Epidémiologie de la résistance aux antibiotiques chez les bactéries nosocomiales, Belgique

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Programmes de surveillance de la resistance en Belgique

- Surveillances épidémiologiques continues par Sciensano
  - EARS-Net (facultatif)
  - NSIH (partiellement obligatoire): MRSA, VRE, MRBGN suivi de l'incidence et la résistance dans les hôpitaux
- Surveillances microbiologiques périodiques
  - CNRs: CHU-UCL Namur, UZ-Antwerpen, LHUB-ULB
  - Hôpitaux: surveillances moléculaires tous les +/- 2 ans
  - MR/MRS (EPAD): surveillance épidémiologique et moléculaire tous les 5 ans

Surveillance des infections liées aux soins & antibiorésistance (NSIH)

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Surveillance nationale des infections dans les établissements de soins de santé - NSIH

Sur cette page, vous trouverez davantage d'informations sur l'enregistrement de vos données de santé dans le cadre des surveillances NSIH.

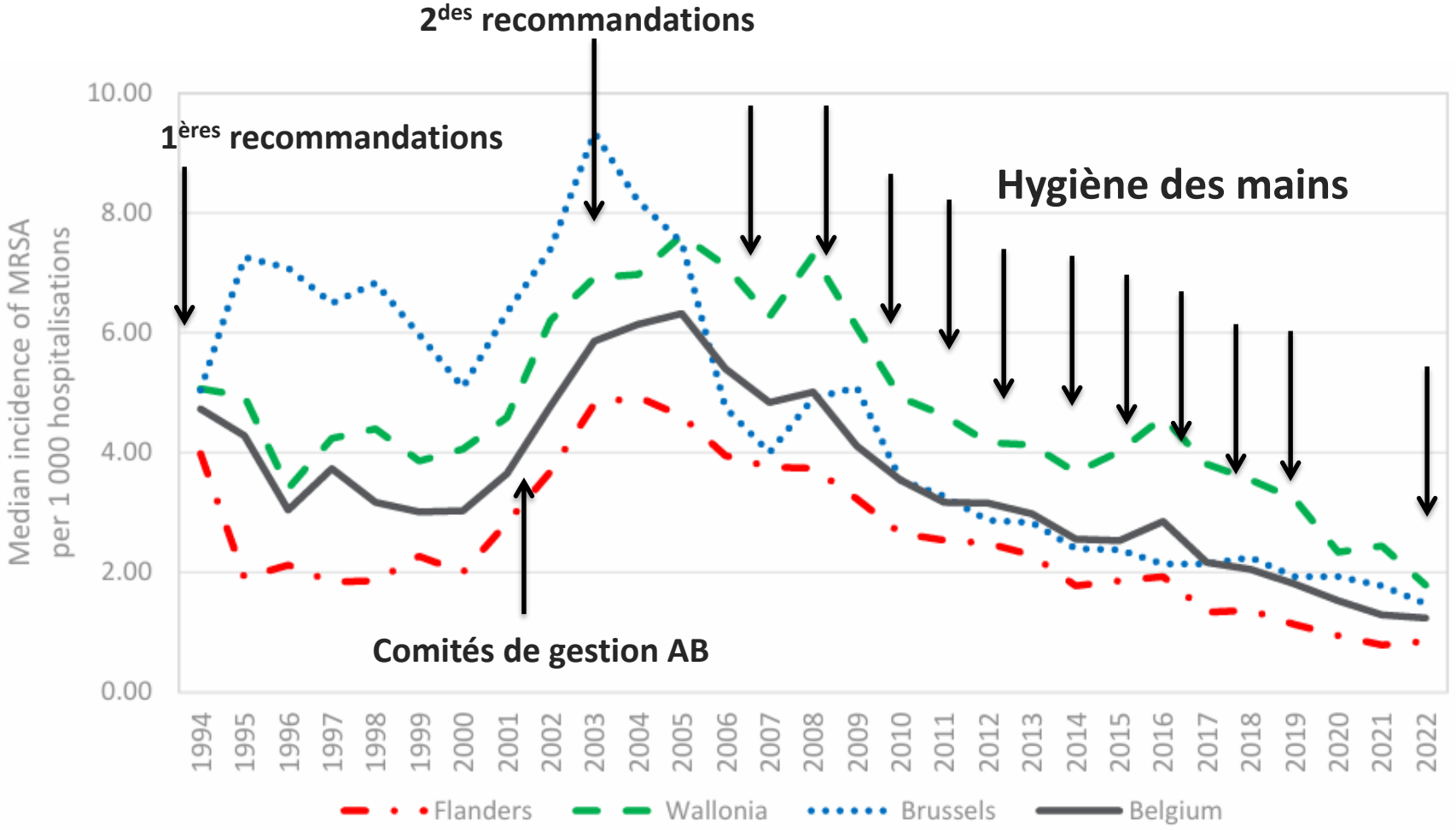
Instructions pour l'enregistrement de vos données de santé

Les **instructions d'enregistrement** varient en fonction de la surveillance. Cliquez ci-dessous sur la surveillance concernée pour obtenir les instructions adéquates.

- **Surveillance nationale des septicémies dans les hôpitaux belges (BSI)**
- **Surveillance nationale de la résistance aux antimicrobiens (MRSA, MRGN, VRE)**
  - **La participation annuelle** aux surveillances **MRSA** (*Staphylococcus aureus* résistant à la méticilline) et **MRGN** (bactéries à gram négatif multirésistantes) est **obligatoire** pour tous les hôpitaux aigus pendant au moins 1 semestre.
  - La participation à la surveillance **VRE** (entérocoques résistants à la vancomycine) est **facultative** pour tous les hôpitaux aigus. Il y a toutefois une obligation de participer à au moins l'une des 4 surveillances suivantes : CDIF, SSI, ICU et VRE. Lors de la participation à la **surveillance VRE**, des **données annuelles** doivent être collectées.
  - Les données sont collectées au moyen d'un formulaire de surveillance unique (fichier Microsoft Excel) disponible sur la page du projet de la surveillance AMR.
  - Plus d'informations, notamment les protocoles d'étude, sont disponibles sur la **page du projet.**
- **Surveillance nationale des infections à *Clostridioides difficile* dans les hôpitaux belges (NSIH-CDIF)**
- **Surveillance nationale des infections des plaies postopératoires (NSIH-SSI)**
- **Surveillance nationale des infections contractées dans les unités de soins intensifs (NSIH-ICU)**
- **Surveillance européenne de la résistance aux antimicrobiens : Belgique (EARS-BE)**
- **Surveillance hospitalière belge de la consommation d'antimicrobiens (BeH-SAC)**
- **Campagne nationale d'hygiène des mains (HHC)**
- **Indicateurs de qualité en hygiène hospitalière dans les hôpitaux aigus (NSIH-QI)**
- **Module du dénominateur et variables communes (NSIH-DENO)**

https://www.sciensano.be/fr/surveillance-nationale-des-infections-dans-les-etablissements-de-soins-de-sante-nsih

Evolution de l'incidence des MRSA dans les hôpitaux, surveillance NSIH, 1994-2022



Source: National surveillance

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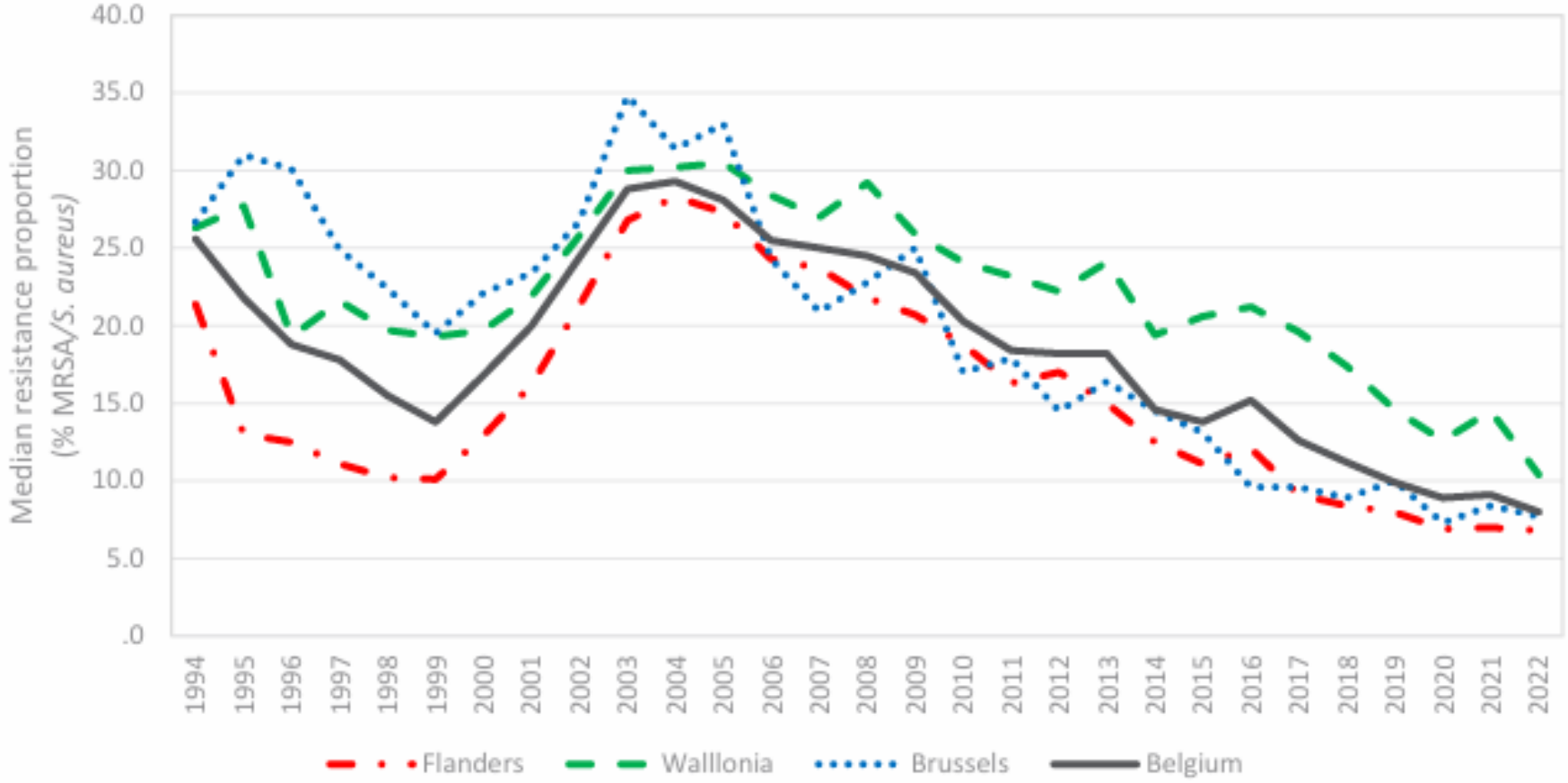
Evolution de la résistance à la méticilline des *S. aureus* dans les hôpitaux, NSIH, 1994-2022



