



Recommendations for central venous  
catheter maintenance:  
shifting the focus from locking to flushing

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## 1. Disclosure of Relevant Financial Relationships

*I have the following financial relationships to disclose:*

Consultant for: **BD Medical**

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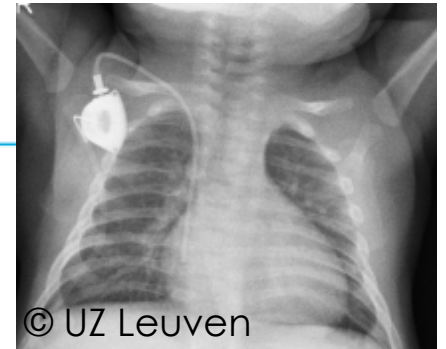
## 2. Disclosure of Off-Label and/or investigative Uses

*I will not discuss off label use and/or investigational use in my presentation.*

## Flushing with 0.9% Sodium Chloride

1. Is the most crucial factor in the prevention of malfunction due to intraluminal occlusion
2. Is crucial in the prevention of catheter-related infection following intraluminal colonization

## A clinical story...



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- Insertion of babyport with 5 Fr catheter
  - 1 mo old baby with congenital nephrotic syndrome (fluid restriction!)

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- Malfunction: difficult injection with impossible blood aspiration
  - Remains after thrombolytic drug administration
  - Huber needle exchange: well-functioning catheter

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- Malfunction: impossible injection with difficult blood aspiration
  - Reverse ball valve effect
  - After thrombolytic drug administration: well-functioning catheter



## A clinical story...cont'd

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- Malfunction: difficult injection
  - Huber needle exchange: well-functioning catheter
  - Start heparin as locking solution

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- Malfunction: difficult injection, with impossible blood aspiration
  - Huber needle exchange: well-functioning catheter after 2<sup>nd</sup> exchange

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- Positive blood cultures for *S.epidermidis*
  - R/Vancomycine IV

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- Port removal: *S. epid.* in port reservoir culture

*Flush regimen: 2 ml NaCl 0.9%  
after each IV administration*



## Lessons learned

- Proper flushing seems to be paramount to keep the catheter patent AND clean!
- Adding a heparin lock to a insufficiently rinsed catheter is worthless
  - Heparin will not resolve precipitates (nor blood clots)
  - Heparin will add to the risk of medication precipitation
  - Heparin might stimulate *S. aureus* biofilm formation\*

*If the catheter can't be flushed properly, you will end up with catheter complications and probably with NO catheter!*

- **Flushing** is the manual pulsatile injection of 0.9 % Sodium Chloride
- **Locking** is the injection of a limited volume of a liquid to fill the IV device following the catheter flush, for the period of time when the catheter is not in use



## Recommended time regimen

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- Before and after administration of drugs or fluids (SAS)
  - SAS = Saline – Administration drugs or fluids - Saline
- Before and after blood sampling (SBS)
  - SBS = Saline – Blood sampling – Saline





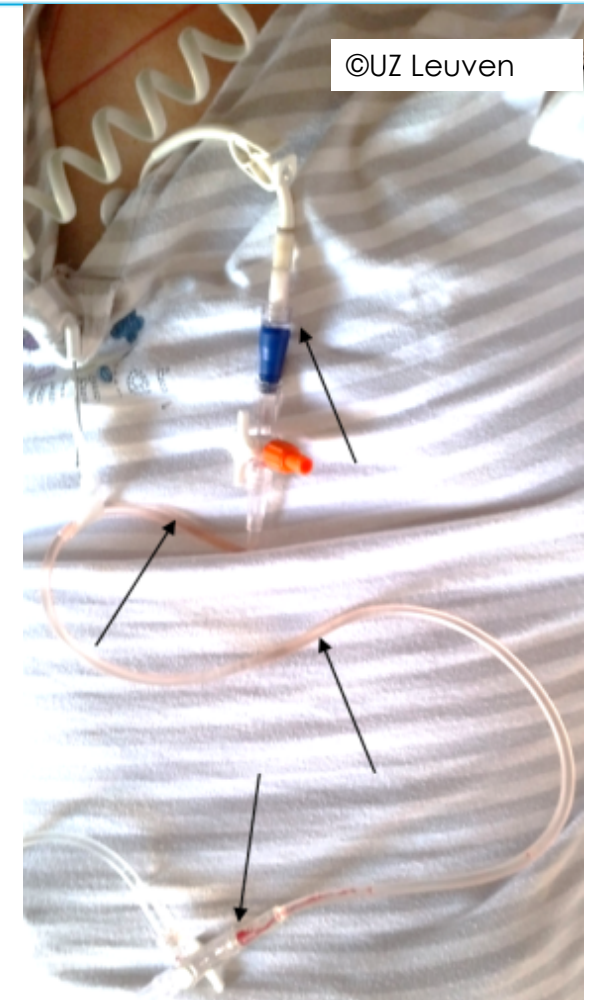
### Flushing with 0.9% Sodium Chloride

1. Is the most crucial factor in the prevention of malfunction due to intraluminal occlusion
2. Is crucial in the prevention of catheter-related infection following intraluminal colonization

- Use a 10 ml flush
  - As a standard
- Use a 20 ml flush
  - After administration of viscous products such as blood components, parenteral nutrition, immunoglobulins and contrast media

# Clinical flushing questions & recommendations

1. If blood residues are visible in the administration set, what actions are required?
  - Flush manually with at least 10 ml, as close as possible to the catheter hub
  - Change administration set if needed
2. Why is flushing with 10 ml recommended after blood sampling and with 20 ml after a blood transfusion?
  - During the blood sampling, there is only a short contact time of blood with the catheter wall
  - During the blood transfusion, the contact time is a matter of hours: therefore it will be more difficult to clean the catheter without using a higher flush volume



# Clinical flushing questions & recommendations


3. Why are ports more vulnerable for intraluminal occlusion?
  - A port has a reservoir and in that dead space accumulation of debris occurs easily
  
4. Why completely occluded ports may be patent again after insertion of a new Huber needle?
  - 2 possible explanations:
    - A Huber needle has a small diameter and simple aspiration of a deposit/clot may block the needle completely
    - A Huber needle may be inserted incorrectly into the septum, a new correctly inserted needle will solve this (mechanical) problem





The time of a strong locking recommendation is over!

Now the time has come to pay strong attention to flushing!



***Proper flushing of the catheter is performed***

- 1. Manually***  
*Pulsatile flush & positive pressure technique*
- 2. Timely***  
*SAS / SBS*
- 3. With sufficient volume***  
*10-20 ml*



Altre domande?

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