Building a database of Sterilization Dose Audit positives to analyse trends seen across the industry

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1. Introduction

Positive results on a Sterilisation Dose Audit (SDA) does not automatically mean that the sterilisation dose is inadequate. However shared knowledge of the types and sources of those surviving microorganisms could aid future sterility failure root cause investigations and improve understanding of the potential causes of microbial contamination.

Investigating the source of these survivors can be labour intensive and expensive for companies to conduct. There is limited guidance on how to investigate and/or provide corrective action to the most common causes of SDA failures. Nor is there a database of the most common causes of SDA positives.

Accepting that positives and failures do occur as part of routine monitoring is vital to enable collaboration and sharing of experiences and best practises.

2. Aim

To collect industry wide examples from Irradiation Panel Microbiology Working Group (MWG) members of microorganisms surviving sub-lethal doses, the dose level they survived, any investigation outcomes including what type of product they were recovered from and subsequent corrective actions.

Trending and analysis of the data to summarise the microbial types, source, most likely root causes and possible corrective actions.

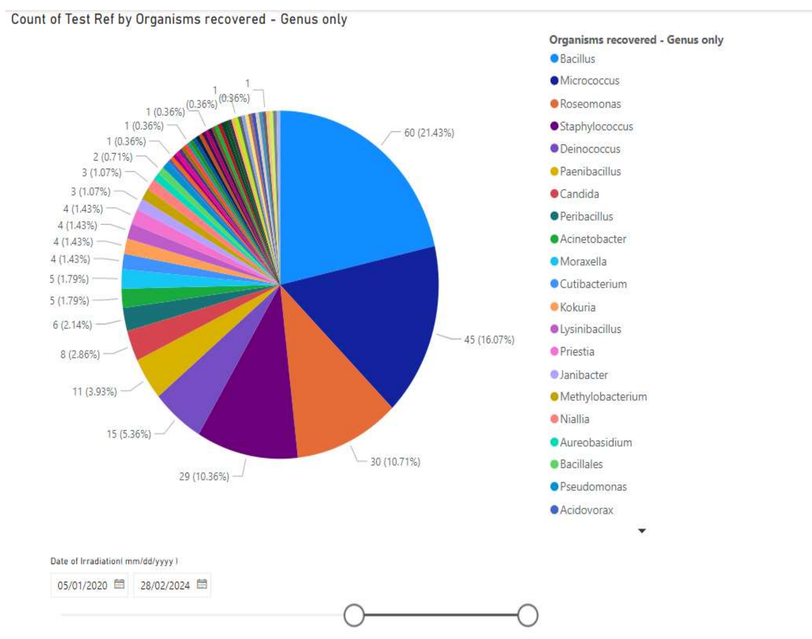
Gather case studies on investigation and corrective actions taken in order that the industry can collaborate and share pertinent information to aid future SDA failure investigations.

3. Key Deliverables

- Create a database of microbial identification results from SDA positives
- Conduct data analysis of SDA positives and related root causes
- Identify sources of SDA positives and how they were tracked and investigated
- Identify common themes in SDA positives and corrective actions taken
- Create guidance on SDA survivors and their origins in cleanroom manufacturing areas
- Investigation planning and corrective actions

4. Preliminary data collection trends

Preliminary results of the data show there are indeed common isolates surviving SDA doses and therefore learnings on how they were dealt with could be valuable to share amongst industry.



Micrococcus luteus on TSA

Staphylococcus hominis on TSA

Deinococcus spp. on TSA

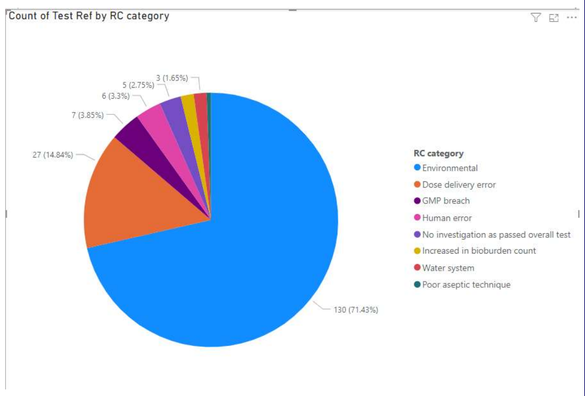
Since 2020 the top 5 surviving microorganisms are;
Bacillus spp.
Micrococcus spp.
Roseomonas spp.
Staphylococcus spp.
Deinococcus spp.

5. Who is contributing?

Ten companies are currently collaborating and have contributed data from SDA positives. their data remains anonymous and is not traceable to specific products. Becton Dickinson, Nelson Labs, Steris, Scapa Healthcare, Bayer, MVS Ltd, Swann Morton, Cytiva, Medtronic, Zimmer Biomet.

6. Indications of common root causes

- Environmental control failures leading to manufacturing environment contamination that then led to product contamination e.g. Air handling breakdown, HEPA filter failure, break in room integrity.
- GMP breaches in production
- Water systems, their maintenance, age and risk of biofilms



7. Dose survival

Data so far has shown that isolates have survived dose levels up to 13 kGy. There is published resistance data for many microorganism types; for example, the Irradiation Panel 'Database of D10 values of microbial resistances.' However, some microorganisms showing up as common trends do not yet have standardised published D10/ resistance values.
Therefore, highlighting the need for further resistance studies for many isolates and newly named isolates with more information on their sources.

Bacillus simplex on TSA

8. Case Studies and investigation pointers

Case studies from contributors describes their investigation and how they tracked and located the source of the SDA positive microorganisms. They include the kind of testing conducted; surface contact plates, air monitoring, water testing, raw material bioburden testing and describes how they found and eradicated the microorganism.

Example :
Roseomonas spp. caused a company repeated SDA positives and failures over time. The investigation included water, air and surface sampling. The water was then discounted as the root cause, but the isolate was found on surfaces and in the air of the manufacturing area.
The environmental reviews alongside this data showed failures in the environmental controls of the manufacturing area – once these were corrected and improved, the microorganism has not reappeared in SDA testing.

9. Concluding remarks

- The more contributions of data the better the data analysis
- Increased sharing of case studies around investigations will improve the output from the panel for others to use as guidance
- The MWG aims to create guidance to be accessed by members to assist investigations into SDA positives and failures to enable quicker turnaround of root cause tracking
- Industry collaboration is key