

What maximum shelf-life should be assigned to sterile injectable preparations?

A risk-based hierarchical classification approach

F. Kerouredan¹, P. Gueroue¹, M. Sangnier², A. Berroneau¹, G. Bouguéon^{1,3}

¹ Pharmaceutical Technology Department, Bordeaux University Hospital, Pessac, France ; ² Pharmaceutical Technology Department, Hospital group of Saintes-Saint-Jean d'Angely, Saintes, France;

³ ARNA laboratory, ChemBioPharm, INSERM U1212, UMR 5320 CNRS, University of Bordeaux, France

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CONTEXT

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Despite validated container integrity, physicochemical stability, qualified aseptic processes and 2023 GPP compliance, **maximum microbiological shelf-life remains uncertain.**

SHELF-LIFE ?

Risk-based judgement varies between institutions

RISK-BASED

GERPAC consensus conference approach [1]

OBJECTIVE

Explore a reproducible **classification** of sterile preparations by microbiological risk **integrating procedural complexity** to support more objective shelf-life assignment.

MATERIALS & METHODS

2

134

distinct
compounding
procedures

119

different
molecules

> 65.000

preparations produced / year

RISK-PRONE OPERATIONS

- Vial reconstitution
- Sampling and transfers
- Dilution
- Solvent addition / withdrawal
- Filtration

MULTIDISCIPLINARY REVIEW

- Chimio software
- Procedure-by-procedure review
- Consensus scoring grid

gentamicin	0	0	0	1,5	2	6
kanamycin	0	0	1	0	2	6
chloramphenicol	8	0	0	0	2	29
ig de rhinov	0	0	0	1,5	2	42
ig de strep - Gentaclon	0	0	0	1,5	2	22,5
ig de strep - Thymoglobuline	10	0	0	1,5	2	37,5
infliximab INFLECTRA REMSIMA	10	1	0	1,5	2	37,5
infliximab REMSIMA	2	1	0	0	2	8
galliumcitrate	0	0	0	1,5	2	15
infliximab	0	0	1	0	2	5
infliximab Remsima	0	0	0	0	2	7
kanamycin	0	0	0	1,5	2	12
kanamycin	2	0	0	0	2	7
meropenem	8	1	0	0	2	21

SCORING FRAMEWORK

3

Hierarchical classification grid

1 Number of compounding steps

2 Risk associated with each step

3 Nature of the drug substance

4 Route of administration

FINAL SCORE → RISK LEVEL

LOW

INTERMEDIATE

HIGH

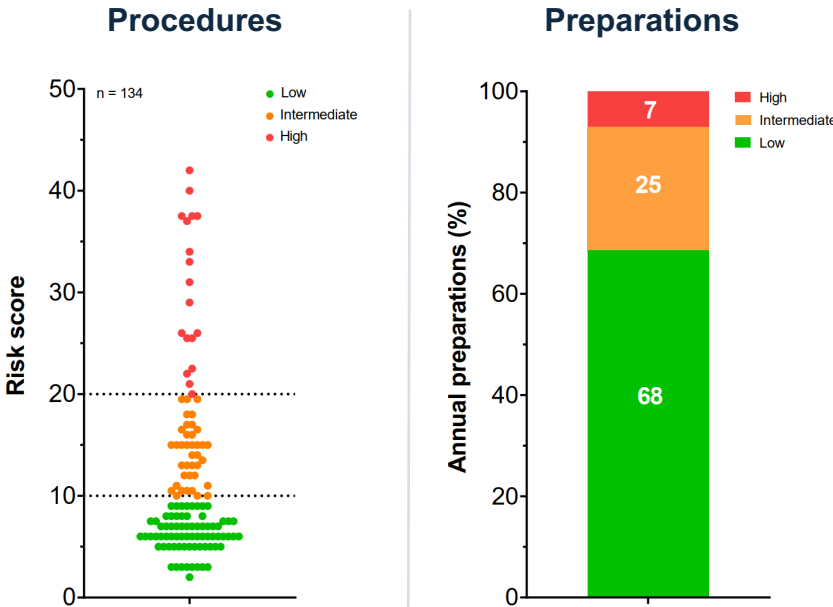
→ Higher score = **increased microbiological risk**

→ Final decision regarding shelf-life **remains pharmacist-led**

RESULTS

4

Quantitative risk profile



LOW-RISK PROFILE

Ready-to-use vials
Few preparation steps
No volume adjustment
SC admin. route
Ex: Bortezomib,
Daratumumab

→ LOWER PROCEDURAL
COMPLEXITY

HIGH-RISK PROFILE

Multiple-vial reconstitution
Transfers / volume
adjustments
Multiple preparation steps
Ex: Treosulfan,
Blinatumomab

→ HIGHER PROCEDURAL
COMPLEXITY

DISCUSSION & CONCLUSION

5

Shelf-life implications

LOW RISK → shelf-life
extension may be considered

HIGH RISK → reassess
anticipatory compounding

BEYOND COMPOUNDING

→ Risk can evolve throughout
the preparation life cycle.

WARD
RETURNS

MULTIPLE
REASSIGN
MENTS

COLD-
CHAIN
BREAKS

NEXT STEP

- Validate the risk levels with appropriately designed media-fill tests (MFTs)
- Assess transferability to other institutions.

CONCLUSION

A hierarchical grid objectifies microbiological risk while final shelf-life assignment remains a pharmacist-led judgement.