

Adaptation of the EUCAST-based "CA-SFM2022" algorithm for carbapenemase detection on VITEK 2®

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Introduction

The incidence of carbapenemase-producing Enterobacterales (CPE) is increasing, and the management of these infections is complex and costly. The French National Antibiotic Committee of EUCAST (i.e **CA-SFM**) has proposed an updated algorithm **based on EUCAST** recommendations for CPE detection in 2022 using diffusion susceptibility testing. It used mainly susceptibility to **Ceftazidime-Avibactam**, **Temocillin and carbapenems**. However, many laboratories use **VITEK2®** instrument (BIOMERIEUX), where **only carbapenems are recommended as a screening criterion**. Furthermore, **not all susceptibility cards used contain all the antibiotics needed for EPC screening**.

Objectives

1

Evaluate the **performance of the EUCAST/CA-SFM2022 algorithm based on a diffusion method with an automated method** on a reference test population

2

Evaluate the **performance of these two algorithms for detecting CPE** in a "test" population

Materials and Methods

Retrospective study : 2021.01 → 2023.06



Rectal screening : reference test population using ChromID® Carba/OXA48 agar combined with phenotypic (RESIT5, Coris BioConcept; Rapidec NP Carba, BIOMERIEUX) and/or genotypic (GeneXpert Carba, Cepheid) tests for CPE detection.

Blood cultures : validation population using AST for CPE detection

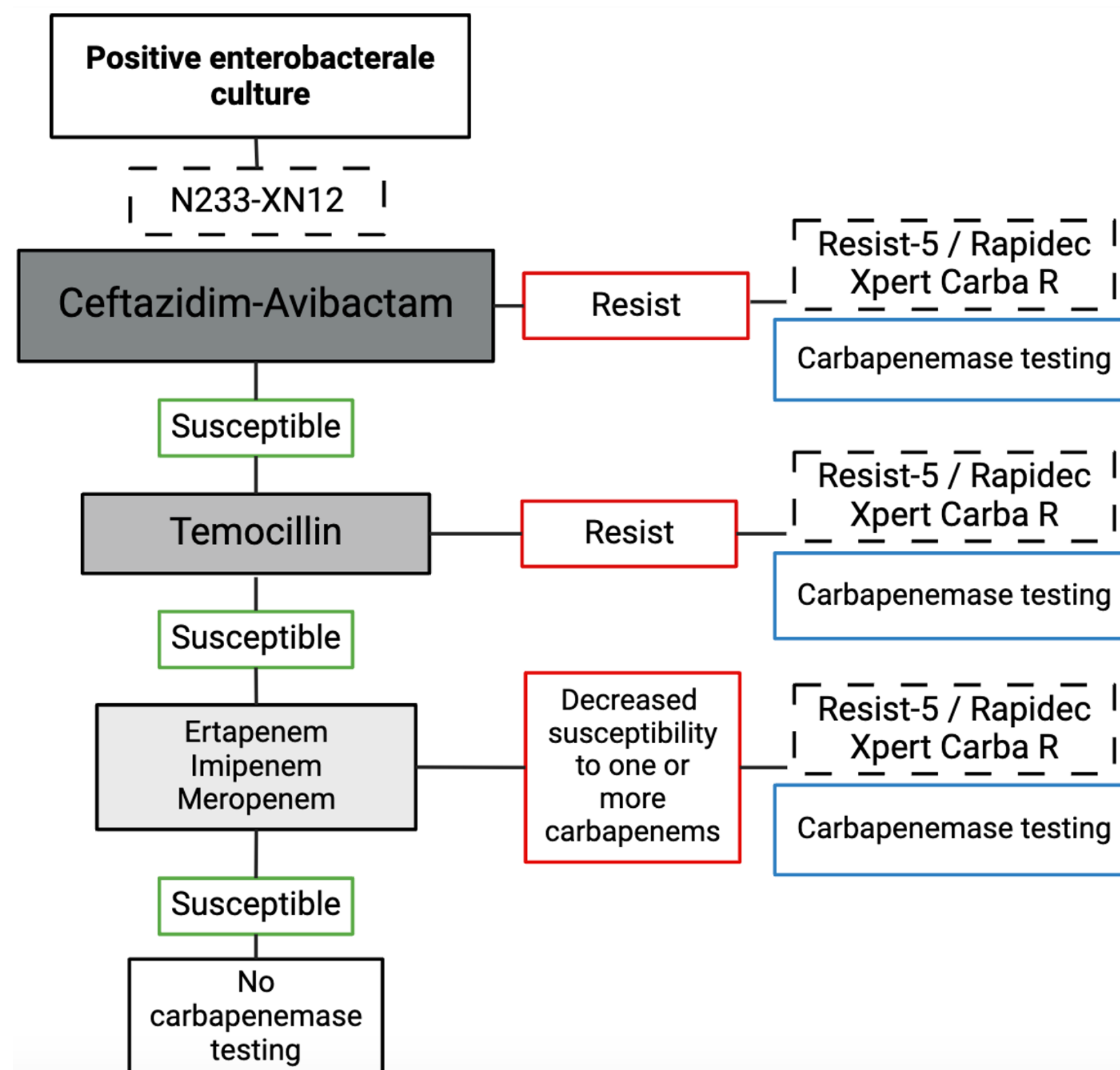
Application of the 2 algorithms to both types of samples

