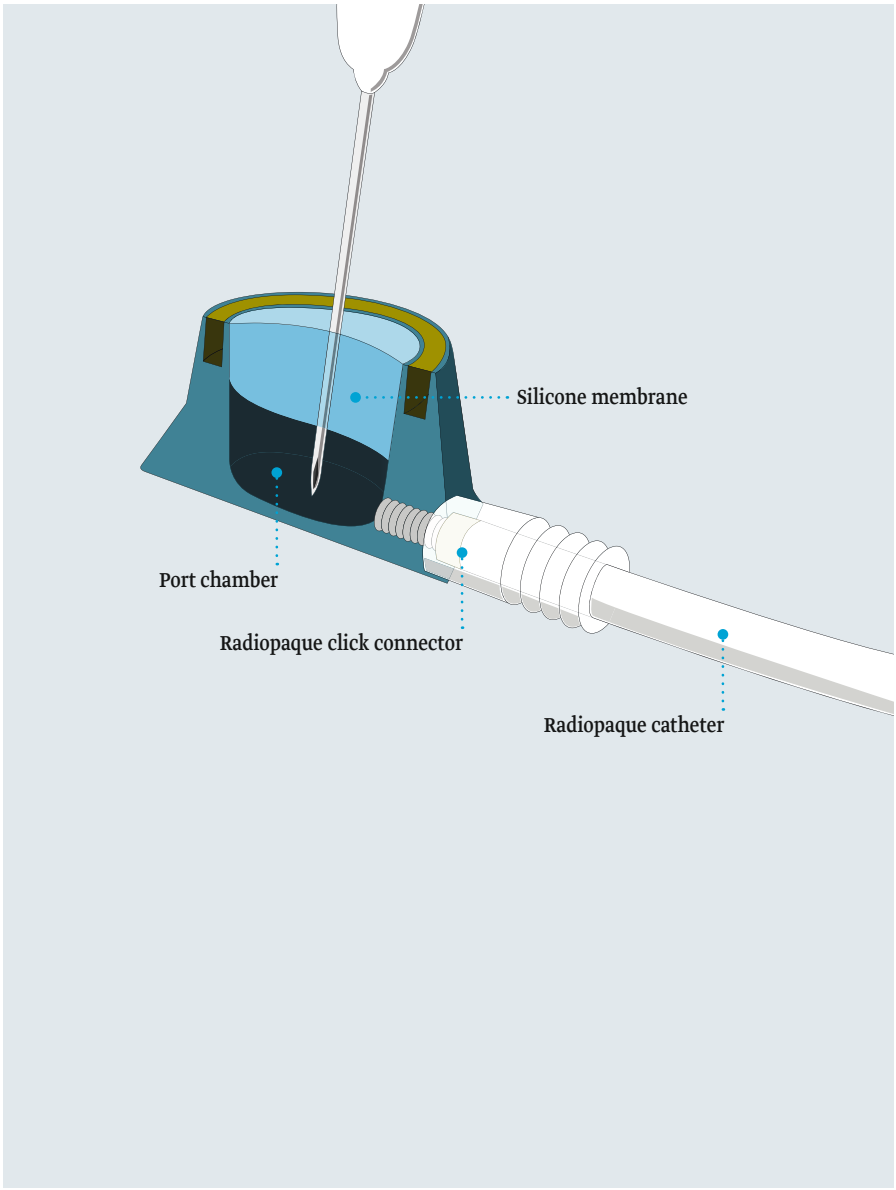
General information

Design of the port system

A port is a permanent, implantable catheter system that consists of a port chamber which is sealed with a thick silicone membrane (septum).
The port body either consists of **plastic, titanium or a combination of both materials.** The port body is attached to a catheter with the help of a radiopaque click connector. The catheter is either made out of silicone or polyurethane (PUR).

Thanks to these special materials, the system can easily remain in the body for years before it should be exchanged or removed if necessary[1].

During insertion procedure, the port system is placed in the vascular system, whereas the catheter is advanced to the right atrium of the heart. The insertion is performed completely subcutaneously so that the body can be easily palpated from the outside. The port can be accessed by using a special needle. By accessing the port through the silicone membrane, the applied drugs and fluids enter the bloodstream directly via the catheter.