Source: National surveillance

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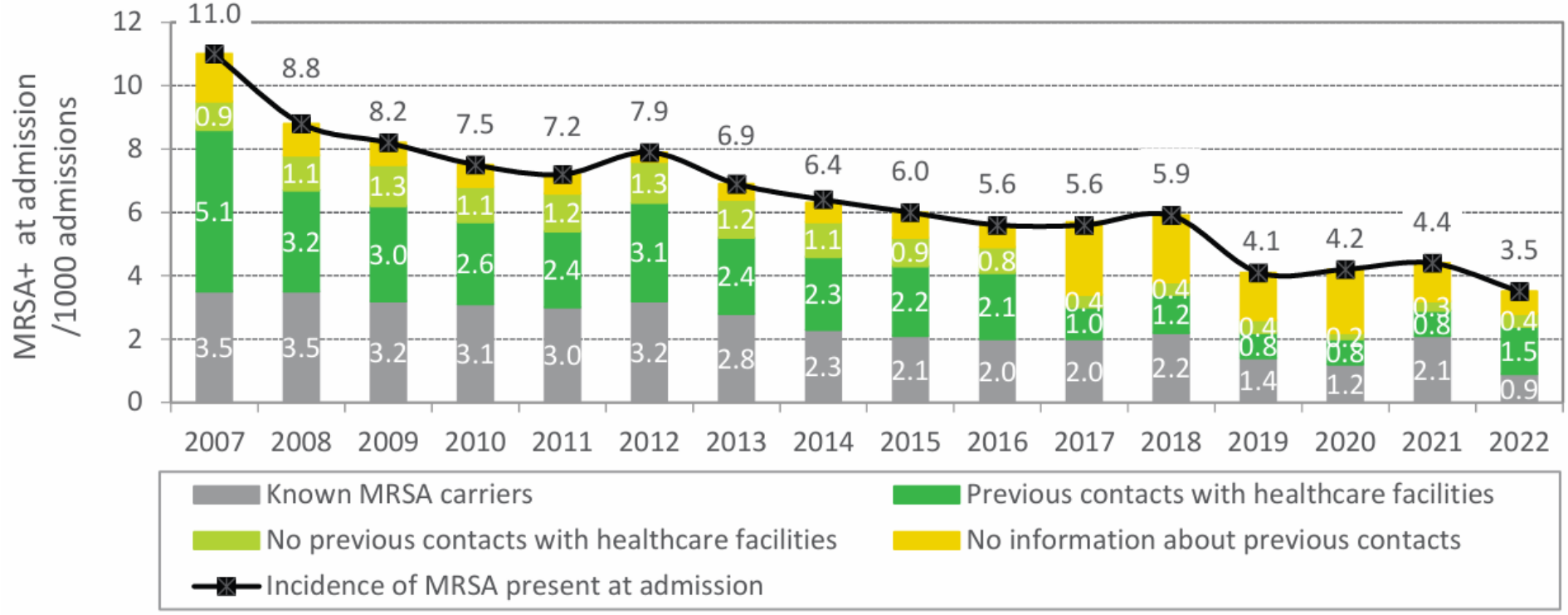
Evolution de l'incidence des MRSA selon les ATCD, hôpitaux, surveillance NSIH, 2007-2022



Source: National surveillance

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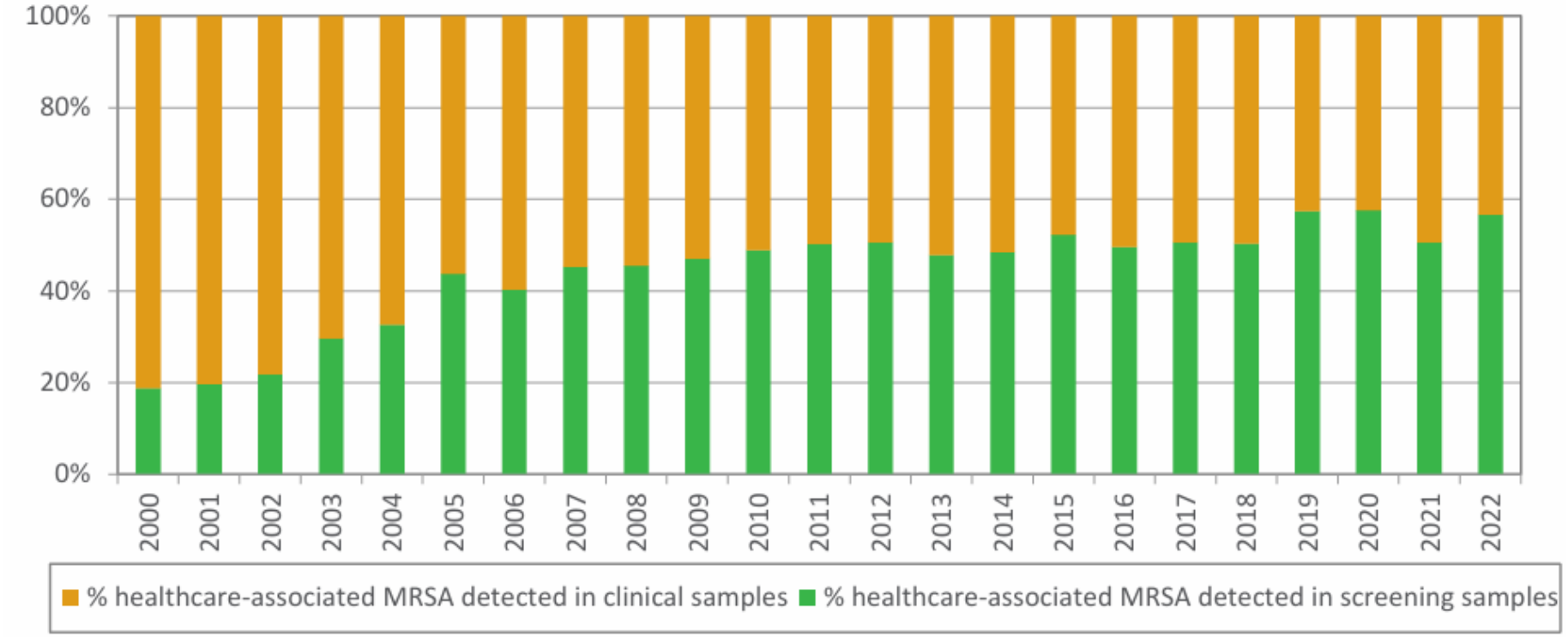
Proportion MRSA prélèvements cliniques versus dépistage, hôpitaux, surveillance NSIH, 2000-2022

Figure 9. Evolution of the crude proportion of healthcare-associated methicillin-resistant *Staphylococcus aur*
(MRSA) detected by clinical samples or by screening samples, Belgian acute care hospitals, 2000-2022



Source: National surveillance

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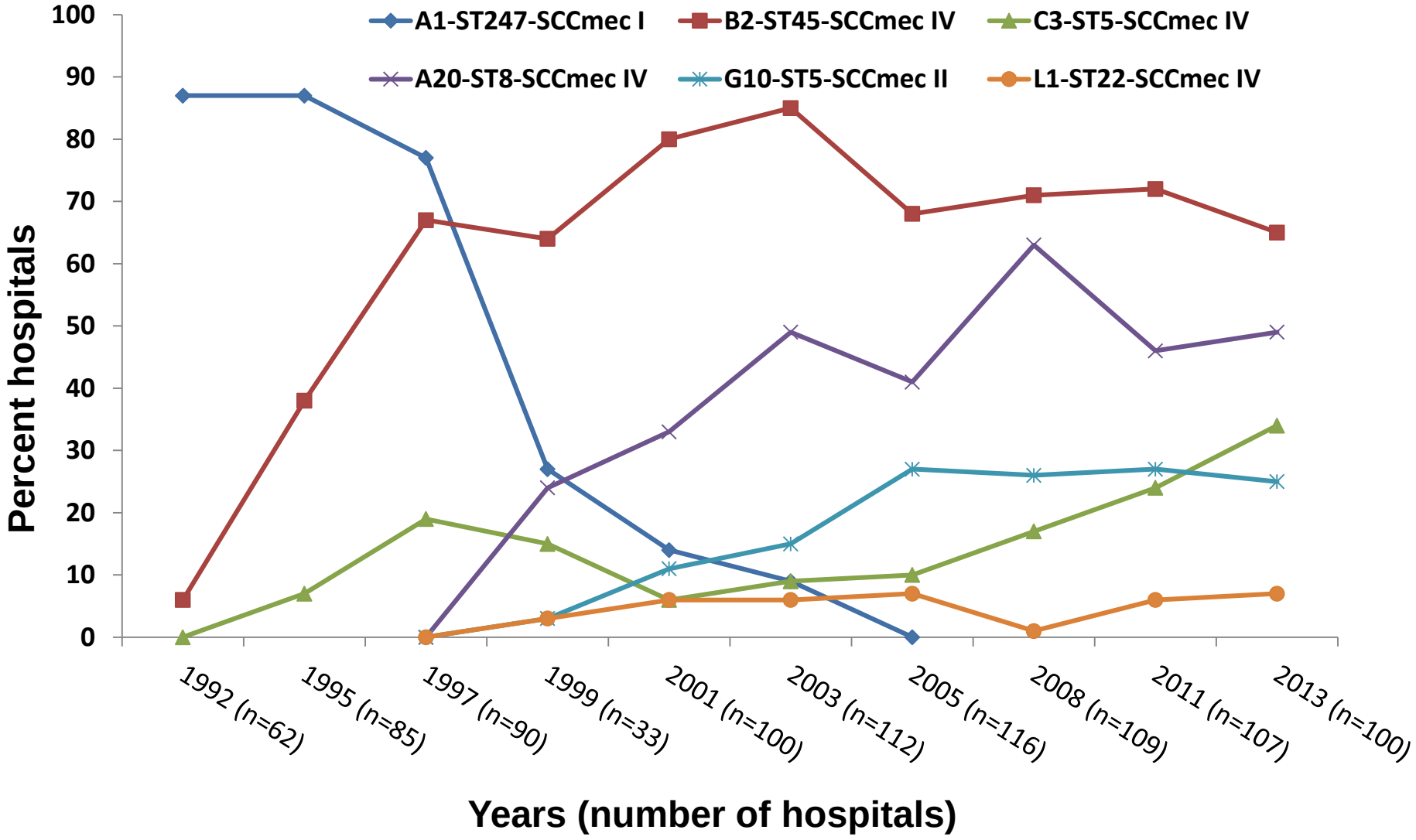
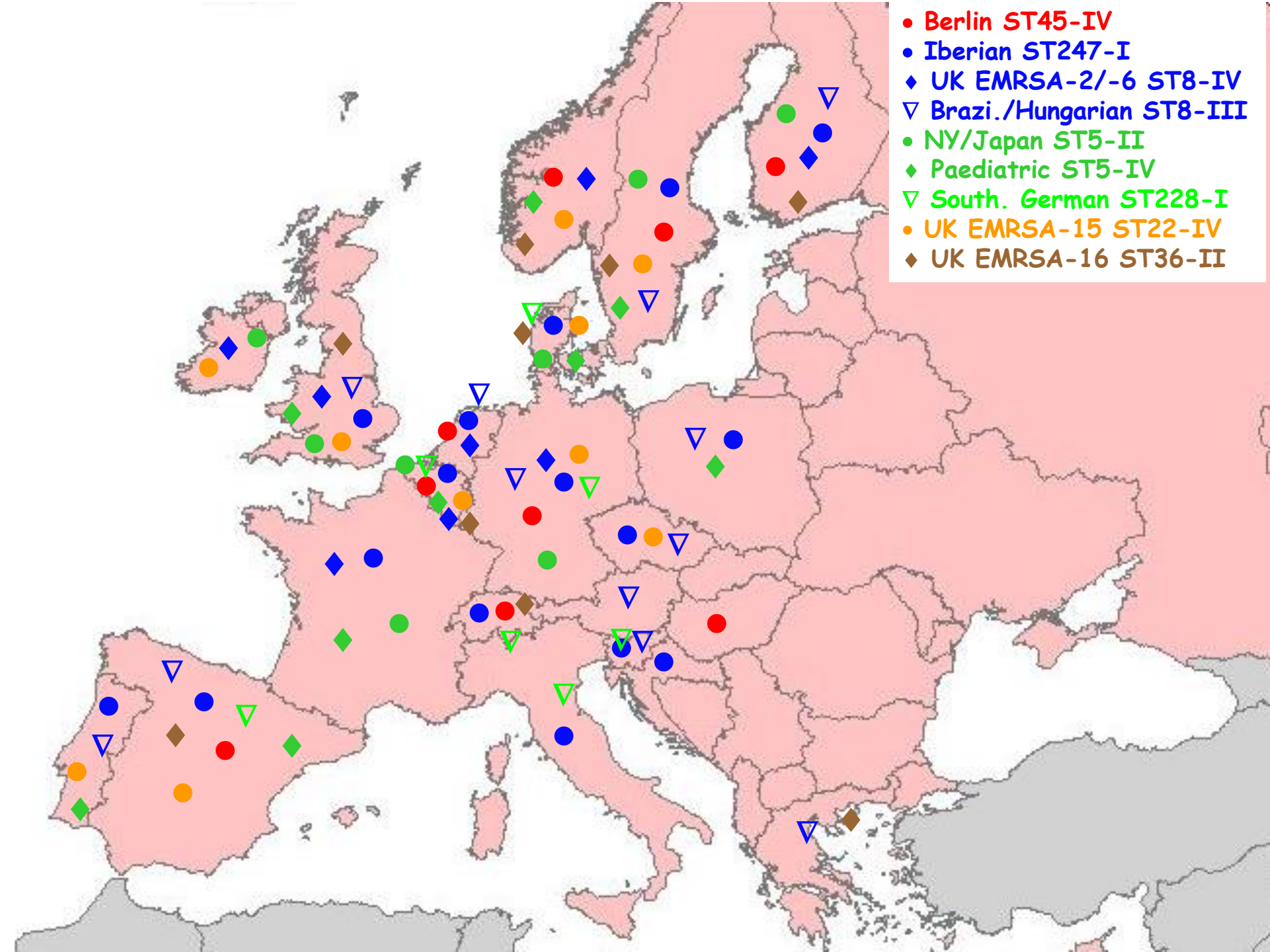
Secular trends of MRSA clonal distribution

