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Devices Stopcocks Accessories

Modern Stopcocks Offer a Solution to the Risks of Dead Space

Stopcocks are an Integral Aspect of Infusion Therapy

The first known use of a stopcock, as part of Dr. James Aveling's human-to-human blood transfusion apparatus, was recorded in 1864[1].

Increasing stopcock safety provides numerous benefits:

- **Enhanced patient health, wellness, and recovery**
- **Enhanced safety of the medical staff**

Today's advanced stopcock designs focus on reducing the risk the following main factors:

- **Dead space**
- **Contamination that contributes to hospital-acquired infections**
- **Medication errors**

Figure 1: First Use of a Stopcock

[1] http://www.infusesafety.com/first-recorded-stopcock-usage

Stopcocks are Beneficial but Not without Drawbacks

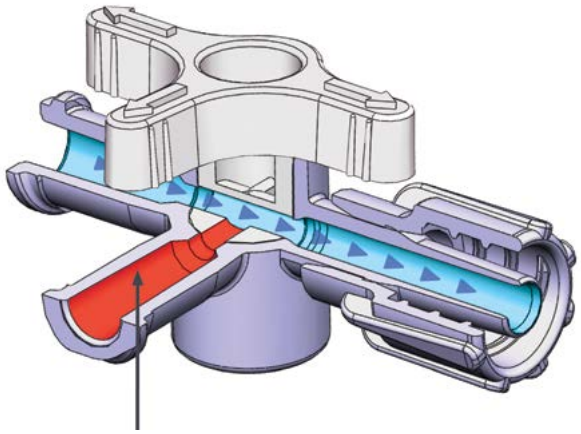


Figure 2: Dead space inside a stopcock

Factors influencing safety issues can be divided into two categories:

Equipment design, technology and components	Staff education
For example, a stopcock:	
• Dead space	• Hand hygiene
• Valved or not	• Adequate training
• Raw material	• Familiarity with specific equipment
• Flush ability	• Adherence to institutional protocols
• Connector type	

Of major concern with use of stopcocks has been the issue of DEAD SPACE = residual volume within stopcocks, not flushed by regular flow.

Inadequate flushing or drug residuals accumulating in IVs, especially during or following anesthesia/surgery contribute to hospital acquired infections, in addition to drug interactions with infusion therapies.

Risks of Dead Space

Contamination and Infection

CRBSIs/CLABSIs are of primary concern, with an estimated 250,000 infections occurring with use of intravascular devices.[2]

According to the CDC, roughly 90% of bloodstream infections occur in conjunction with central venous catheters.[3]

Blood and anesthetics residues accumulating in IVs during/ following blood sampling, anesthesia or surgical procedures are noted to be major contributors to device associated infections[4].

[2] http://www.infusesafety.com/challenges-in-clabsi-prevention

[3] https://www.cdc.gov/HAI/pdfs/progress-report/hai-progress-report.pdf

[4] Journal of Infusion Nursing: January/February 2018 – Vol. 41 – Issue 1. pp 24-34

Adverse Drug Events (ADE)

Healthcare environments today often face challenges including n**ursing and physician** shortages, nurses burdened with heavier workloads, lack of sleep and work fatigue.

All these factors increase the risk of drug administration errors.

- **Tens of thousands of patients die every year due to medication or medical errors, which are defined as an adverse drug event (ADE).**
- **About one million ADEs are reported each year in the US.**
- **Roughly 5% of those ADEs occur in pre-op settings.[5]**

Drug residuals and ADEs

An ADE includes administering drugs at the wrong time. Residue of previously administered medications can cause erroneous and unintentional drug administration when the accumulated drug in the line is flushed back into the IV. There is a high risk of dosing errors in high pressure departments.

[5] http://www.nationalacademies.org/hmd/~/media/Files/Report%20 Files/2006/Preventing-Medication-Errors-Quality-Chasm-Series/medicationerrorsnew.ashx

Solutions

Provide clear guidelines and education, combined with advanced equipment.

When looking for solutions to mitigate such risks, the focus divides itself to two focus points: **staff and equipment.**

Staff Training and Best Practices

Staff hygiene is essential. Strict adherence to hand-washing and hygiene by healthcare professionals is not to be underestimated in infection control, as well as continual education through in-service training at regular intervals.