Silicone membrane
Port chamber
Radiopaque click connector
Radiopaque catheter

Indications and contraindications of the port system

The fully implantable port lies subcutaneously and is designed for repeated vascular access. Port systems are primarily indicated for patients who may need the following infusion therapies delivered over a longer period of time:

- drugs (e. g. cytostatics)
- infusion solutions (e. g. NaCl)
- blood products
- parenteral nutrition
- contrast media (only used with port systems that are indicated as power injectable) with a flow rate from up to 5 mL / s at a pressure of less than 20.7 bar

In case of poor vein conditions, implantable port systems can also be used for blood collection[2].

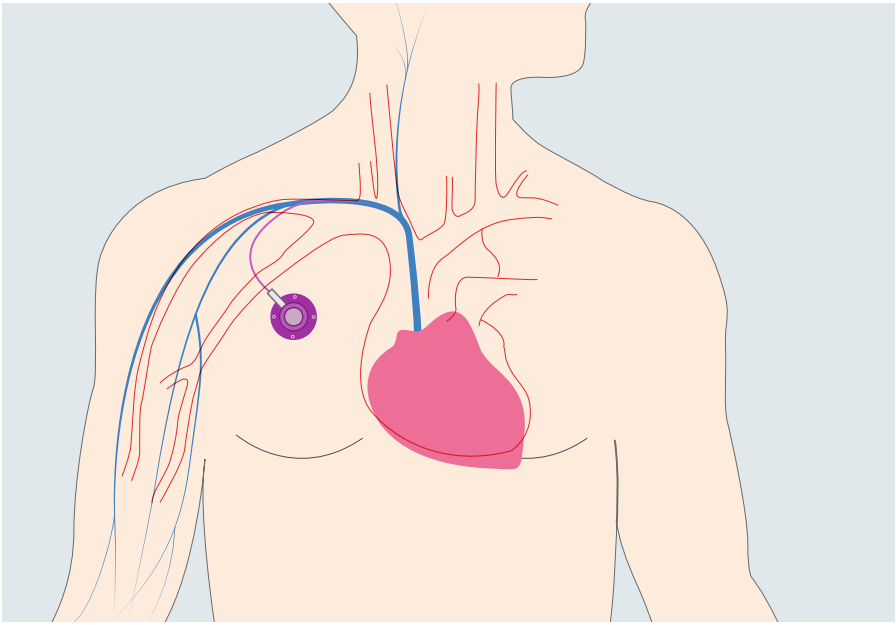
In particular, the regular administration of chemotherapeutic agents via peripheral veins can put a great deal of strain on them, which in turn can lead to damage to the veins and even extravasation. This can be avoided by implanting a port system.

Implantation procedures

Implantation can be performed as an inpatient or outpatient procedure under local anesthesia, analgesia, or general anesthesia. Access to the venous system with a port can be made via several veins. The following veins are mainly used for this purpose:

- Subclavian vein (puncture technique)
- Cephalic vein (venae sectio)
- Jugular vein (puncture technique or venae sectio)

In some cases, the port system is also placed in the area of the arm, e. g. via the basilic vein or cephalic vein.



For newly implanted ports, a dressing change and inspection of the surgical site should be performed on the second postoperative day. The surgical site should be observed for signs of infection such as redness or swelling[1].

The patient may shower from the first postoperative day, provided that the dressing is waterproof. After the third postoperative day, showering is allowed even without the dressing. The patient should not swim or bathe until the surgical site has healed[1].

Port access procedure instructions

Selection of a suitable Huber needle

After implantation, the port system can be used immediately. Only non-punching port needles, commonly referred to as Huber needles, may be used for port puncture. Conventional needles can cause plugs of the silicone membrane to be removed, which can increase the potential for leaking and silicone particles entering the patient's bloodstream.

The **correct size** (cannula diameter G = Gauge) and **length of the port needle** is also essential for successful port access.

If the port needle is too long, there is a risk of instability of the Huber needle in the port, which can lead to bending or breaking of the needle, resulting in damage to the port membrane. This is associated with an increased risk of infection.

