ECONOMIC IMPACT OF CLOSED SYSTEMS TRANSFER DEVICES IN THE CYTOTOXICS PREPARATION UNIT AT HOSPITAL DO ESPÍRITO SANTO, ÉVORA

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INTRODUCTION

The **NIOSH** defines a Closed System Drug-Transfer Device (**CSTD**) as a drug transfer device that mechanically prohibits the transfer of environmental contaminants into the system and the escape of drug or vapor concentrations outside the system, during upon delivery its manipulation (1). Occupational Safety and Health Regulatory Agencies and the **United States Pharmacopeia** (USP <797> and <800>) strongly recommend the use of these Medical Devices (**MD**), when hazardous drugs are handled, controlling exposure to occupational hazards, reducing microorganisms exposure, error and time reduction of preparations (2-4).

OBJETIVES

This study aimed to prospectively investigate the **Economic Impact** and **Benefits** that arise from the use of CSTD at the Cytotoxic Preparation Unit (**CPU**) at *Hospital Espírito Santo* in Évora, Portugal (*HESE*), through drug reuse, meeting eligibility criteria, during the preparation of intravenous (IV) treatments, throughout study period and, afterwards extrapolated for a 1-year period of time.

MATERIALS AND METHODS

INCLUSION CRITERIA

- Drug compatibility with CSTD components
- Physicochemical stability of drugs
- Microbiological stability
- September to October - 2021

DESIGN

- Observational Study
- Prospective Impact

STATISTICAL ANALYSIS

- Residual volumetric measuring drug
- Informatic system residual drug determination
- Average IV treatments at CPU per month

Hospital Espírito Santo, Évora

ECONOMIC IMPACT ANALYSIS

- Drug cost-residual volume analysis
- CSTD acquisition costs
- Economic impact/balance

€10.97 per CSTD unit
€0.94 per CSTD vial adaptor unit

Average of 1 CSTD plus 2 vial adaptors per preparation

±432 PREPARATIONS PER MONTH

€5551

RESULTS

During the study period, **432** preparations were handled at our CPU. According to compatibility studies of drugs with CSTD components, duly validated, showing safer handling, and proved physicochemical and microbiological stability, **26** drugs were selected for further analysis and therefore eligible for the study. Among these, 15 were biotechnological (5 biosimilar) and 11 cytotoxic drugs. The greatest potential for volumetric reuse was documented for **Cisplatin**, accounting for 688mL of drug wasted during study period, **Bevacizumab**, (Avastin® and Mvasi[MV]), a total of 132mL drug waste, and **Cetuximab**, 84mL. These findings are represented in **Figure 1** and **2**. After proper **pharmaceutical validation**, the acceptance criteria for reusing residual drug between IV preparations were approved. It was accounted a total drug wasted of **1971mL**, with reuse potential.

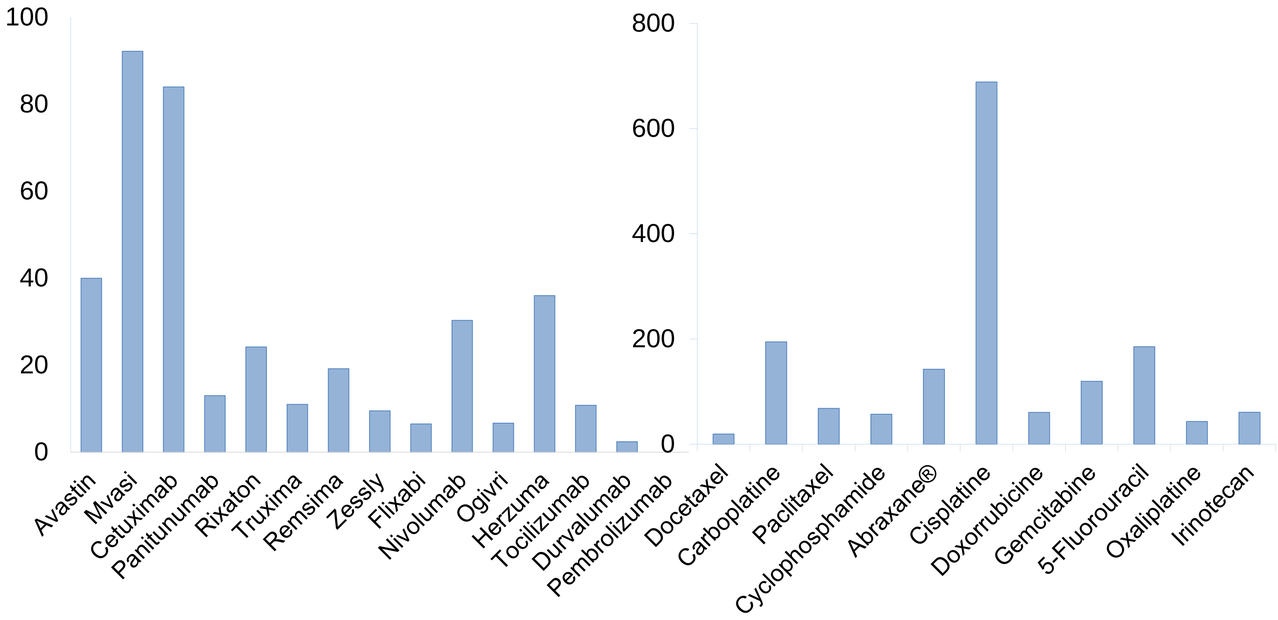

Figure 1 and **2**: Residual drug volume (Sep-Oct 2021)

We analyzed the drug cost/residual volume relationship, to evaluate the economic impact of CSTD utilization. The greatest potential for cost savings were mostly achieved with monoclonal antibodies, such as **Bevacizumab**, with an estimated drug waste of €4416 (45 preparations), **Nivolumab**, €3191 (28 preparations), **Trastuzumab**, (Herzuma® and Ogivri[MV]), €1066 (29 preparations) and **Durvalumab**, €639 (2 preparations). The total remaining wasted drug volume totalized **€13.394**, during the 4-week study period. These results are documented in **Figure 3** and **4**.