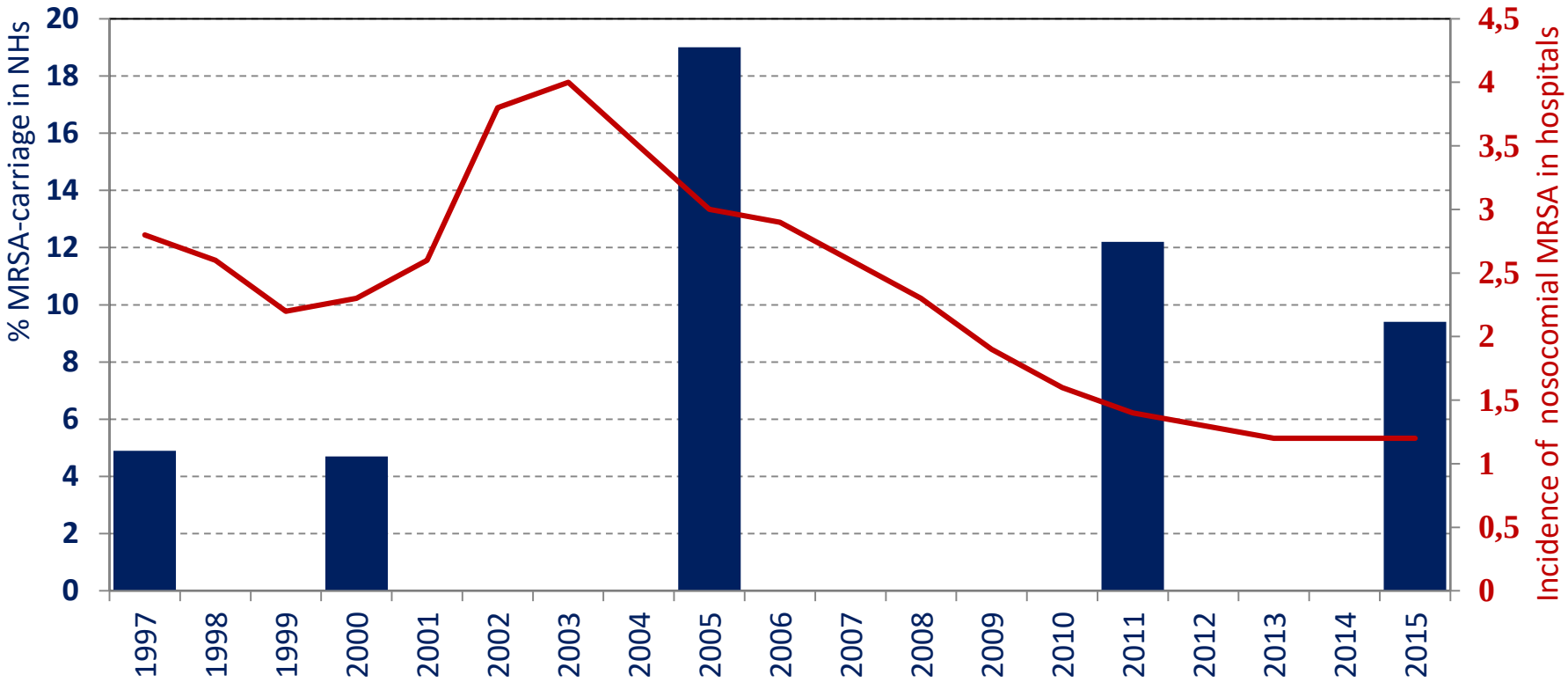
National Surveillance, hospitals, Belgium 1992-2013



Deplano *et al.* CMI 2000; Denis *et al.* JAC 2002; MDR 2003; AAC 2004; AAC 2006; Vandendriessche *et al.* EJCM 2012


Berlin ST45-IV
Iberian ST247-I
UK EMRSA-2/-6 ST8-IV
Brazi./Hungarian ST8-III
NY/Japan ST5-II
Paediatric ST5-IV
South. German ST228-I
UK EMRSA-15 ST22-IV
UK EMRSA-16 ST36-II

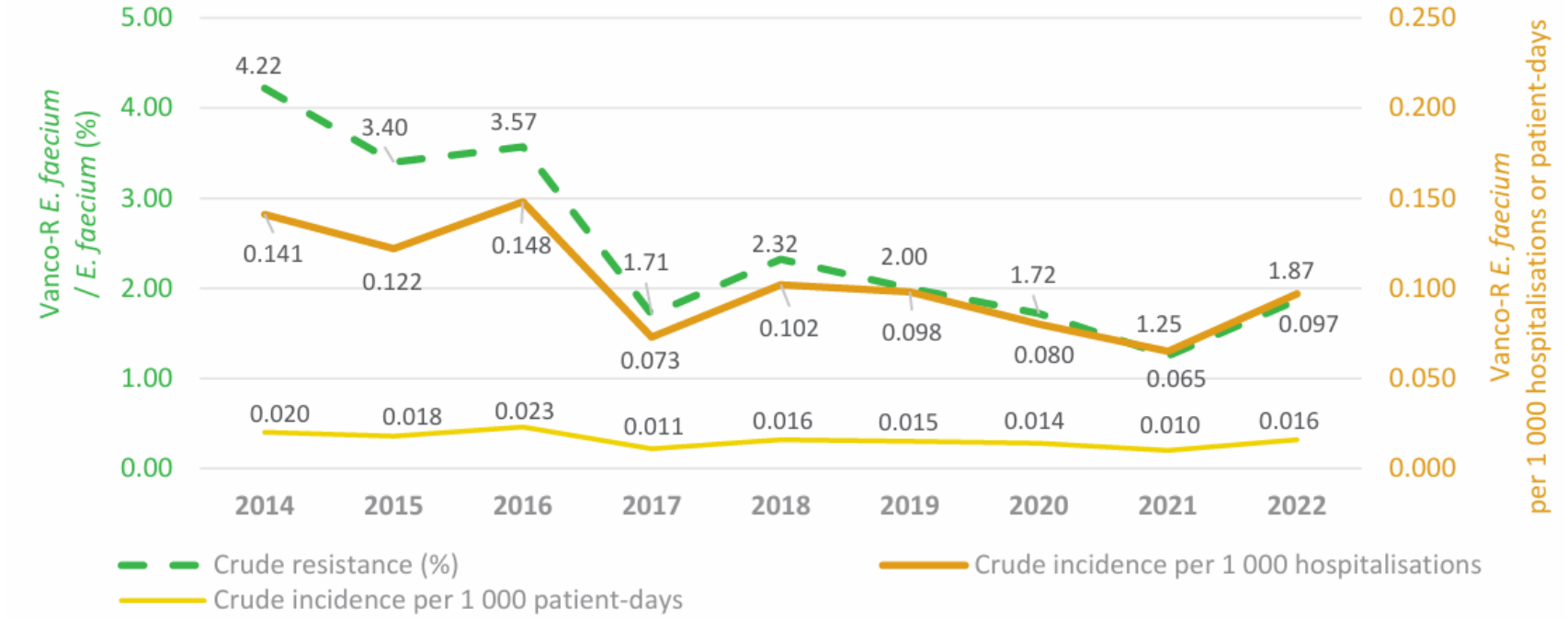
Evolution du portage de MRSA (%) chez les résidents de MR/MRS, Belgique: 1997-2015



17 MR/MRS (1997)	24 MR/MRS (2000)	60 MR/MRS (2005)	60 MR/MRS (2011)	29 MR/MRS (2015)
4.9 % MRSA	4.7 % MRSA	19 % MRSA	12.2 % MRSA	9.0%
	(0% - 14%)	(2% - 43%)	(0% - 36%)	(0% - 22%)

Evolution de l'incidence des VR *E. faecium*, hôpitaux, surveillance NSIH, 2014-2022

Figure 14. Evolution of the crude resistance proportion, incidence (per 1 000 hospitalisations) and incidence density (per 1 000 patient-days) of vancomycin resistance in Enterococcus faecium (clinical samples only), Belgian acute care hospitals, 2014-2022



Note: Prior to 2016, vancomycin resistance was separated under vancomycin resistance (defined as vanco-R and susceptible to teicoplanin or susceptibility unknown) and glycopeptide resistance (defined as vanco-R and teicoplanin resistant). Since 2017, vancomycin resistance is questioned independently from the susceptibility to teicoplanin.