If the port needle is too short and lies in the subcutaneous tissue instead of in the port chamber, there is a risk of extravasation.

The length of the port needle used should **always be documented** and, if necessary, **re-evaluated and adjusted during therapy** (criteria: depth of the port in the subcutaneous fat tissue and nutritional status of the patient).

The needle diameter influences the flow rate of the delivered drugs - the higher G, the thinner the cannula. Thus, for more viscous infusions such as parenteral nutrition, a needle with 19 G should be selected[3].

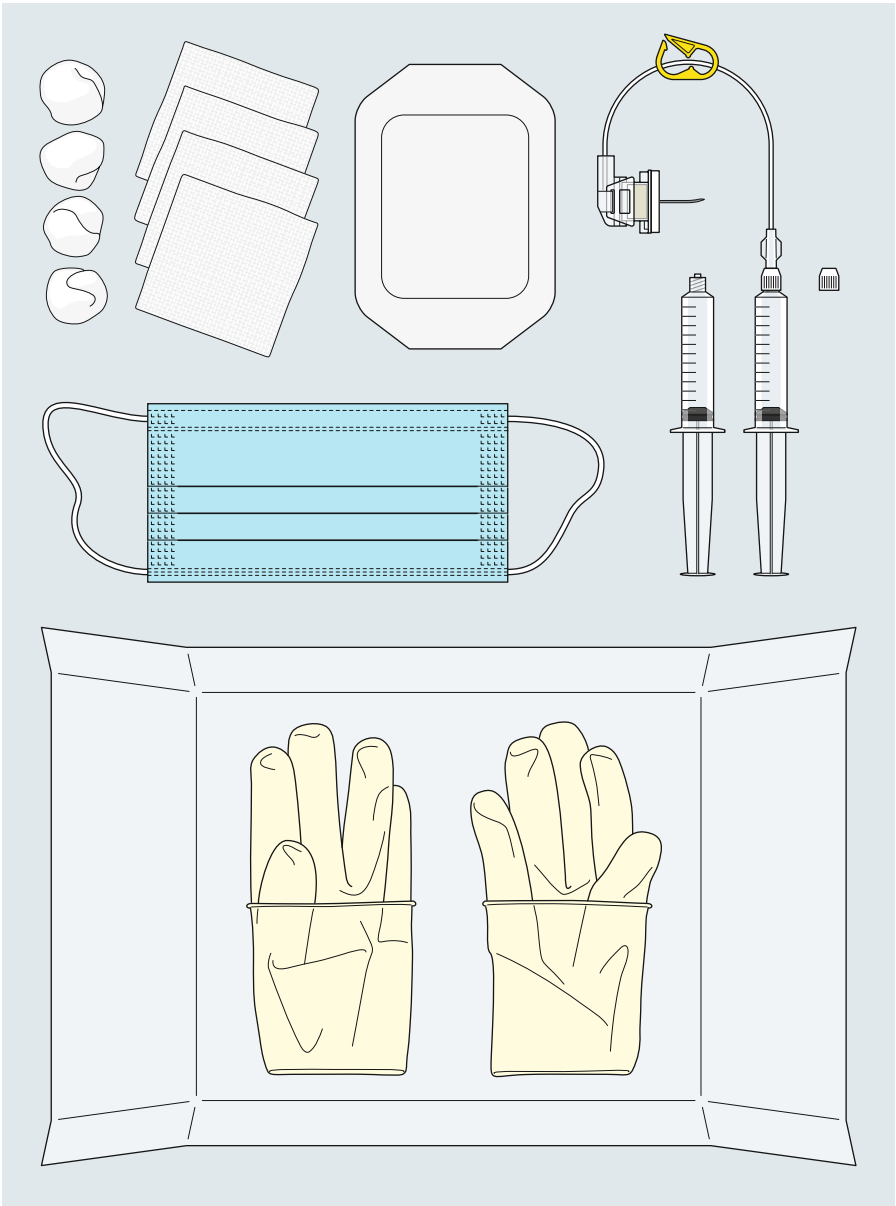
Prior to port access procedure

The accessing of a port requires careful preparation while following the aseptic working method. Only syringes with a size of 10 mL or larger should be used for port access[2]. Syringes that are too small can generate excessive pressure and increase the potential for damage to the port system.

