

What is the Actual Price of an Occluded Venous Catheter?

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Placing an intermediate to long-term venous access device is not just a case of establishing venous access. It is a partnership between health care professionals and the individual patient who is the recipient of the VAD. The patient is relying on the health care professional to ensure that every step is taken to minimize the potential complications that could arise from such a device. The health care professional relies on the individual patient to ensure that the advice they provide their patient with is followed, such a partnership should result in a reliable, trouble free venous catheter for both the patient and health care professional (Jackson 1999). But what happens if the catheter becomes occluded? Who is to blame? What are the financial implications? What are the personal implications to the patient?

Is it possible to actually place a price tag on an occluded Catheter? There are so many variables to consider, i.e.

- ◆ The cost of the pharmaceutical agents e.g. Urokinase alcohol, etc.
- ◆ The cost of other materials e.g. syringes needles, etc.
- ◆ The time of the health care professionals
- ◆ The delay in the patient's treatment
- ◆ The inconvenience and disruption to the patient
- ◆ The cost of an extended outpatient/inpatient visit
- ◆ The possible cost of a replacement venous catheter

Occlusion

There are two main types of venous catheter occlusion, they are intraluminal and extraluminal - Both intraluminal and extraluminal occlusions will prevent blood from being aspirated back from a VAD. However, with an extraluminal occlusion it is sometimes possible to continue with the infusion of drugs/fluids without realizing that there is a problem (Mayo and Pearson 1995). This is because a "sheet" of fibrin and/or platelets becomes fixed to the tip of the catheter/cannula. When positive pressure is applied to the VAD i.e. as when injecting/infusing, the 'sheet' of fibrin/platelets is pushed away from the VAD's tip. In the presence of a negative pressure, i.e. when aspirating from the VAD, the 'sheet' is pulled back and thus occludes the tip of the VAD preventing aspiration, This phenomenon has been described by Tschirhart and Rao (1988) as Persistent Withdrawal occlusion (PWO).

Intraluminal occlusions are more commonly a consequence of clotted blood. The commonest cause being the reflux of blood into the lumen of the VAD and then the resulting clot gradually increasing in size, causing a progressively slower infusion of fluids/drugs (Wickham et al 1992). Precipitation of incompatible drugs and of Total Parenteral Nutrition can result in sudden occlusion of VAD.

The Problem

Back in 1993 Goodwin and Carlson drew attention to the importance of the flushing technique in preventing catheter occlusion. A 'positive-pressure flush' involves a technique where one continues to flush the VAD as the syringe is removed from the venous catheter/cannula. This technique will ensure that a positive pressure is created when the syringe is removed from the VAD, and consequently minimize the risk of blood refluxing into the lumen of the catheter/cannula. However, in practice this is quite a difficult technique to master, especially with the variety of different injection devices available to attach to venous catheters and cannula today.

The Study

Within the specialist setting of the Oncology Day Unit we experience very few problems with occluded venous catheters. However, we are aware of how problems are increased when our patients go to other clinical areas. In an attempt to identify the level of knowledge relating to the prevention of catheter occlusion it was decided to undertake a small study.

In the spring of 1999 a 'Venous Access Maintenance' questionnaire was distributed to all grades of nursing staff, and junior medical staff, working in the Oncology Centre of our hospital (Fig. 1). The questionnaire asked what was a 'positive pressure flush' and gave three possible answers.

Results

Of the 20 individuals surveyed only 6 identified a 'positive pressure flush' as: "A flush technique whereby you continue to flush as you remove the syringe from the injection hub of a venous catheter/cannula". Four of these individuals were the staff working in the Oncology Day Unit.

Eight individuals stated it was a rapid push/pause flush technique. Of the six who accurately identified what a positive pressure flush was, only three stated that its purpose was to minimize the risk of blood from refluxing into the lumen of the catheter/cannula. The other three stated: "To prevent debris and stale blood sticking to the wall of the venous catheter/cannula"

While there is written material available in all three clinical areas of the Oncology Centre stating what a 'positive pressure flush' is and what its purpose is, together with regular teaching sessions, it is clear that there is a big problem. However, there is a solution.

The Solution

In the autumn of 1998 the CLC2000™ was introduced for a three month trial period, to assess if it would have an impact on improving the incidence of occlusion in venous access catheters within the specialty of oncology.

The CLC2000 is a luer lock needleless injection system, which will attach securely to all VADS. When the flushing process is commenced a spring is depressed in the 'T' section of the system (Fig. 2). When the syringe is removed, the spring 'bounces back', but as the system is closed the only direction the returned flush solution can go is down the catheter/cannula, therefore delivering a positive pressure flush.