Source: National surveillance

Evolution de l'incidence du nombre de cluster à VRE, hôpitaux, surveillance NSIH, 2014-2022

Table 10. Evolution of the number of outbreaks reported in the national surveillance of resistant, Belgian acute care hospitals, 2014-2022

	2014	2015	2016	2017	2018	2021	2022	2021	2022
N of hospitals reporting an outbreak (%)	3/40 (7.5)	7/75 (9.3)	7/95 (7.4)	13/98 (13.3)	13/96 (13.5)	16/91 (17.6)	5/89 (5.6)	4/106 (3.8)	11/106 (10.4)
N of hospitals with no answer/no type D data	0	0	1	4	13	10	14	11	11
N of clusters (min-max)	3 (1-1)	11 (1-4)	12 (1-3)	21 (1-6)	28 (1-13)	19 (1-3)*	7 (1-2)	3 (1-2)*	14 (1-3)
N of patients involved	68	140	247	166	164	285	27	10	723
% patients colonised	*79.4*	*87.7*	*88.8*	*89.8*	*88.4*	*93.1*	*77.8*	*90.0*	*91.2*
% patients infected	*20.6*	*12.3*	*11.2*	*10.2*	*11.6*	*6.9*	*22.2*	*10.0*	*8.8*

*data missing for two hospitals

Source: National surveillance

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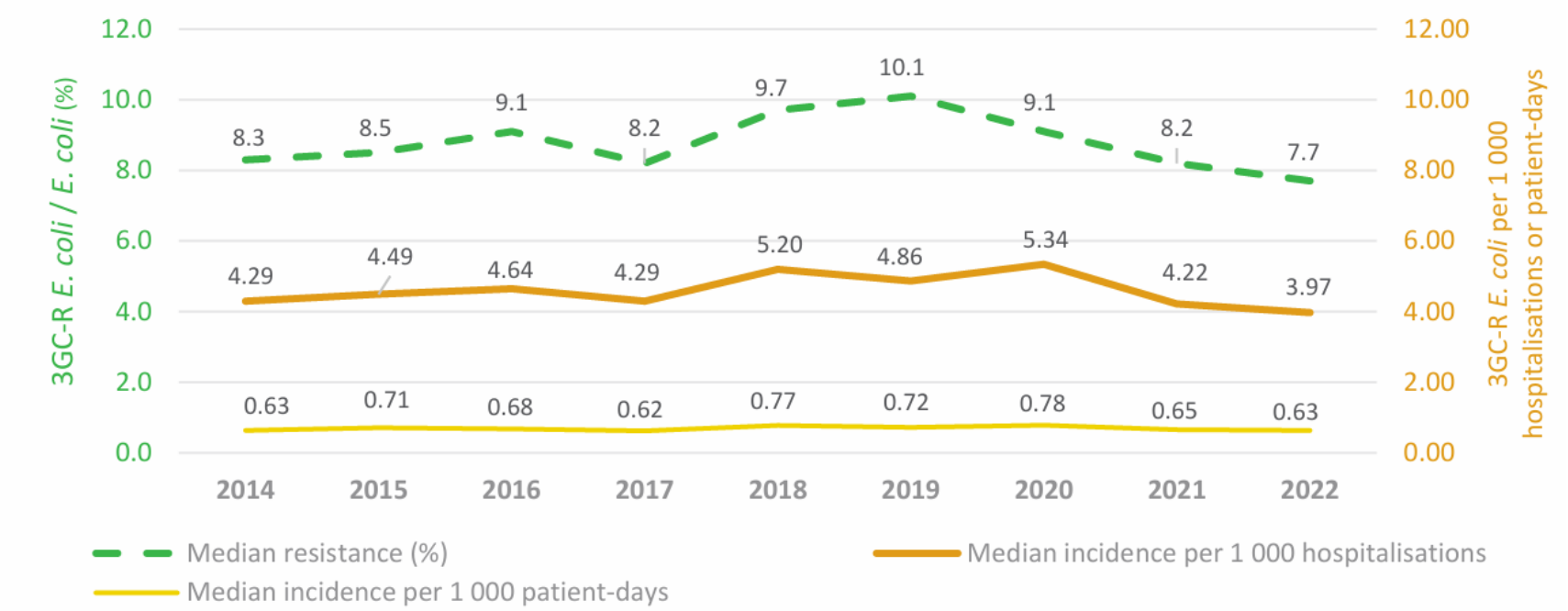
Evolution de l'incidence et de *E. coli* résistants aux C3G, hôpitaux, NSIH, 2014-2022

Figure 15. Evolution of the median resistance proportion, incidence (per 1 000 hospitalisations) and incidence density (per 1 000 patient-days) of *Escherichia coli* resistant to third generation cephalosporins (clinical samples only), Belgian acute care hospitals, 2014-2022

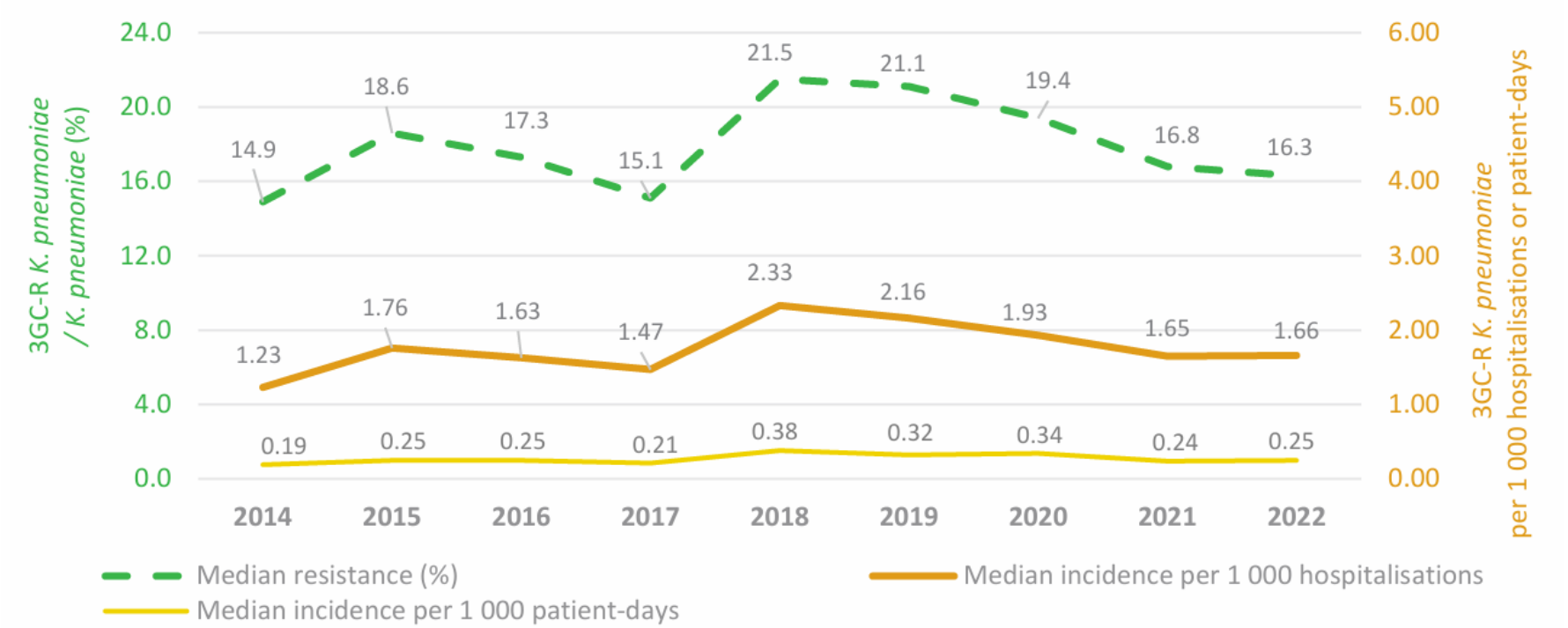


3GC-R = resistant to 3rd cephalosporins; note: prior to 2018 non-susceptibility to 4th generation cephalosporins was included, prior to 2021 I/R (resistant, incl. also susceptible, increased exposure (intermediate result)) is displayed.

Source: National surveillance

Evolution de l'incidence et de *K. pneumoniae* résistants aux C3G, hôpitaux, NSIH, 2014-2022

Figure 16. Evolution of the median resistance proportion, incidence (per 1 000 hospitalisations) and incidence density (per 1 000 patient-days) of *Klebsiella pneumoniae* resistant to third generation cephalosporins (clinical samples only), Belgian acute care hospitals, 2014-2022



3GC-R = resistant to 3rd cephalosporins; note: prior to 2018 non-susceptibility to 4th generation cephalosporins was included, prior to 2021 I/R (resistant, incl. also susceptible, increased exposure (intermediate result)) is displayed.

Source: National surveillance

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RESEARCH ARTICLE

Prevalence of multidrug-resistant organisms in nursing homes in Belgium in 2015

Katrien Latour[1,2☯*], Te-Din Huang[3☯], Béatrice Jans[1], Catherine Berhin[3], Pierre Bogaerts[3], Audrey Noel[3], Claire Nonhoff[4], Magali Dodémont[4], Olivier Denis[5], Margareta Ieven[6], Katherine Loens[6], Didier Schoevaerdts[7,8], Boudewijn Catry[1,5], Youri Glupczynski[3]

- Méthode
  - 51 résidents sélectionnés dans MR/MRS
  - Frottis rectal pour VRE, ESBL et CPE
  - Frottis nez, gorge et périnée pour MRSA
- Résultats
  - 1447 résidents
  - MRSA 9,0%; ESBLE 11,3%, co-colonisation chez 1,8% des résidents
  - VRE et CPE un résident

E. coli dans 83,1%
K. pneumoniae dans 16,9%

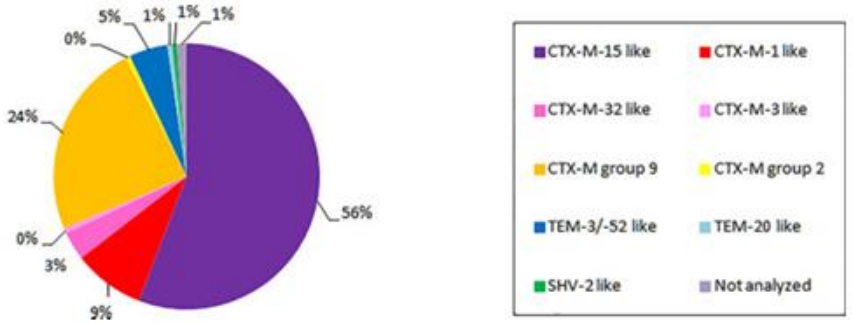


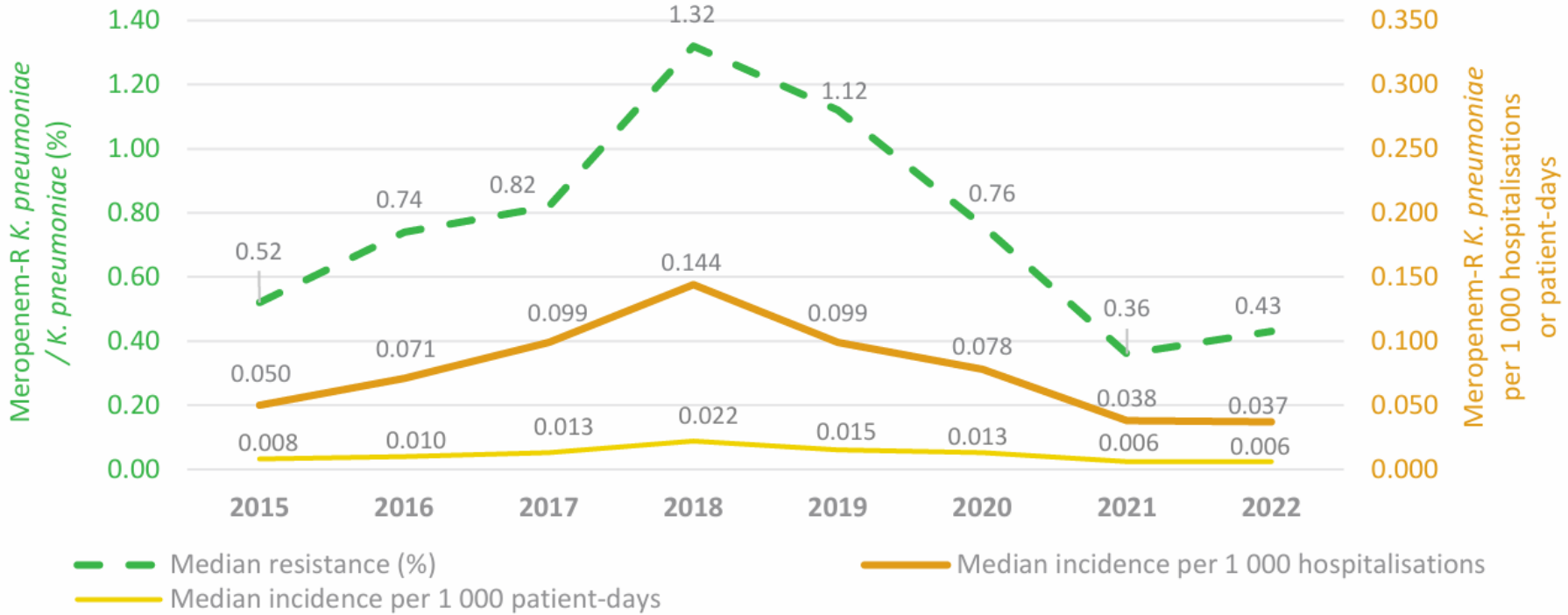
Fig 1. Distribution of ESBL-producing *Enterobacteriaceae* by type of enzyme (n = 172 isolates).