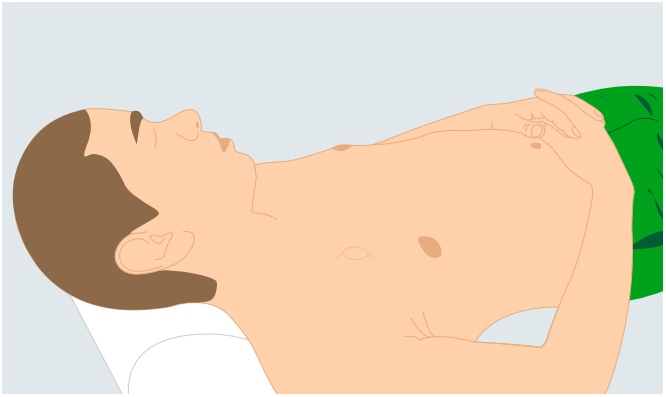
Port puncture material:

- Hand and skin disinfectant
- Non-sterile and sterile gloves
- Face mask
- Sterile compresses
- Two syringes of 10 mL NaCl 0.9% each
- Huber needle of appropriate size
- Sharps disposal container
- Sterile pad
- (Three-way stopcock with extension and) Closure cap[3]
- Sterile wound dressing

Port access can be performed either by sitting or lying down – increased attention should be paid to a stable position, especially when sitting.
The patient's head should be turned to the side away from the port to avoid contamination of the puncture site by coughing and sneezing.



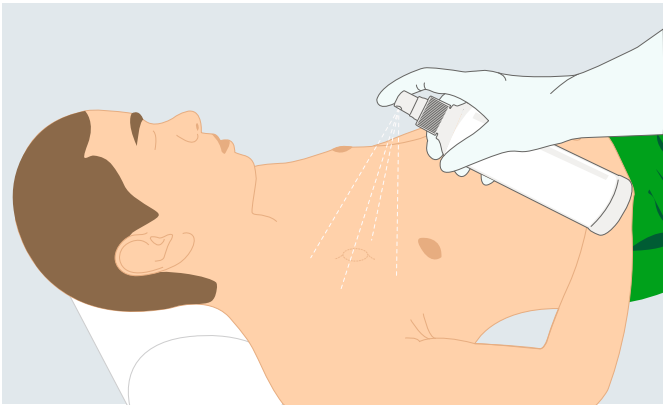
Port access procedure



1 The patient's upper body should be **completely undressed** and **hygienic hand disinfection** should be performed

2 Palpation and **examination of the port body** and its surroundings with non-sterile gloves

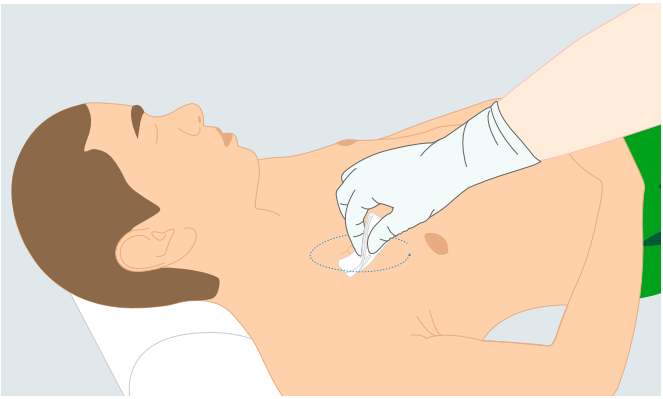
If the patient indicates discomfort in the port chamber area, discontinue the planned port access and inform a physician.