During this three month period all pre-existing patients with Peripherally Inserted Central Catheters (PICC) and the 20 new PICC recipients had the CLC2000 attached to their PICC. Despite visiting several different clinical areas during this time period, not one PICC became occluded. All staff found the connector easy to use, even if they did not understand the technology! Patients who had experiences of other injection hubs did find the CLC2000 slightly more cumbersome initially, but those who had no other experiences of such devices expressed no concerns regarding its comfort.

Conclusion

While it is not possible to place an exact figure on the cost of an occluded VAD, the CLC2000 can contribute greatly to reducing the costs associated with poor flushing techniques resulting in intraluminal occlusion.

Figure 1:

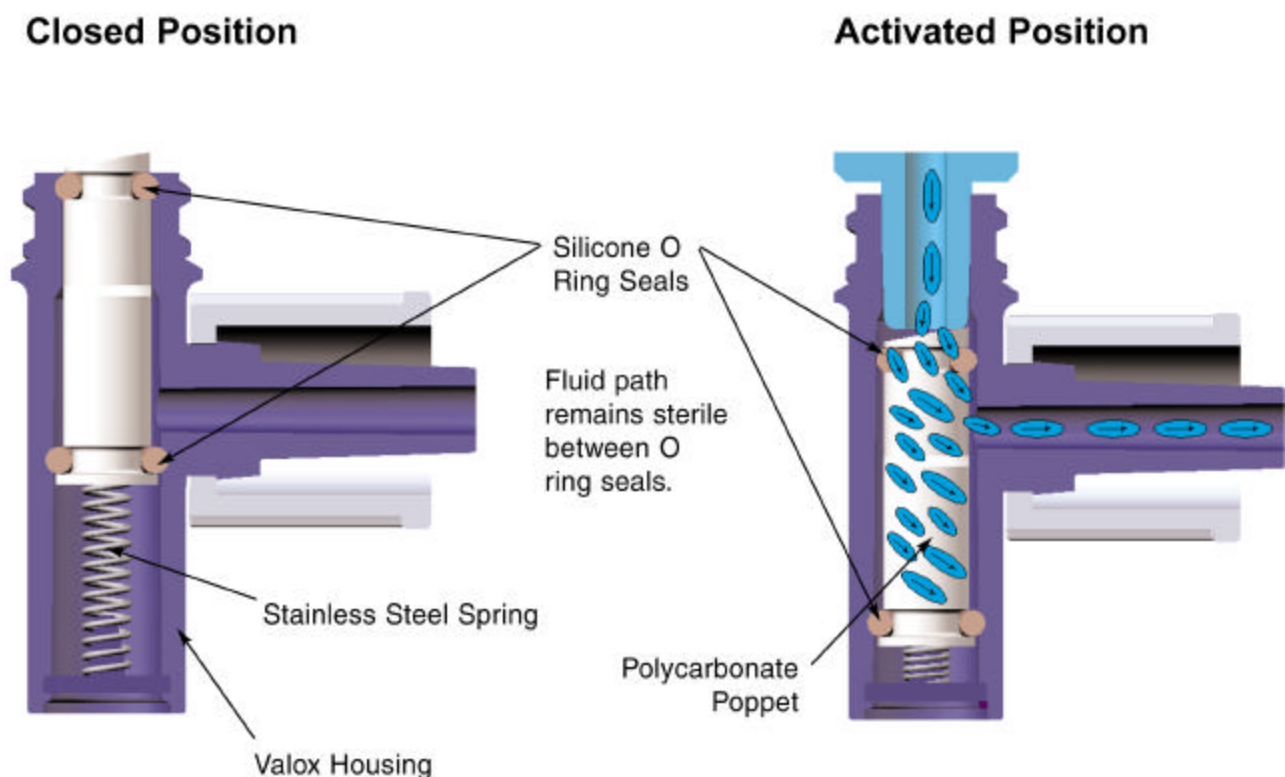


Figure 2:

PORTSMOUTH ONCOLOGY CENTRE

Venous Access Maintenance Questionnaire

Please could I ask you to answer the following questions anonymously and leave the form in my folder in ODU/C3. Many thanks. Janice.

(Please ring your answer)

1. What is a positive pressure flush?

- a) A rapid push/pause flush technique when flushing venous cannula/catheters.
- b) A flush technique whereby you exert an even pressure when flushing venous cannula/catheters.
- c) A flush technique whereby you continue to flush as you remove the syringe from the injection hub of a venous catheter/cannula.

2. What is the purpose of a positive pressure flush?

- a) To prevent debris and stale blood from sticking to the wall of the venous catheter/cannula.
- b) To minimize the risk of blood from refluxing into the lumen of the venous catheter/cannula.
- c) To minimize the risk of the venous cannula/catheter becoming infected.

Many thanks for your help.

References

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