https://doi.org/10.1371/journal.pone.0214327.g001

Latour K et al Plos One 2019

Evolution de l'incidence et de *K. pneumoniae* résistants au méropénem, hôpitaux, NSIH, 2015-2022

Figure 17. Evolution of the median resistance proportion, incidence (per 1 000 hospitalisations) and incidence density (per 1 000 patient-days) of *Klebsiella pneumoniae* resistant to meropenem (clinical samples only), Belgian acute care hospitals, 2014-2022



Note: prior to 2021 I/R (resistant, incl. also susceptible, increased exposure (intermediate result)) is displayed.

Source: National surveillance

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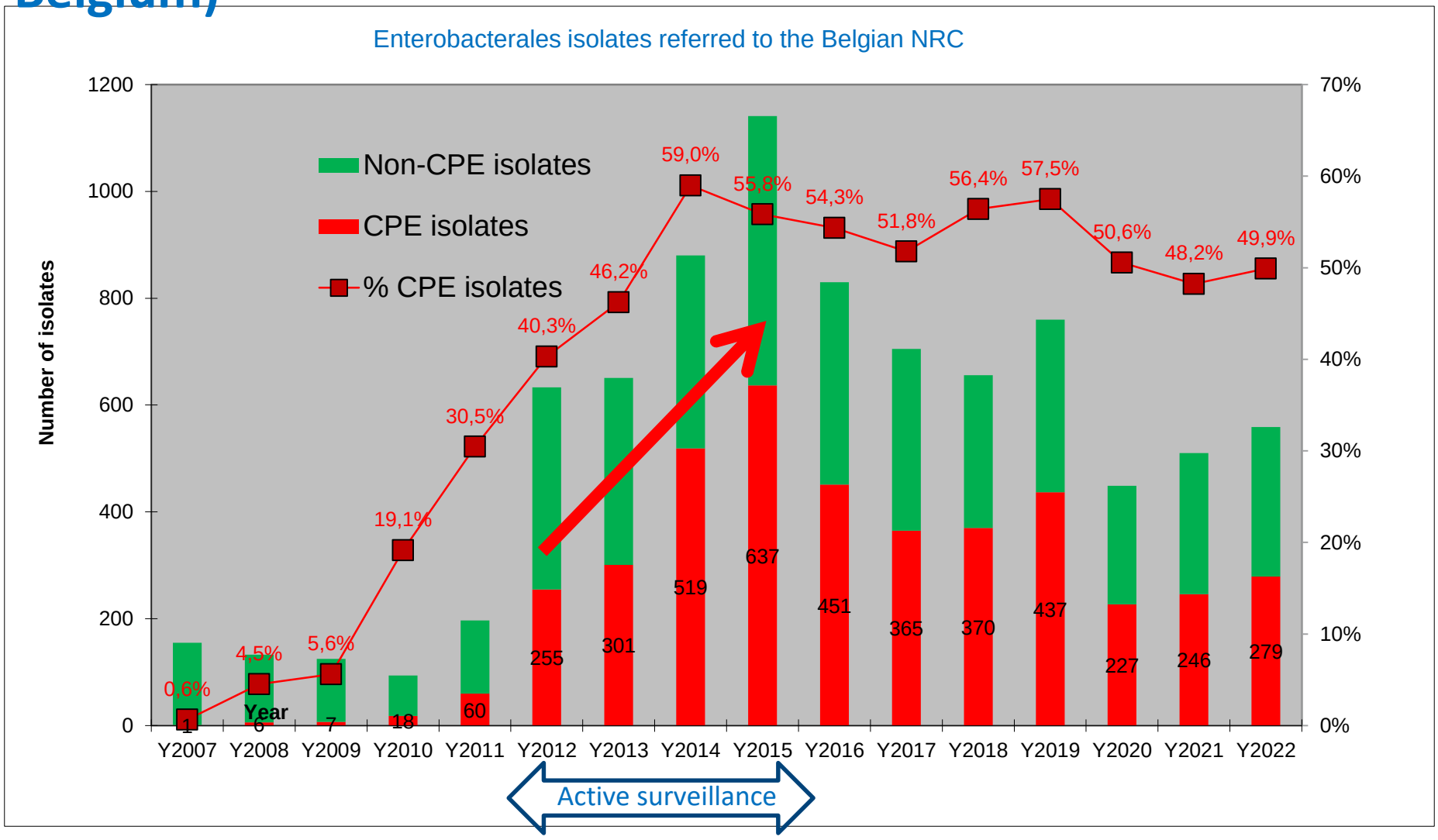
Enterobacterales referred for CPE confirmation (NRC, Belgium)

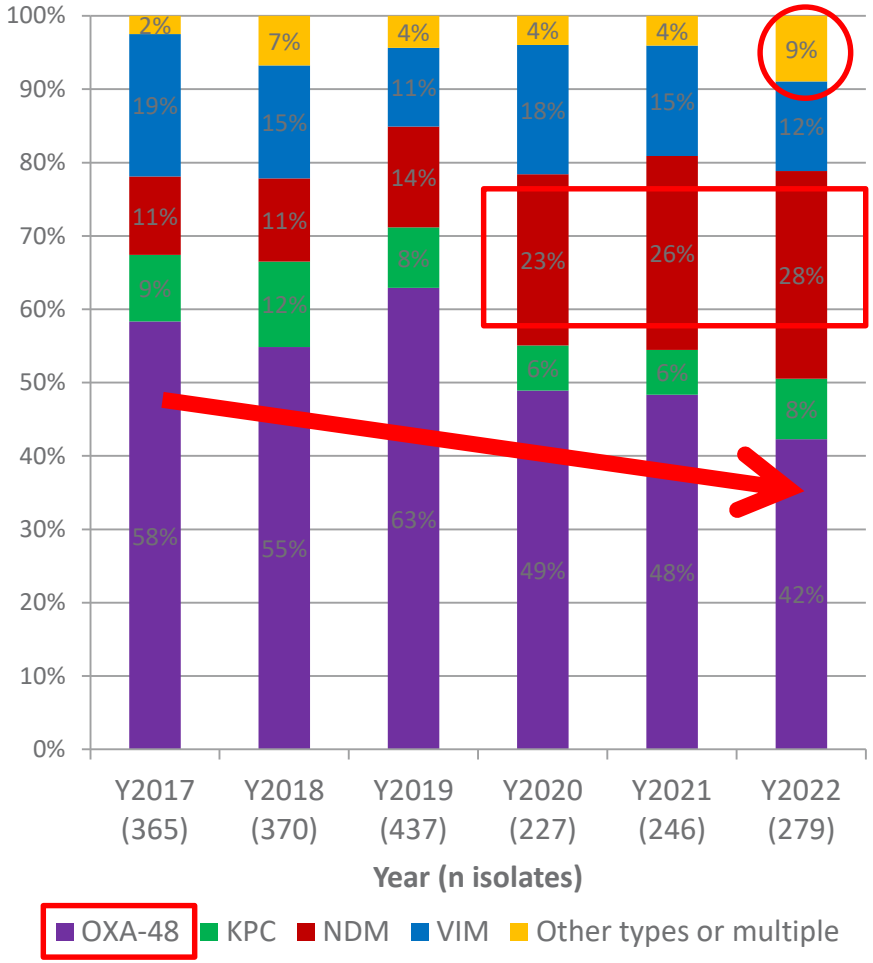


→ **Significant increase (2010-2015) in number and proportion of confirmed CPE**

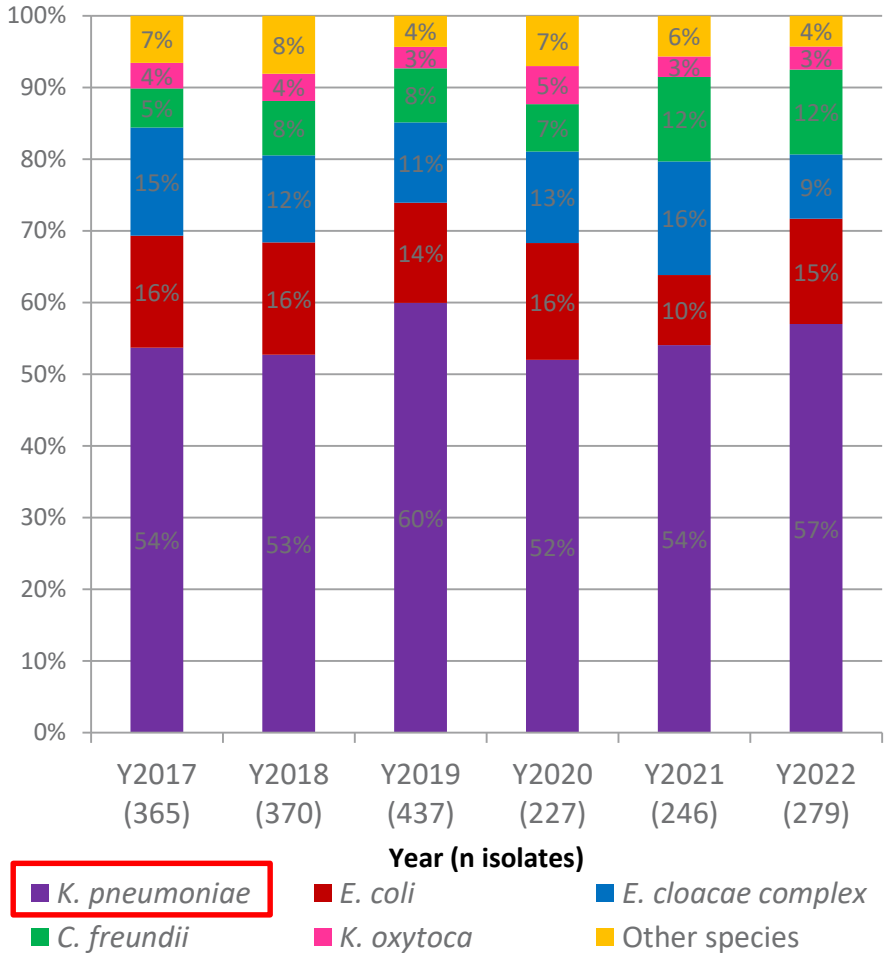
Belgium NRC data 2022

Yearly distribution of CPE (NRC, Belgium)