3 Subsequent **disinfection of the puncture site** according to current guidelines

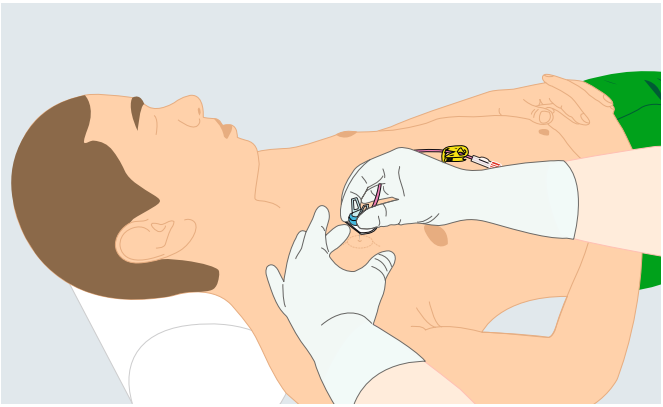
4 Disposal of the non-sterile gloves; again, execution of hygienic hand disinfection

To avoid the formation of a puncture channel with a puncture defect, each new port access should be performed at a different puncture site on the skin.



5 **Sterile preparation** of the materials for port access

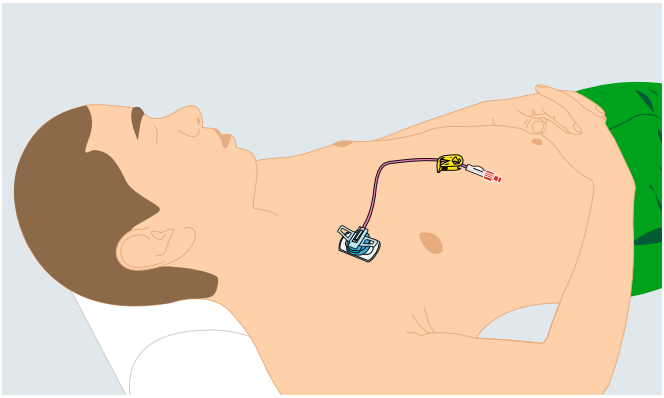
6 **Disinfect hands** once more and put on sterile gloves



7 **Sterilely vent the Huber needle** (and three-way stopcock) **with NaCl 0.9%** and connect the clamp to the cannula tubing

8 Palpate the port body with one hand and secure it with two fingers. Instruct the patient to take a deep breath. **Access the port by inserting the Huber needle vertically into the port chamber**

An injection must be possible at all times without resistance!

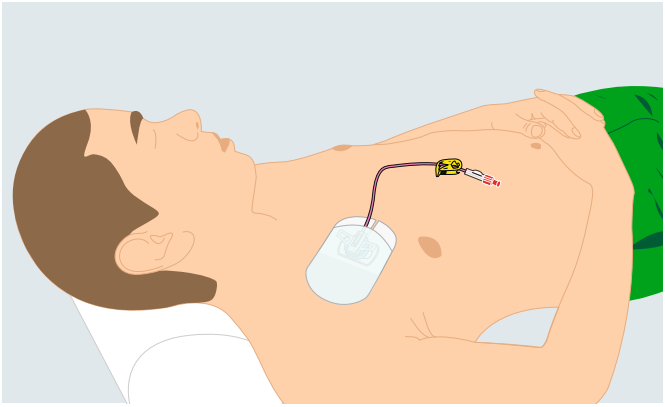


A port needle must not be left open in the system, otherwise there is a risk of air aspiration!

9 After accessing the port system, **open the clamp and aspirate blood** to check the correct position of the port needle. If no blood can be aspirated, the port should be flushed with increased caution

10 Subsequent **flushing of the port catheter** with 10 - 20 mL NaCl 0.9%

11 Connect infusion



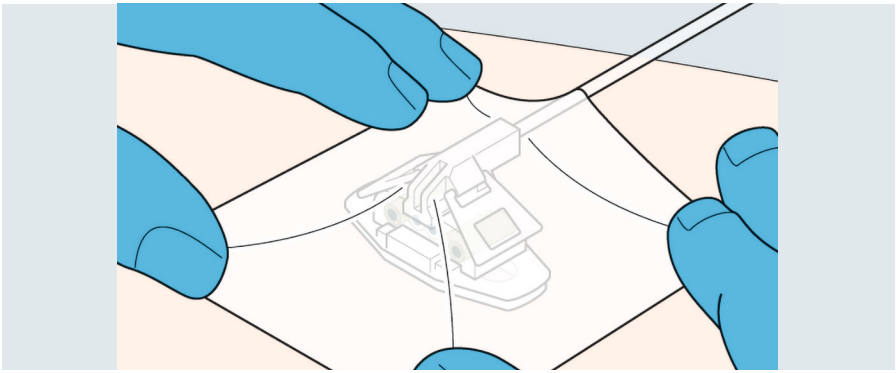
12 After completion of the infusion, the catheter needs **to be flushed again**[3]

