INT-010: Risk of contamination in cytotoxic reconstitution

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Background

Ready-to-use infusion bags are used in great quantities as basic components in cytotoxic drug reconstitution services. In 2005, infusion bags and their secondary packaging from different suppliers were examined for bacterial contamination by the pharmacy of the University Hospital of Heidelberg. The results ranged between high contamination and nearly no contamination, depending on the supplier. This study was repeated in 2012 to reevaluate the risk assessment of used materials, in this case the infusion bags.

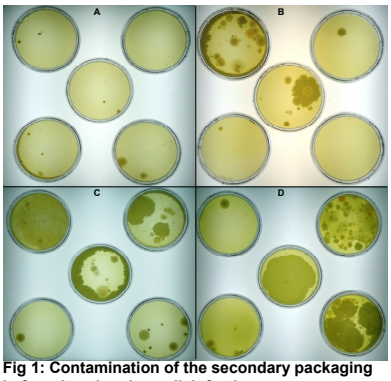

Fig 1: Contamination of the secondary packaging before the wipe down disinfection

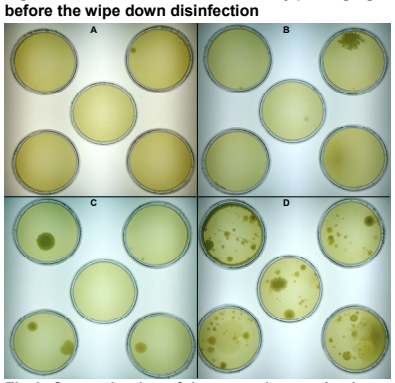

Fig 2: Contamination of the secondary packaging after the wipe down disinfection

Material and methods

Boxes of three different bag sizes were purchased from four different suppliers, respectively, and examined in the university hospital pharmacy. The extent of microbiological contamination on the outer surfaces was assessed with contact plates, which were incubated for 48h at 37°C and subsequently subjected to CFU counts.
From each box, samples were taken on the inside of the cardboard box, the outer surface of the secondary packaging of 5 bags, each before and after a disinfecting wipe down using ethanol 70%, as well as the bags themselves after peeling into the LAF hood. For controlled conditions, the LAF itself was also examined for contamination during sampling. To receive reliable results, each bag size was purchased and examined twice. All sampling was carried out in a class C clean room equipped with a LAF hood.

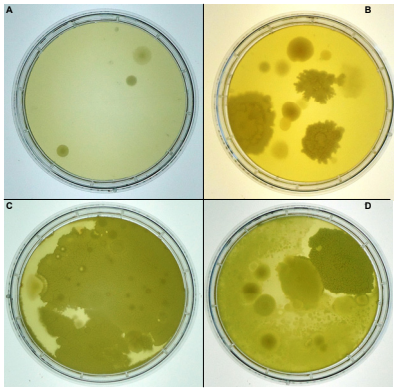

Fig 3: Contamination of the inside of the cardboard box

Results

Comparison of the different suppliers (see table 1) reveals that the examined outer surface of the secondary packaging of supplier D's infusion bags shows remarkably high microbiological contamination. For B and C the contamination of secondary packaging was moderate, while for A contamination was consistently low. The peeled bags were all sterile - with the exception of supplier D, where in two cases one CFU was found on the bag itself. The control of the LAF shows that sampling was performed under aseptic conditions. Figures 1-3 show the results for the suppliers A-D exemplarily.

	supplier A	supplier B	supplier C	supplier D
Cardboard box, inside	2,7	12,3 (3/6 bacterial lawn)	14 (3/6 bacterial lawn)	60,3 (3/6 bacterial lawn)
Secondary packaging before wipe down disinfection	3,2 (1/30 bacterial lawn)	14,8 (5/30 bacterial lawn)	6,1 (3/30 bacterial lawn)	22,4 (7/30 bacterial lawn)
Secondary packaging after wipe down disinfection	0,7	1,7	1,3	13,7 (1/30 bacterial lawn)
Infusion bags, peeled	0	0	0	0,1
LAF	0	0	0	0

Table 1: Overview of the average CFUs. Plates presenting a bacterial lawn (innumerable amount of germs) are not included in the average value, but are listed separately.

Discussion

This study confirmed the results from 2005. Back then, as a consequence, supplier D was excluded and completely substituted by supplier A. The current results affirm the decision to exclusively use the infusion bags from supplier A, since those have the lowest microbiological contamination. Even the cardboard boxes, which are used for transportation and storage and are therefore not necessarily expected to be sterile, showed only a minimal extent of contamination for supplier A. The high CFU counts on the outer surface of the secondary package of infusion bags – especially of supplier D- constitute a high risk for aseptic preparations as the bags are introduced to the clean room in this package and dissemination of germs into the LAF is possible. For supplier D, even the wipe down disinfection was not sufficient to reduce contamination to an acceptable amount. Most likely for this reason, the process of peeling resulted in contamination of the bags which originally were sterile.

Conclusion

The study was again able to reveal strong qualitative differences between examined suppliers, especially concerning the contamination of the secondary packaging of the infusion bags. Therefore, we recommend that every hospital pharmacy with an aseptic drug preparation service should analyse the microbiological quality of the used infusion bags on a regular basis and that the results should be taken into account when a supplier is contracted in order to minimise the risk of contamination of clean rooms and LAF hoods.