Agreement / disagreement of detection

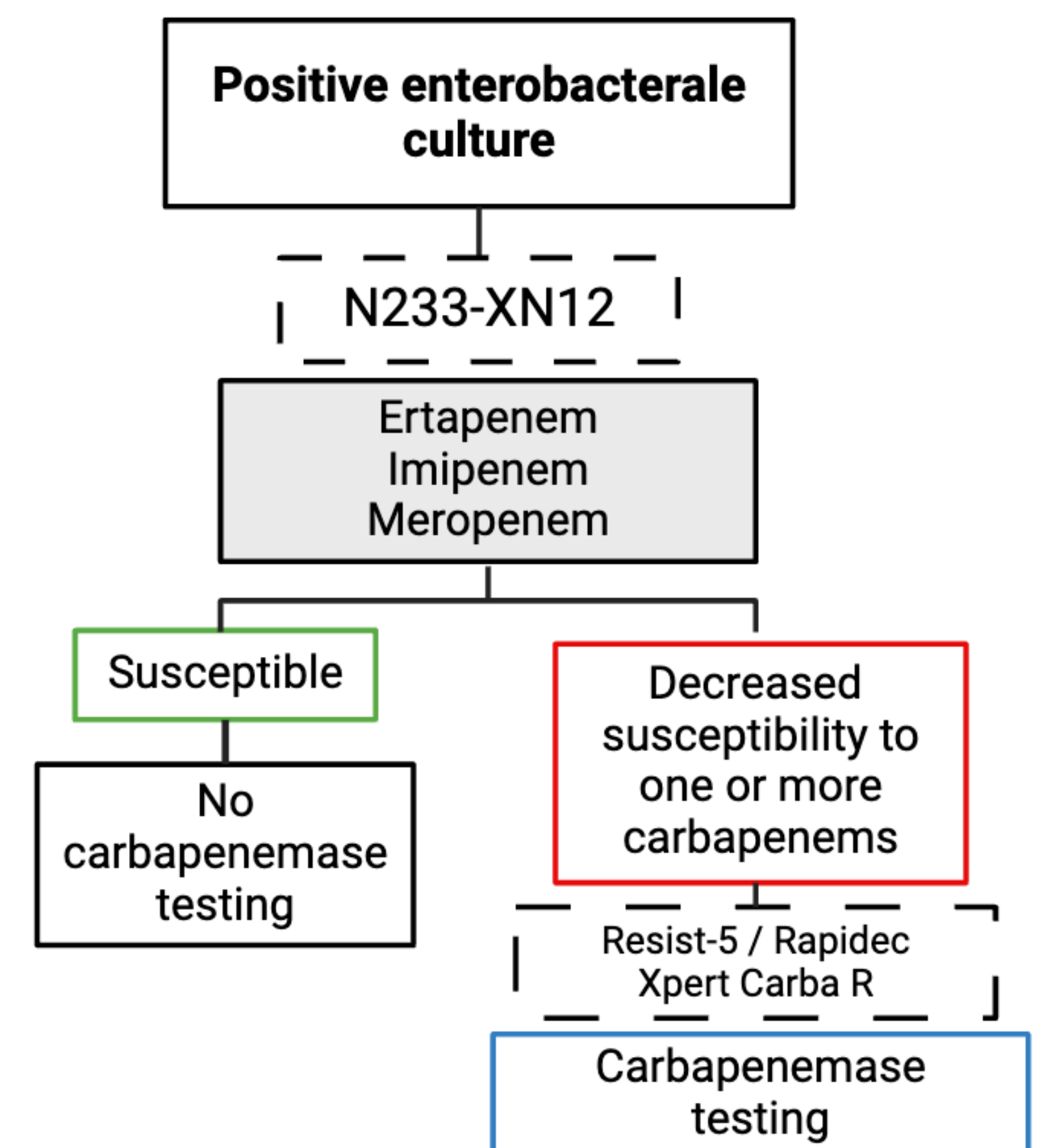
Comparison with phenotypic and/or genotypic tests carried out systematically and when necessary, for the reference test population and the validation population respectively.

Sensitivity analysis for each algorithm on the two types of samples

Adapted EUCAST based CA-SFM algorithm



VITEK2® Carbapenem alteration only algorithm



Results

	Detected carbapenemase (%)	Undetected Carbapenemase (%)	Total	
Carbapenemase testing	1260 (100)	130 (92,2)	1390	Rectal swab screening Se = 100%
No carbapenemase testing	0	11 (7,8)	11	
Total	1260	141	1401	
	Detected carbapenemase (%)	Undetected Carbapenemase (%)	Total	
Carbapenemase testing	49 (100)	192 (3,9)	241	Blood culture Se = 100%
No carbapenemase testing	0	4708 (96,1)	4708	
Total	49	4900	4949	

EUCAST based CASFM2022 algorithm for CPE detection is sustainable on VITEK2® system

	Detected carbapenemase (%)	Undetected carbapenemase (%)	Total	
Carbapenemase testing	1223 (97.1)	114 (80.9)	1337	Rectal swab screening Se = 97.1%
No carbapenemase testing	37 (2.9)	27 (19.1)	64	
Total	1260	141	1401	
	Detected carbapenemase (%)	Undetected carbapenemase (%)	Total	
Carbapenemase testing	48 (97.9)	127 (2.6)	175	Blood culture Se = 97.9%
No carbapenemase testing	1 (2.0)	4773 (97.4)	4774	
Total	49	4900	4949	

The VITEK2® algorithm for CPE detection using carbapenems CMI alone is not optimal

Conclusion

Despite the overestimation of carbapenem MICs by VITEK 2, the CPE detection algorithm based solely on carbapenems (MICs) is unsatisfactory.

1

Under-detection of CPE has significant consequences: **inappropriate antibiotic therapy, outbreak risk, etc.**

2

The VITEK2® algorithm systematically uses the 3 carbapenems requiring the use of 2 antibiotic cards. **What about samples using a card testing 1 or 2 carbapenems only?**

3

Cost of this strategy: use of **2 cards systematically** with targeted antibiotic susceptibility testing for Urine Culture ?