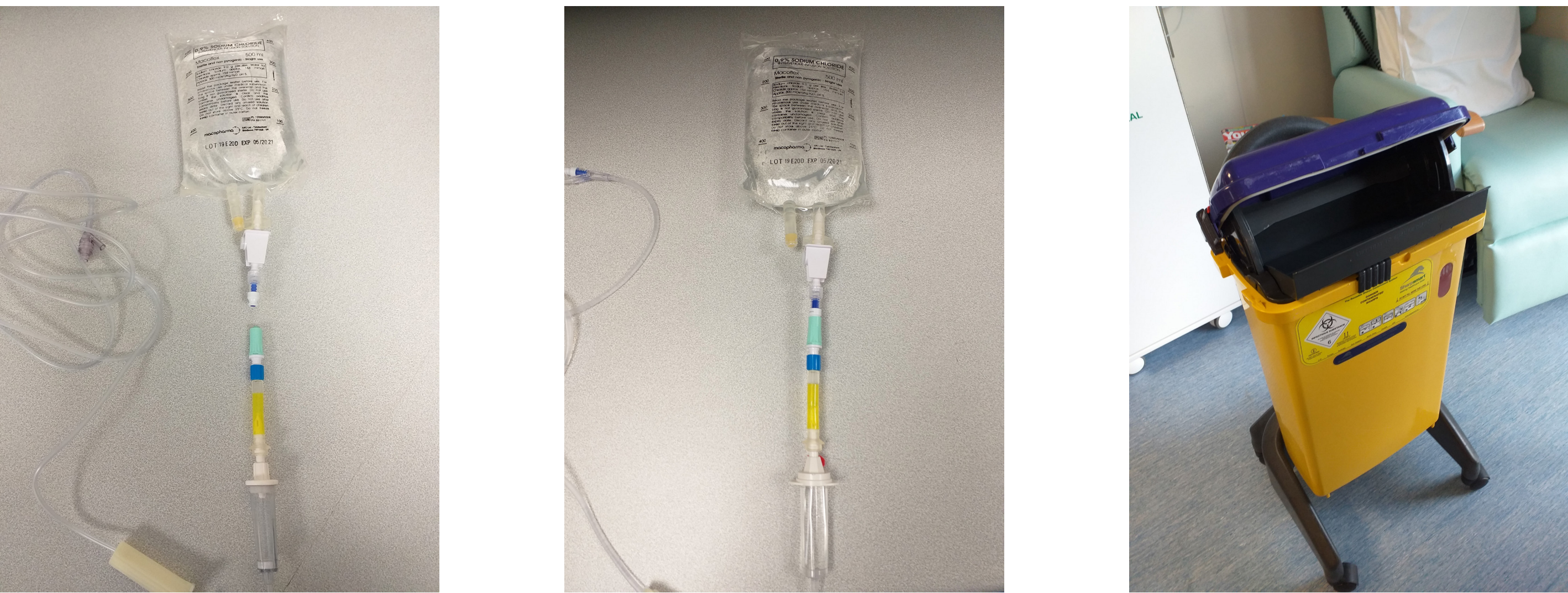


Quest for Closed Systems

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1. Introduction

The conversation around hazardous drug safety and exposure risks for nurses has been gaining momentum in recent years. Healthcare workers are now increasingly aware of the need to ensure their employer is providing them with optimum protection from the potentially hazardous substances that they are exposed to in their daily working lives. Studies have found drug contamination on work surfaces, sharps bins, equipment and floors (Connor and McDiarmid, 2006; Power and Polovich, 2011; Sessink et al, 2011). In the UK, many nurses are concerned by the significant disparity between the high levels of safety measures afforded to aseptic pharmacists who prepare SACT, versus the typical plastic apron and gloves given to staff who administer it. There are multiple points where exposure and subsequent contamination can occur: during drug preparation, transportation, administration and disposal (Oncology Nursing Society Position, 2015). Exposure to these drugs can lead to undesirable reproductive effects such as low birth weights, infertility, foetal loss and congenital abnormalities (Meade 2014). There is compelling clinical evidence to support the use of closed systems in nursing practice where there is a risk of exposure to hazardous drugs, plus numerous national and international guidelines and recommendations around best practice. COSHH (Control of Substances Hazardous to Health) regulations have a hierarchy of control and PPE is the very lowest tier (out of 6), in terms of protection for staff. Engineering controls such as a closed system is recommended by COSHH as the best protection for staff, with the next level being complete substitution or elimination of the drug, which is obviously not possible in a SACT unit due to the therapeutic effects of the drugs for patients. There has been an EU Directive on hazardous drug safety since 2004 that recommends ‘employers must ensure that the carcinogen/mutagen is manufactured and used in a closed system’. The Health and Safety Executive (HSE 2015) advises to ‘use totally enclosed systems where reasonably practicable’. Other official (national and international) guidelines and recommendations from governing bodies such as NIOSH (2004), the American Society of Health Systems Pharmacy (AHSP 2006) and the Oncology Nursing Society (ONS 2011) all state within their guidelines that the use of closed systems are recommended in the handling of hazardous drugs. Providing nurses with these devices to prepare and administer SACT is an obvious step in the right direction to improve their occupational safety and minimise or eliminate health risks caused by exposure to hazardous drugs.



