

**The importance  
of CSTD when  
compounding &  
administering  
antibiotics**



**Usage of antibiotics in Sweden is at least 140 fold greater than antineoplastic drugs<sup>1</sup>. In a recent study, the use of Tevadaptor<sup>®</sup> significantly reduced antibiotics contamination in several hospital wards<sup>2</sup>**

**Spill and leakage of antibiotics present a significant health risk to Health Care Workers**

Preparation and administration of antibiotics are widespread over many departments in hospitals and many health care workers, especially nurses, are involved in handling these drugs daily. Adverse health effects of occupational exposure to antibiotics in health care personnel are occasionally published. Weak and moderate effects include hypersensitivity (itching, runny nose, irritation of the eyes), allergic

skin reactions (eczema, urticaria, allergic dermatitis) and respiratory symptoms (asthma and wheezing). More severe effects may even include anaphylactic shock<sup>3</sup>.

Long term effect of exposure is not well established but may cause building up resistant strains of bacteria in the working area that will be harmful to patients and health personnel.

Two surveys of 161 and 153 Health Care Workers (HCW) (nurses and pharmacists) in two hospitals in Korea revealed a 17.4% and 20.3% increased IgE sensitization to three common cephalosporins, respectively. This detection system was concluded to be "sensitive to screen for symptomatic or asymptomatic sensitized HCW"<sup>4,5</sup>. None of the subjects used protective equipment when handling the antibiotics<sup>4,5</sup>.

A retrospective study<sup>6</sup> by Pinheiro et al. tested 4 female nurses working at surgical departments who developed allergic contact dermatitis (ACD). Patch tests showed positive reactions to ampicillin, cefazolin, cefotaxime and ceftriaxone as well as several penicillins. It was concluded that occupational ACD is significant in healthcare workers.

Cases of severe allergic reactions in nurses due to antibiotics exposure are rare. Nevertheless, reports of anaphylactic reactions to cefuroxime<sup>7</sup> or piperacillin<sup>8</sup> were published. It was concluded that work-related systemic allergic reactions to antibiotics may occur in nurses after inhalation of low doses and without perceived association with drug-specific tasks like handling of antibiotics<sup>7</sup>.

A study by Nygren et al. screened 21 hospital wards in 16 hospitals, with a total of 206 samples. The screening showed that the use of Closed System Transfer Devices (CSTDs) during antibiotics compounding and administration significantly reduces the risk of spillage and contamination<sup>9</sup>. Swab testing showed an adverse correlation between the use of CSTDs and the level of contamination. Hospital wards and pharmacies that use CSTDs had the lowest spill and leakage, whereas wards that use open injection needle venting were with the highest level of contamination<sup>9</sup>.

## Correlation of Antibiotic Contamination Levels in Hospital Wards with Different Drug Transfer Systems

In a study<sup>2</sup> recently performed in 3 hospitals in Europe, potential contamination of work areas was tested before and after implementation of a CSTD (Tevadaptor®).

Potential surface contamination was tested by swab samples. Stationary air samples and personal air samples from the nurses during antibiotics preparation, administration and patient care were also tested. The most frequently used antibiotics were monitored: vancomycine, meronem, augmentin, ceftriaxone, cefotaxime, piperacillin and benzylpenicillin. Extracts of wipe and air samples were analysed using LC-MSMS (detection limit: 1 ng/ml extract). The results showed that using conventional preparation techniques widespread contamination with antibiotics up to 767 ng/cm<sup>2</sup> was detected. After implementation of the Tevadaptor® CSTD overall contamination levels significantly

decreased for the most frequently prepared antibiotics in all three hospitals.

Using the conventional preparation technique three antibiotics were detected in environmental air of seven nurses in two hospitals (0.01 to 5 µg/m<sup>3</sup>), whereas after implementation of the CSTD only one antibiotic was detectable in environmental air in one hospital (1.4 µg/m<sup>3</sup>).

This study adds data regarding the high contamination rate during use of conventional preparation techniques for antibiotics, and provides support that CSTDs, specifically Tevadaptor®, significantly reduce contamination<sup>2</sup>. Reducing the exposure to antibiotics is expected to have positive impact by reducing local or systemic adverse health effects in healthcare professionals.

**The effectiveness of Chemfort™ as a closed system is based on Tevadaptor® TOXI-GUARD® air cleaning technology and elastomeric septa. Therefore, the data in this Tevadaptor® study is relevant for Chemfort™.**



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