Carbapenemase type distribution of CPE



Species distribution of CPE

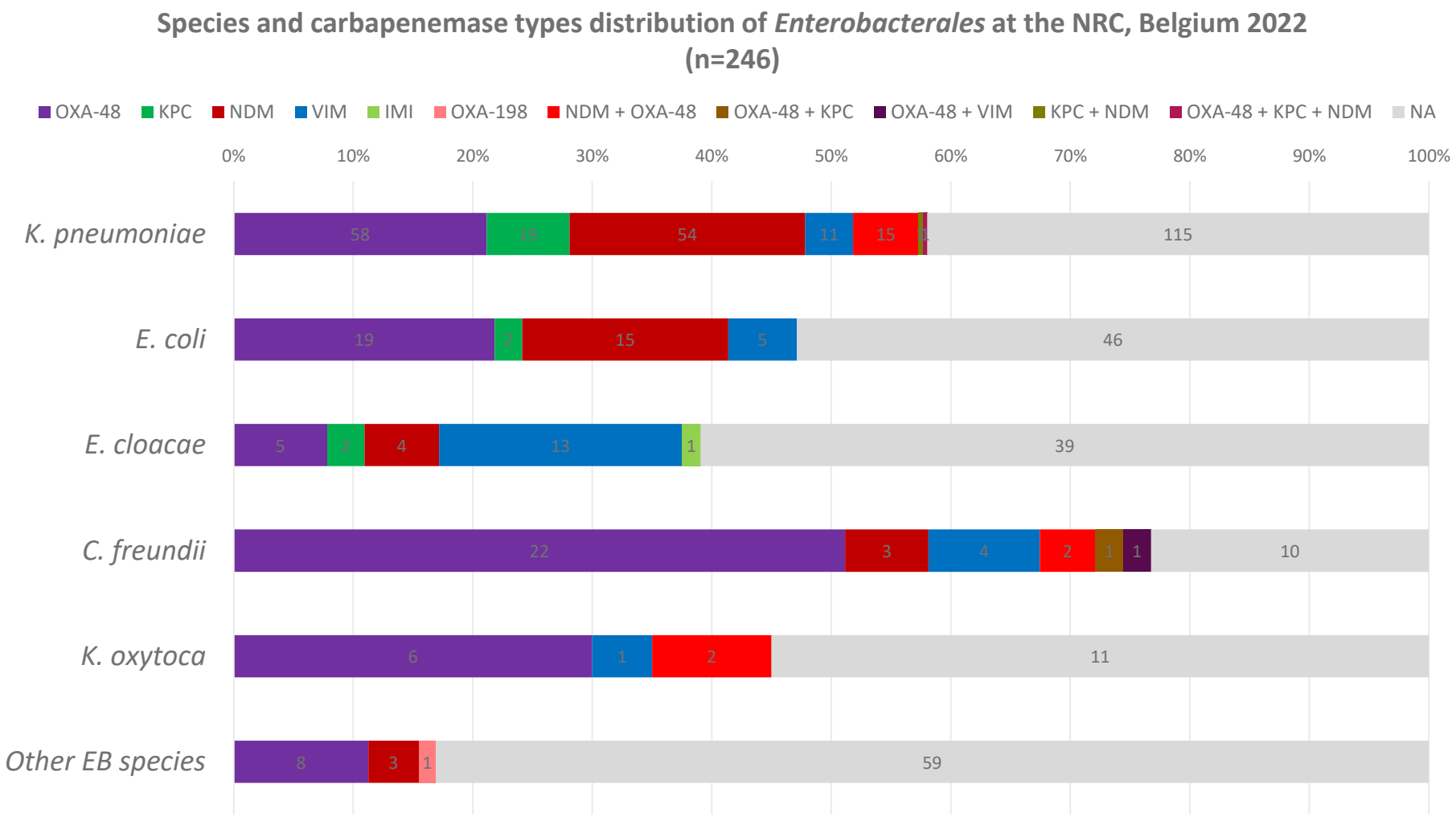


➢ ***K. pneumoniae*** and **OXA-48**: predominant CPE species and carbapenemase types

→ **Diversification of enzyme (increasing NDM) and of species** among confirmed CPE

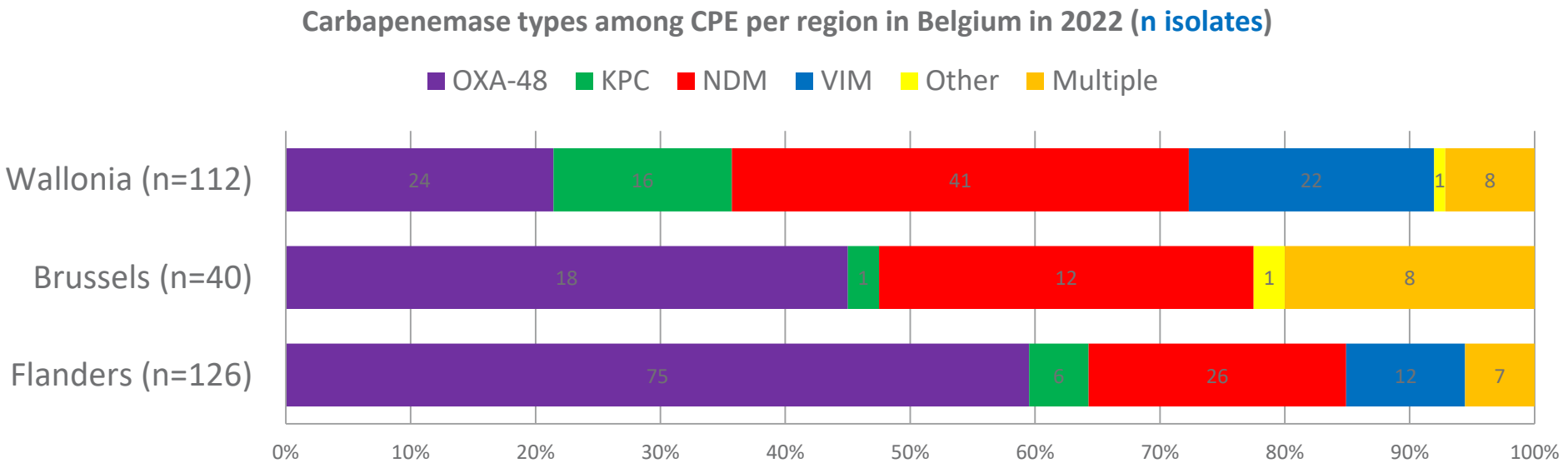
Belgium NRC data 2022

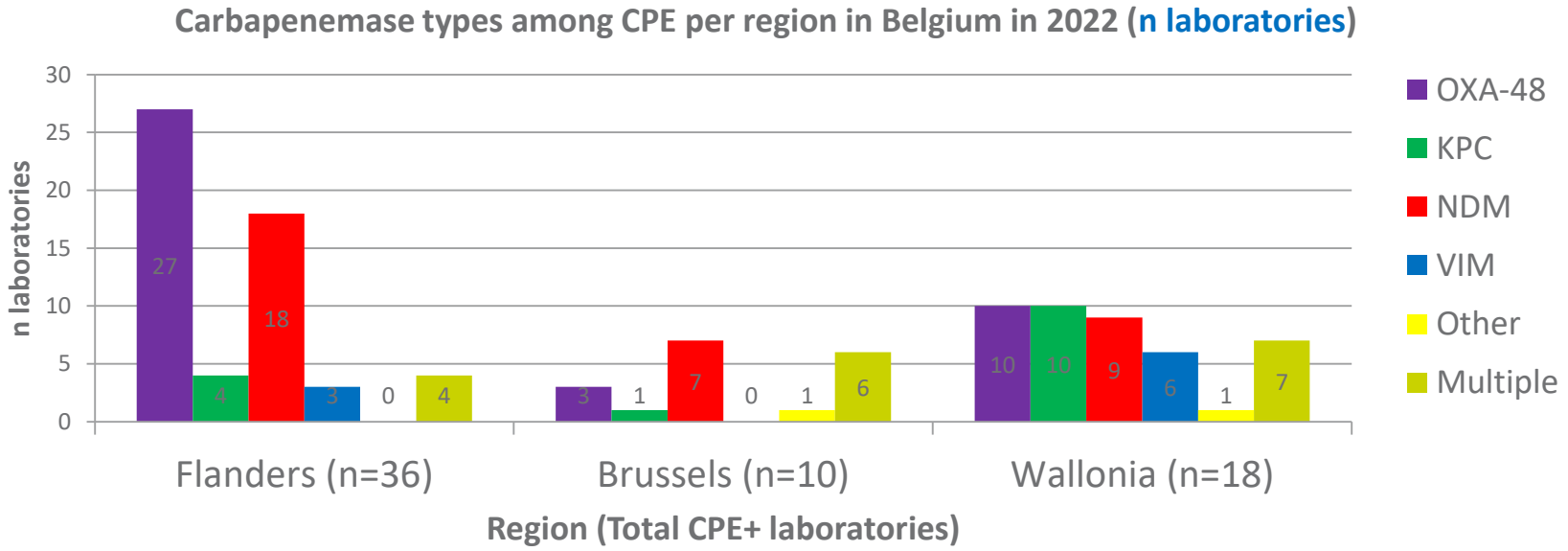
Distribution of Enterobacterales isolates at the NRC



Belgium NRC data 2022

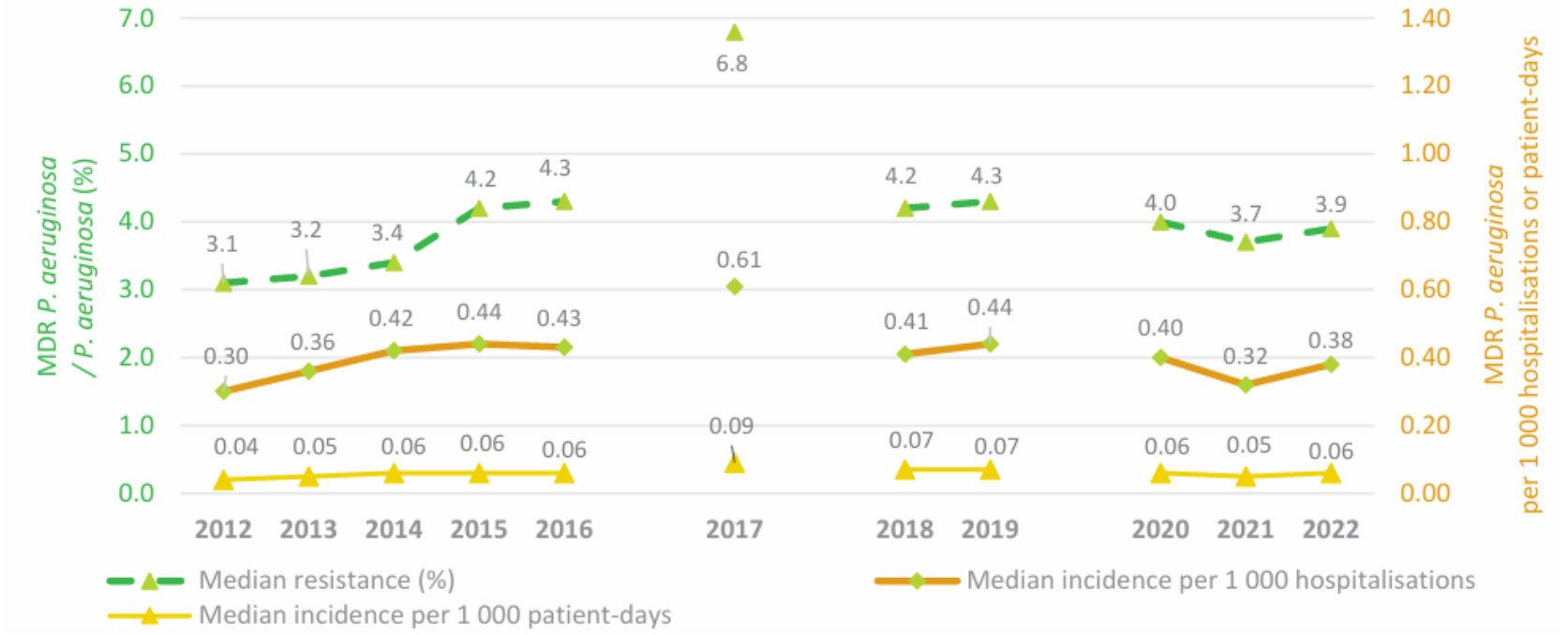
Regional distribution of laboratories referring CPE