Attention to detail and implementation of strategies that reduce medication errors. For example:[6]

- Adequate use and monitoring of drug administration devices
- Enhanced staff education and competencies
- Improved communication for all staff involved in a patient's care in ICU, and from surgery to recovery, to floor.
- Increased familiarity with the medication administration record (MAR)

[6] www.americannursetoday.com/medication-errors-best-practices

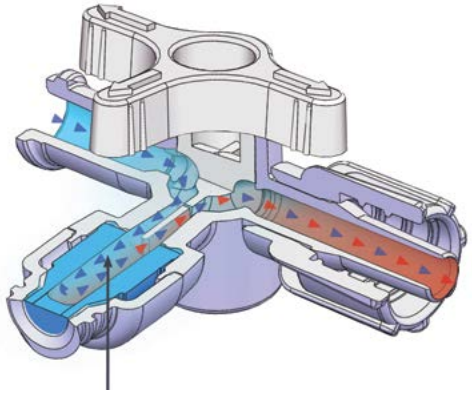
Advanced Stopcock Design

1. Advanced Design in Stopcock Development Focuses on Elimination of Dead Space

In stopcocks, the existence of dead space seems to be a necessary evil, contributing to the risks of intraluminal contamination and infection, and administration of drug residues.

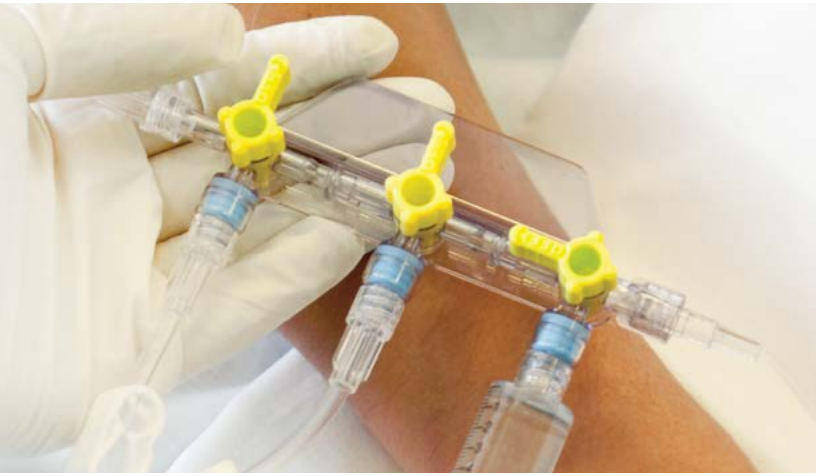
Dead space becomes even more problematic when the stopcock is capped with a Luer-Activated Device (LAD), to create a barrier against air and bacteria ingress.

Preventing the situation in which air and bacteria can enter the lumen and residual drugs and blood remain in the IV is at the base of preventing infections and contamination issues.



Constant flushing of the side port

Figure 3: Constant flushing of side port minimizes dead space



Therefore, increasing stopcock safety involves design changes that provide a solution to three major points:

- Dead Space
- Adequate flushing
- Open lumen

Advanced Stopcock Design

Figure 4: Continuous Flushing

Figure 5: Needle-Free Device

2. Flush Away!

A circumferential flow path within the stopcock can help minimize dead space.

Elcam's Marvelous™ (MRVLS) stopcock design features:

- A unique "circumferential channel" that reaches the entire internal volume of the valve
- Flushing of residual fluids with the unique continuous-flushing feature, assuring minimal residual volume
- Fewer line and port manipulations[7]
- Continuous flushing following blood sampling or IV bolus procedures, reducing the risk for nosocomial infections and medical errors.

3. Keeping the Lumen Closed at all Times

The design incorporates a closed Luer Activated valve (LAV) that also acts like a barrier against bacteria. Reducing needle stick injuries is an added bonus of the closed system.

[7]www.infusesafety.com/marvelous--

Three is a Magic Number

The importance of these three features is further illustrated in an article recently published: Lynn Hadaway, Med, RN-BC, CRNI, knows all the risks and all the devices. In an integrative review and practice survey, she discussed the design of closed stopcocks that allows for continual flushing of residual medications[8].

Figure 6: Priming and Blood Sampling in a Fully Closed System

Learn more

[8] journals.lww.com/journalofinfusionnursing/Fulltext/2018/01000/Stopcocks_for_Infusion_Therapy__Evidence_and.3.aspx

Summary

Dead space is a primary cause of both intraluminal contamination and resulting infections, in addition to residual drugs in IV lines that can contribute to drug administration errors.

With the creation of a LAD stopcock with constant flushing capabilities, minimal dead space within the closed system greatly reduces such risks. Marvelous is indeed a safer stopcock that advances safety for patients and medical staff.

Read the full article courtesy of Elcam Medical

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