STUDY SUMMARY

Economic and Environmental Impact of Commercially Available Closed System Transfer Devices (CSTDs)

How the ICU Medical ChemoClave™–the world's only needlefree CSTD–can provide nearly $482K in annual cost savings while generating more than 3,200 fewer pounds of biohazardous waste per year

INTRODUCTION

The toxicity of antineoplastic drugs and the dangers of prolonged exposure to them has been well documented. Healthcare professionals who work with or near hazardous drugs may suffer from skin rashes, infertility, miscarriages, birth defects, and possibly leukemia or other cancers.[1,2]

Recent advances in safe handling practices have led to recommendations that pharmacists, technicians, and nurses who work with these hazardous drugs should protect themselves through the implementation of various safety programs and provisions, including the use of a CSTD.[3]

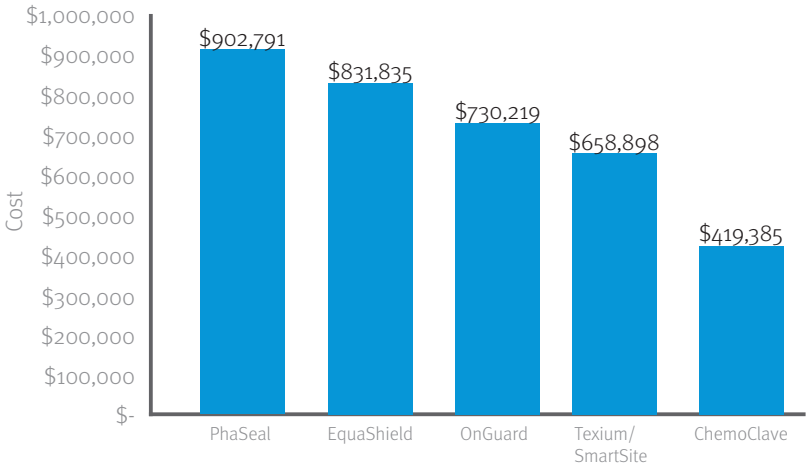
The purpose of this study was to determine the cost of implementing a CSTD protocol throughout the clinical delivery continuum, including the preparation, transportation, administration, and disposal of hazardous drugs. In addition, we analyzed the volume and cost of biohazardous waste that is generated when using various CSTDs.

At the time of the study there were five commercially available CSTDs. We evaluated all commercially available CSTDs: ChemoClave™ by ICU Medical, Inc., PhaSeal® by BD (Becton, Dickinson and Company), Texium®/SmartSite® by CareFusion Corp., OnGuard™ with Teva-Adapter® components by B.Braun Medical Inc., and EquaShield® by EquaShield Medical Ltd.

ASSUMPTIONS

We based our calculations on an average, high-volume oncology facility/hospital preparing 100 mixes a day over 365 working days, for a total number of 36,500 mixes annually. In addition, we assumed an average waste cost of $.40/pound based on the Baxa Corporation Star Center® course on Safe Handling and Preparation of Hazardous Drugs.

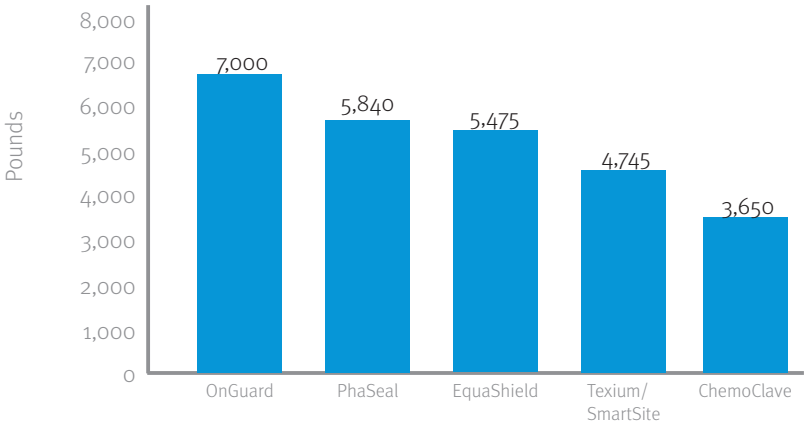
Total Annual Costs Associated with Implementing Competing Closed System Transfer Devices (CSTDs)



ChemoClave Costs Less to Implement than Any Other Commercially Available CSTD

Component cost may vary slightly due to manufacturing price changes, contract pricing, and/or volume discount pricing. Texium/SmartSite is marketed as a closed system, not a CSTD.

Total Annual Biohazardous Waste Generated by Competing Closed System Transfer Devices (CSTDs)



ChemoClave Generates Less Biohazardous Waste than Any Other Commercially Available CSTD

Calculations are based on a single, high-volume oncology facility/hospital preparing 100 mixes a day over 365 working days, for a total of 36,500 mixes annually. Texium/SmartSite is marketed as a closed system, not a CSTD.

Additional assumptions made in determining our calculations were the following:

- Protocol utilizes three drugs per patient, with a primary pump set being used for delivery.
- All systems except Texium and ChemoClave need an additional luer lock adapter to fit the needlefree valve.
- All sets will use an infusion adapter between bag and set.
- All CSTD's will use their proprietary closed male luer or injector once per drug for mixing and once per drug for the end of the IV set, for a total of six per patient over the course of the three drugs.

Using the above assumptions, we calculated the total cost of a three drug per patient regimen and divided by three to get the per mix costs and waste volumes shown below. We then multiplied the per mix costs and biohazardous waste volume and disposal costs by the 36,500 mixes per year assumption to get the total annualized costs and waste volumes.

System	Components Cost	Components Cost/Year	Components Waste (lbs)	Components Waste/Year (lbs)	Components Waste Cost/Year (Disposal)	Total Cost Implementation/ Year
PhaSeal	$24.67	$900,455	0.16	5,840	$2,366	$902,791
EquaShield	$22.73	$829,645	0.15	5,475	$2,190	$831,835
OnGuard	$19.93	$727,445	0.19	6,935	$2,774	$730,219
Texium/SmartSite	$18.00	$657,000	0.13	4,745	$1,898	$658,898
ChemoClave	$11.45	$417,925	0.10	3,650	$1,460	$419,385

FINDINGS

By using the ICU Medical ChemoClave CSTD, a single, high-volume cancer center/hospital could save $483,406 annually compared to the most expensive system (PhaSeal) and generate nearly 3,285 fewer pounds of biohazardous waste a year than the system that generates the most waste (OnGuard).

References
1. Connor TH, McDiarmid MA. Preventing Occupational Exposures to Antineoplastic Drugs in Health Care Settings. CA Cancer J Clin. 2006;56:354-365.
2. NIOSH Alert Preventing Occupational Exposures to Antineoplastic and Other Hazardous Drugs in Health Care Settings. CDC. 2004;165
3. United States Pharmocopeial Convention: ‹797› Pharmaceutical Compounding - Sterile Preparations. 2008