Evolution de l'incidence et de la résistance chez *P. aeruginosa* dans les hôpitaux, NSIH, 2012-2022

Figure 19. Evolution of the median resistance proportion, incidence (per 1 000 hospitalisations) and incidence density (per 1 000 patient-days) of multidrug-resistant (MDR) *Pseudomonas aeruginosa* (clinical samples only), Belgian acute care hospitals, 2012-2022



Note: Between 2016 and 2017, the definition of MDR *P. aeruginosa* changed from reduced susceptibility (I or R) to at least one antibiotic in four out of the five following antibiotic classes to reduced susceptibility to at least three of the following antibiotic classes: fluoroquinolones (ciprofloxacin, levofloxacin), aminoglycosides (gentamicin, tobramycin, amikacin), carbapenems (meropenem, imipenem), 3rd and/or 4th generation cephalosporins (ceftazidime, cefepime) and anti-pseudomonas penicillins (piperacillin/tazobactam). In 2018, anti-pseudomonas penicillins (piperacillin/tazobactam) were dropped from the definition. Since 2020, only strict resistance (R - excluding susceptible, increased exposure (intermediate result)) is considered.

Source: National surveillance

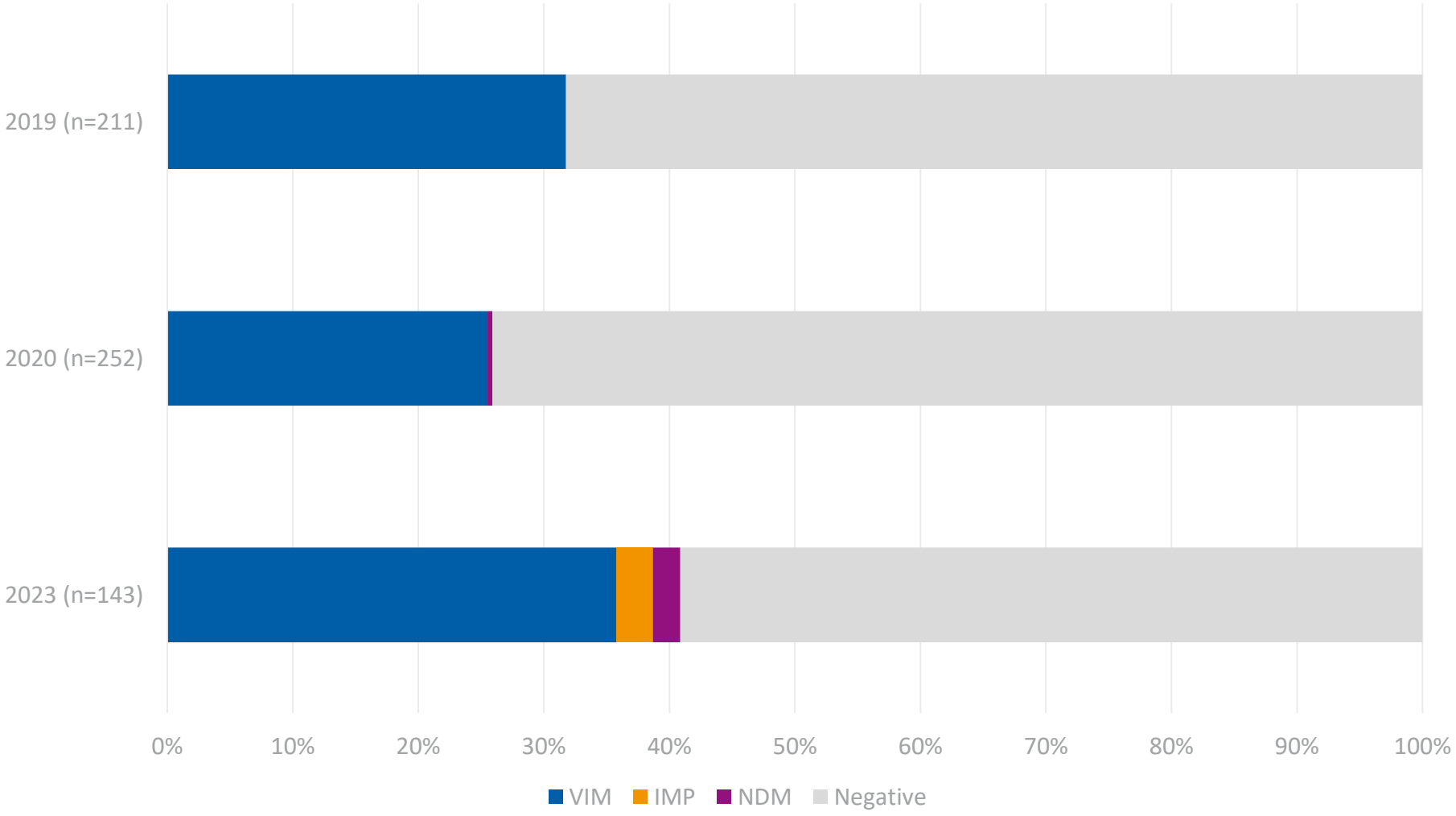
Proportion and incidence of MDR *P. aeruginosa* in Belgian hospitals

	N hosp	Crude	Mean	Md	P25 - P75
Proportion (%)					
Belgium	**113**	**7.2**	**5.6**	**4.2**	**2.4 – 7.5**
Flanders	57	7.3	5.5	4.8	2.3 – 6.7
Wallonia	42	6.5	5.4	4.0	2.4 – 8.0
Brussels	14	7.9	6.5	5.2	2.7 – 10.4
Primary hospitals	87	5.9	5.0	3.8	2.1 – 6.5
Secondary hospitals	18	5.7	5.7	5.0	2.7 – 8.5
Tertiary hospitals	7	12.4	12.5	13.7	6.6 – 14.8
Incidence					
Belgium (per 1 000 pd)	**113**	**0.12**	**0.10**	**0.06**	**0.03 – 0.12**
Belgium (per 1 000 adm)	**113**	**0.80**	**0.71**	**0.41**	**0.20 – 0.83**
Flanders (per 1 000 adm)	57	0.76	0.63	0.38	0.21 – 0.68
Wallonia (per 1 000 adm)	42	0.74	0.72	0.47	0.18 – 0.92
Brussels (per 1 000 adm)	14	1.09	1.03	0.69	0.30 – 1.81
Primary (per 1 000 adm)	87	0.60	0.59	0.38	0.17 – 0.73
Secondary (per 1 000 adm)	18	0.58	0.73	0.51	0.23 – 0.83
Tertiary (per 1 000 adm)	7	2.19	2.27	2.51	1.22 – 2.54

- MDR *P. aeruginosa* significantly higher in **tertiary > primary/secondary hospitals** (p<=0.022).
- No significant differences by regions.

K. Latour (Sciensano HAI AMR)
Surveillance of Antimicrobial Resistant Bacteria Report 2018

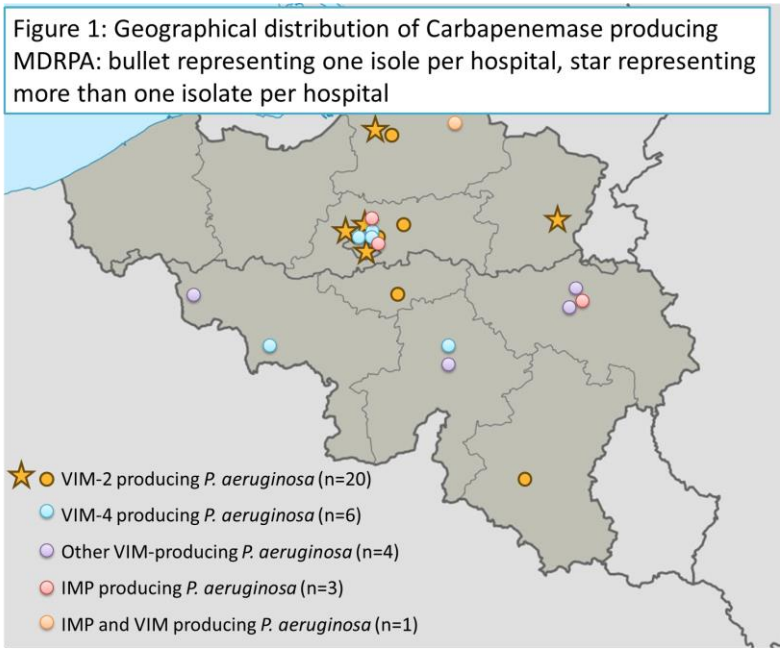
Carbapenemase produces among MDR *Pseudomonas* spp 2019-2023



Carbapenemases, ST types, hospitals and presence of ESBL among MDR *P. aerigunosa*, 2023

Carbapenemases	Total	ST types (n=47)	Number of hospitals	ESBL genes
VIM-2	20	ST111 (n=12), ST175 (n=2), ST773 (n=2), ST233, ST395, new ST	11	0
Other VIM	10	ST235 (n=2), ST446 (n=2), ST740, ST175, ST1203, new ST	8	0
IMP-like	3	ST235, ST621 and ST1047	3	0
IMP-13 and VIM-2	1	ST357	1	VEB-1
Other	68	ST235 (n=14), ST446 (n=3), ST316 (n=2), ST823 (n=2) and other ST types (n=20)	31	GES-1 (n= 4, ST235), OXA-2 (n=1, ST235), OXA-35 (n=1, ST235), TEM-121 (n=1, ST446)

Figure 1: Geographical distribution of Carbapenemase producing MDRPA: bullet representing one isole per hospital, star representing more than one isolate per hospital