2. Aims/Objectives

The aim of this small study was to identify any advantages of using the BD Texium™ closed system. The Lead Nurse on the Chemotherapy Suite had long since had concerns around working with cytotoxic drugs, citing the differences in PPE for nurses, compared to the pharmacists where the drugs are made. Several nurses experienced fatigue and ill health, plus chronic low staffing levels on this very busy unit provided even more reason to explore innovative ways to promote a healthy workforce, and improve staff recruitment and retention.

3. Methodology

In May/June 2018, a pre and post closed system implementation study was conducted on the Chemotherapy Suite at the Queen Elizabeth Hospital in Kings Lynn, to look at the impact on nurses’ wellness and fatigue levels, and any resulting time and cost saving efficiencies.

Two short questionnaires were designed, to be completed anonymously by nursing staff pre and post implementation of the BD Texium™ closed system. This was to identify and compare any differences in results to show the benefits of a closed system. The first questionnaire had 2 open ended questions and looked at nurses’ wellness and if they felt they experienced any adverse effects from working with SACT. This allowed qualitative data to be gathered for analysis. The second questionnaire looked at their daily step count and fatigue levels. Due to ongoing staff shortages, only 5 nurses were available on the Chemotherapy Suite to complete the research.

4. Results

Prior to implementing closed systems, some of the questionnaire responses received regarding nurses’ wellbeing included comments around feeling extreme tiredness and having sore feet.

Hair loss, dry skin and a metallic taste in the mouth were also reported. Step counts averaged 6000-8000 per shift. One nurse had Multiple Sclerosis and was particularly affected by the heavy workload and constant rushing around. Fatigue levels were rated at 5/5.

Following the BD Texium™ closed system implementation, staff noted that they were feeling much less tired and were saving time, mostly through not having to repeatedly run back and forth for saline flushes. The chemical smell in the air and metallic taste had gone, and their average step count had decreased to 5000-6000 per shift. The nurse with Multiple Sclerosis felt significantly better, required less pain medication and had more energy than usual at the end of the shift. Fatigue levels were rated at 3/5.

Patient numbers on the 12 chair Chemotherapy Suite were reviewed for the last 4 years and the data showed that numbers have steadily increased - in 2018 over 600 more patients were treated compared to 2014. Despite this continuing rise, a cost saving on bags of normal saline and SACT clinical waste bins was still noted. This is due to the closed system eliminating the need for multiple smaller saline flush bags. One larger 250ml or 500ml flush bag can be used for the whole treatment regime, as the bag spike has a needle free device on it. This avoids un-spiking the bag, so the needle free device can simply be cleaned as per local guidelines, ie. ‘scrub the hub’ before re-attaching to the closed system device on the giving set following a drug infusion. In June 2019, despite treating an extra 72 patients compared to June 2018, a saving of £95 was made on saline that month, thanks to the closed system set up. Nurses risk exposure to cytotoxic drugs when spiking and un-spiking infusion bags. Vandenbrouke and Robays (2001) demonstrated that leakage of the drug occurs 25% of the time during spiking and 100% of the time during un-spiking. This can generate aerosols for dermal absorption and vapours for inhalation, and can also happen when connecting and disconnecting syringes from an IV port.

5. Conclusion

The results from this small study showed an improvement in staff wellbeing after introducing BD Texium™ closed systems. The team have all found the new IV infusion set up easier and safer to use. Whilst there was a cost implication to implement closed systems, this was offset by the savings made on the reduction in saline flush usage. A significant decrease in SACT bin wastage was also noted, due to only one larger bag of saline used per regime, as opposed to multiple smaller flushes being disposed of.

There is still extensive work to be done in the UK to raise awareness of safer SACT administration and to reduce variation in safety standards amongst all the healthcare workers who are exposed to hazardous drugs. There is increasing evidence that once exposed, both short and long term complications can occur. Nurses are a precious resource and every effort should be made by their employers to show that their occupational health and safety is taken seriously, and any risks are mitigated as far as possible.

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From a personal point of view, I have MS and the closed systems actually had a huge impact on my health. I am running around less and not walking so many miles each day. I felt so much better and have needed less of my prescribed pain relief. I could really feel a difference.
Chemotherapy Nurse

With the current contract for clinical waste, using your closed systems is a winner, so thank you.
Waste Services Manager

I noticed I was not having to walk around the Chemotherapy Suite as much. Connecting up and disposing of the drugs felt safer.
Chemotherapy Nurse

Since implementing closed systems, I can't smell or taste the drugs any more on the unit.
Lead Chemotherapy Nurse

We found we were not wasting so much time (or steps/miles) looking for flushes and equipment, as it was all right there.
Chemotherapy Nurse