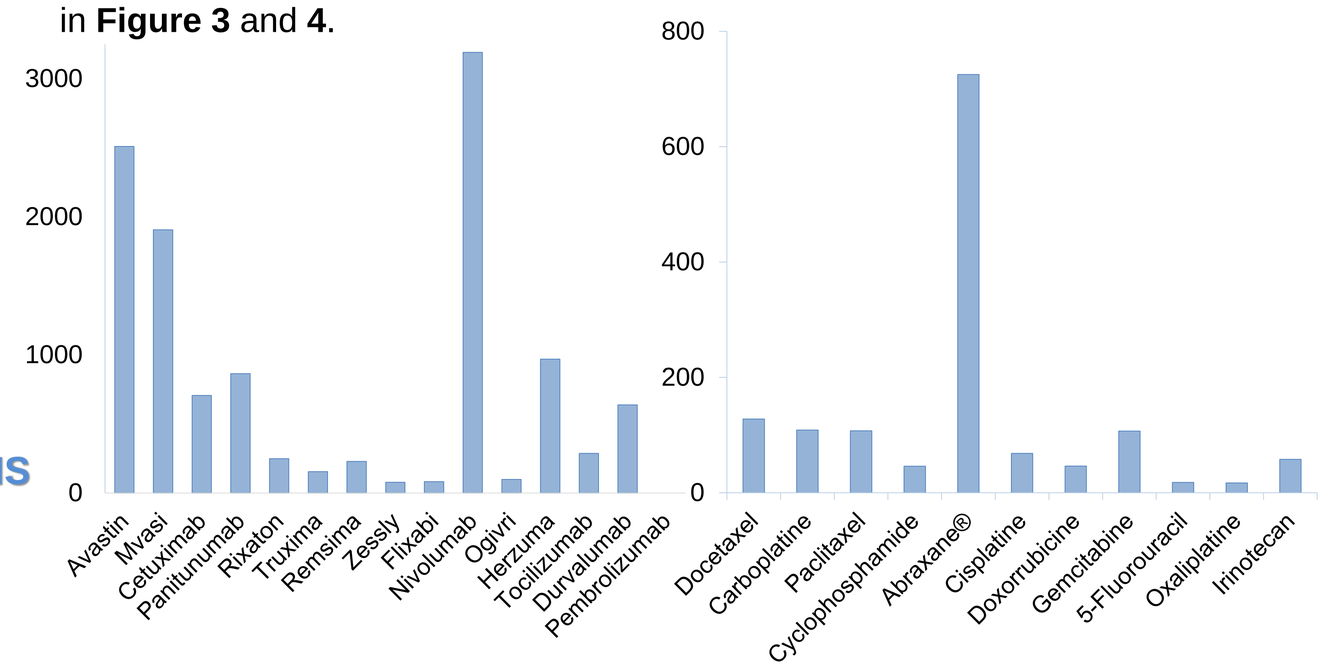

Figure 3 and **4**: Residual costs related to drug waste (Sep-Oct 2021)

Considering the monthly average IV treatments production at our hospital institution CPU, we estimated economic savings of **€13.394** potentially obtained throughout the use of CSTD. It was also considered the investment in these MD, corresponding approximately to **€5551**, during study period. Thus, a monthly estimated saving of **€7843** was documented, in the 4-week period, which by extrapolation translates into an annual economic impact of approximately **€101.956**.

DISCUSSION/CONCLUSION

The Pharmaceutical Services are responsible for managing the second largest hospital budget of the Portuguese Healthcare System, **pharmaceutical products and drugs**, playing a key role in resource management and the use of **economic savings strategies**. Pharmaceutical intervention in reducing drug waste, through the use of CSTD surely leads to a reduction in economic burden, without compromising the safety of the preparations and diminishing the occupational exposure at handling hazardous drugs. In this study, an economic impact of **€101.956 annually** was estimated, by using CSTD. This impact was extensively minimized by the use of other saving strategies, such as **biosimilar switching**, approved in the European Union by EMA, **Flat-Dose**, **Dose-Banding** and other waste management strategies, validated by guidelines and already assumed by our institution (5). We also excluded from the study all drugs for extemporaneous use only. Another study conducted by the **Pharmaceutical Services** at the CPU of *HESE*, using data from 4-year experience of **Dose-Banding**, predicted an estimated annual savings of **€187.595** (6). It is thus considered that these waste management strategies used by the Pharmaceutical Services generate savings with a significant economic impact and increase the efficiency of the intravenous drug preparation process at the CPU.

REFERENCES

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