13 While the port needle is placed, a **sterile wound dressing** should be applied

Port care

Care and maintenance

According to current best practice research and guidelines, gauze and wound dressings should be changed **at least every 72 hours.** Transparent semipermeable film dressings should be changed **every seven days** with the port needle in place[4].



During every wound dressing change the puncture site should be inspected. Contact with water while the port needle and dressing are in place should be avoided[3].

There is no guideline on the indwelling time of port needles. However, current studies indicate that the Huber needle should be changed after **five to seven days at the latest**[1]. Before each infusion, the correct position of the port needle should be checked[3].

After each disconnection of the infusion, a new closure cap must be attached.

Change or removal of the Huber needle

1. Perform hygienic hand disinfection
2. Flush the port with 10 mL NaCl 0.9%
3. Put on non-sterile gloves
4. Fix the port with two fingers, grasp and pull out the port needle. Safely dispose the port needle
5. Perform skin disinfection
6. Remove gloves during exposure time and perform hygienic hand disinfection
7. Apply sterile wound dressing to the puncture site[3]

Flushing and locking the port system

In order to be able to guarantee the long-term, complication-free functionality of port systems even when not in use, **regular port care** in the form of flushing (e. g. with NaCl) should be performed carefully.

Flushing the port with NaCl is one of the **most important factors in preventing malfunctions** (such as infections or occlusions). The flushing volume should be at least 10 mL to flush the catheter sufficiently[5].

There is no clear evidence to recommend the care of non-punctured ports and, as such, should be performed periodically **according to in-house guidelines and physician judgment**. The care of the port system must be performed in accordance with these care recommendations or in accordance with the applicable rules and procedures of the treatment center under its own responsibility.

These rules and procedural instructions should consider **the patient's health status, laboratory results, existing experience, and accepted medical evidence**[2].

However, some studies indicate that ports with longer flushing intervals of up to twelve weeks are **not expected to have increased complication rates** such as infections or occlusions[6].

In addition, the port should be locked when not in use[2]. For this purpose, the port system is filled with a locking solution that is to remain in the port catheter until the next application. This is for **infection and thrombosis prevention.**

There is no clear recommendation for the selection of the appropriate locking solution. Thus, the locking solution should also be selected according to in-house guidelines and medical judgment.

No scientific evidence is available on the superiority of heparin for catheter locking. Some studies indicate that the use of heparin is not superior to NaCl. It may therefore be assumed that **locking with NaCl is just as effective as heparin for the prevention of occlusions**[7].

Blood sampling and potential complications

Blood sampling

In order to be able to take blood samples via the port, some specifics must be observed.

Usually, blood sampling should not be performed via the port if the peripheral vein status is in a sufficient condition, in order to prevent possible port occlusions due to improper irrigation[3]. If peripheral blood sampling is not possible, the port can be used.

Blood sampling

A port cannula with **at least 20 G** should be used for blood collection - 19 G is optimal.

To flush all blood particles from the port system after a blood collection, the port should be flushed with **at least 30 mL** (better: 50 mL) **NaCl 0.9%** using the push-pause technique[3].

Potential complications and causes

If the following complications occur in connection within port access procedure, the infusion should be stopped and the attending physician should be informed immediately!

Symptoms	Possible causes
Increase in temperature, fever and chills	Systemic port infection
Redness, swelling, pain over the port housing, secretion	Local port infection
Swelling of neck and / or arm on the body side of the port	Thrombosis Catheter dislocation Port system leakage
Blood backflow into the port needle or into the infusion system	Clamp not closed properly Infusion hangs too low System without return valve
Swelling in the area of the port, the port pocket or the catheter course	Catheter defect Port needle not properly punctured into the port

Literature

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pfm medical ag
Wankelstraße 60
50996 Köln
Germany

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