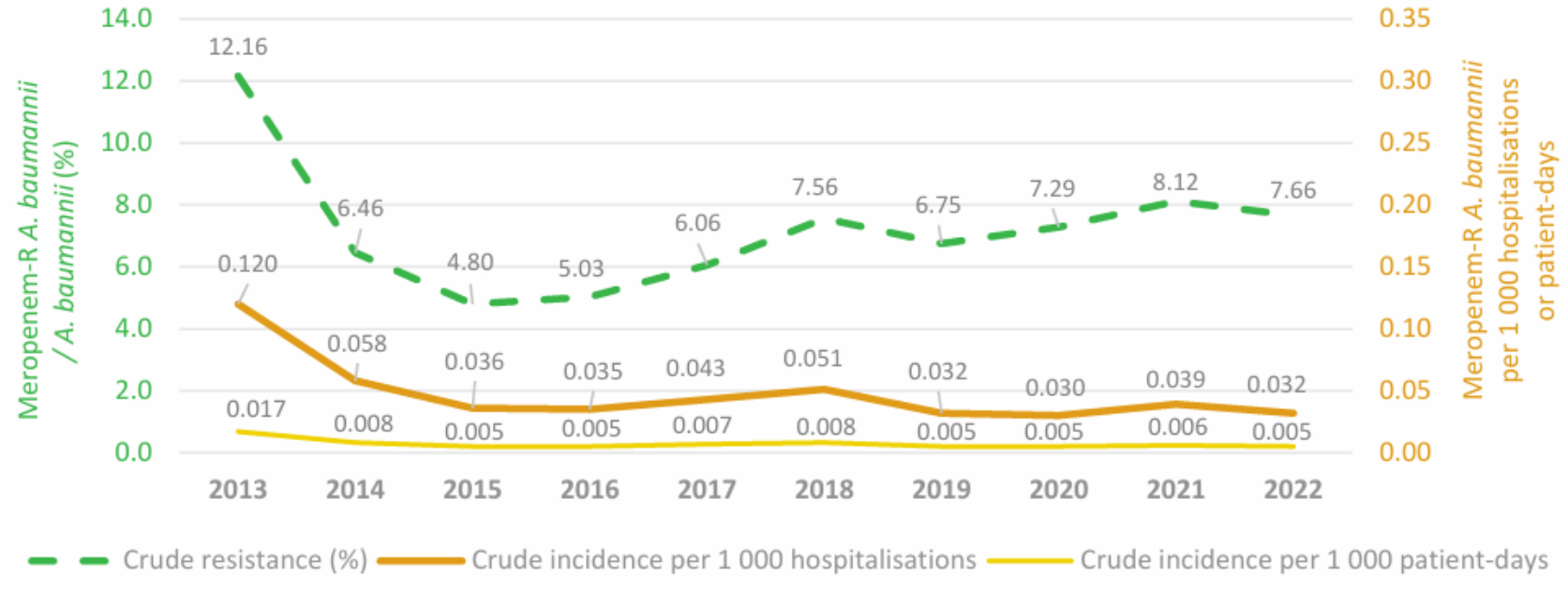


Major clones harbouring mainly VIM2 or VIM4 genes

Denis O et al. ECCMID 2024

Evolution de l'incidence et de la résistance chez *A. Baumannii* dans les hôpitaux, NSIH, 2012-2022

Figure 18. Evolution of the crude resistance proportion, incidence (per 1 000 hospitalisations) and incidence density (per 1 000 patient-days) of *Acinetobacter baumannii* resistant to meropenem (clinical samples only), Belgian acute care hospitals, 2013-2022



Note: prior to 2021 I/R (resistant, incl. also susceptible, increased exposure (intermediate result)) is displayed.

Présents dans 29 hôpitaux sur 111 participants

Source: National surveillance

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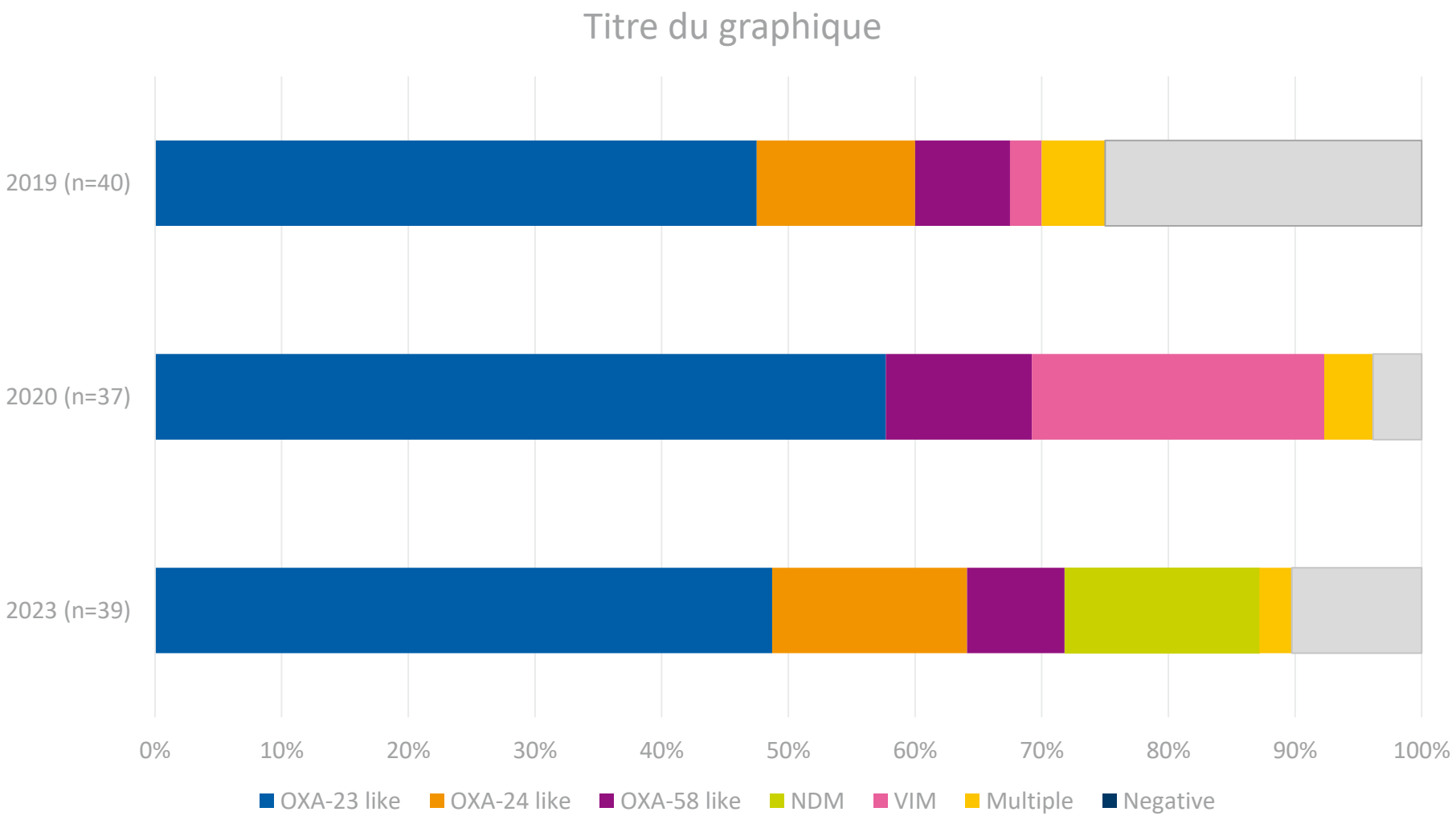
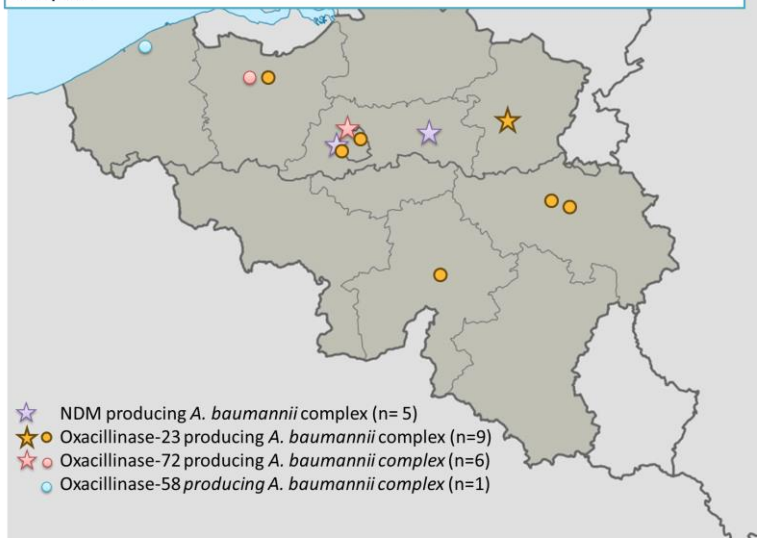
Carbapenemase produces among *Acinetobacter spp* 2019-2023



Carbapenemases, ST types, hospitals and presence of ESBL and methylase genes among CRAB, 2023

Carbapenemases	Total	ST types (n= 7)	Number of hospitals	ESBL genes	Methylase genes
OXA-23-like	9	ST2 (n=8), other	7	PER-7 (n=3), TEM-12 (n=2), GES-1 (n=1)	ArmA (n=5)
OXA-24-like	6	ST2 (n=5), other	2	PER-1 (n=1)	0
OXA-58-like	1	Other	1	0	0
NDM-like	5	ST78 (n=3), ST85 (n=2)	2	PER-7 (n=3)	0
Other	2	ST1 (n=2)	1	0	0

Figure 2: Geographical distribution of CRAB: bullet representing one isole per hospital, star representing more than one isolate per hospital



Major clones harbouring different carbapenemases plus ESBL

Denis O et al. ECCMID 2024

Resistance et incidence des principaux pathogènes nosocomiaux, Belgique

Table 1. Resistance proportion and incidence per 1 000 hospitalisations of the bacteria included in the surveillance of antimicrobial resistance (clinical samples only), Belgian acute care hospitals, 2021 and 2022

		2021				2022			
		Resistance proportion (%)		Incidence per 1 000 hospitalisations		Resistance proportion (%)		Incidence per 1 000 hospitalisations	
		Crude	Median	Crude	Median	Crude	Median	Crude	Median
Staphylococcus aureus	Methicillin R	10.7	9.1	1.72	1.29	8.4	8.0	1.32	1.24
Healthcare-associated *Staphylococcus aureus*	Methicillin R	20.3*	23.5*	0.35	0.30	21.2*	18.8*	0.28	0.20
Enterococcus faecium	Vancomycin R	1.25	0.00	0.065	0.000	1.87	0.00	0.097	0.000
Enterococcus faecalis	Vancomycin R	0.05	0.00	0.007	0.000	0.05	0.00	0.007	0.000
Escherichia coli	3GC-R	7.8	8.2	4.10	4.22	8.0	7.7	4.03	3.97
	Meropenem R	0.06	0.00	0.029	0.000	0.05	0.00	0.027	0.000
Klebsiella pneumoniae	3GC-R	18.3	16.8	2.21	1.65	17.9	16.3	2.04	1.66
	Meropenem R	1.13	0.36	0.137	0.038	1.14	0.43	0.130	0.037
Acinetobacter baumannii	Meropenem R	8.12	0.00	0.039	0.000	7.66	0.00	0.032	0.000
Pseudomonas aeruginosa	MDR	6.0	3.7	0.67	0.32	5.6	3.9	0.67	0.38

*Proportion healthcare-associated methicillin-resistant *Staphylococcus aureus* (MRSA) on total number of MRSA; R = resistant, 3GC = 3rd generation cephalosporins, MDR = resistance to at least three of the following antibiotic classes: fluoroquinolones (ciprofloxacin or levofloxacin), aminoglycosides (gentamicin, tobramycin or amikacin), carbapenems (meropenem or imipenem), 3rd and/or 4th generation cephalosporins (ceftazidime or cefepime)

Conclusions

- Au niveau des Gram positif
  - Diminution continue de l'incidence des MRSA
  - Augmentation du nombre d'épidémies à VRE mais surtout portage
- *E. coli* et *K. pneumoniae*
  - Résistance encore élevée aux céphalosporines de 3ème génération pour ces deux agents pathogènes
  - Résistance stable aux carbapénèmes chez K. pneumoniae avec grande diversité des carbapénémases et une prédominance des OXA-48, NDM, VIM et KPC
- *P. aerigunosa* et *A. baumanii*
  - Prédominance de VIM chez P. aerigunosa
  - Grande diversité chez CRAB avec prédominance de diverses oxacillinases

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