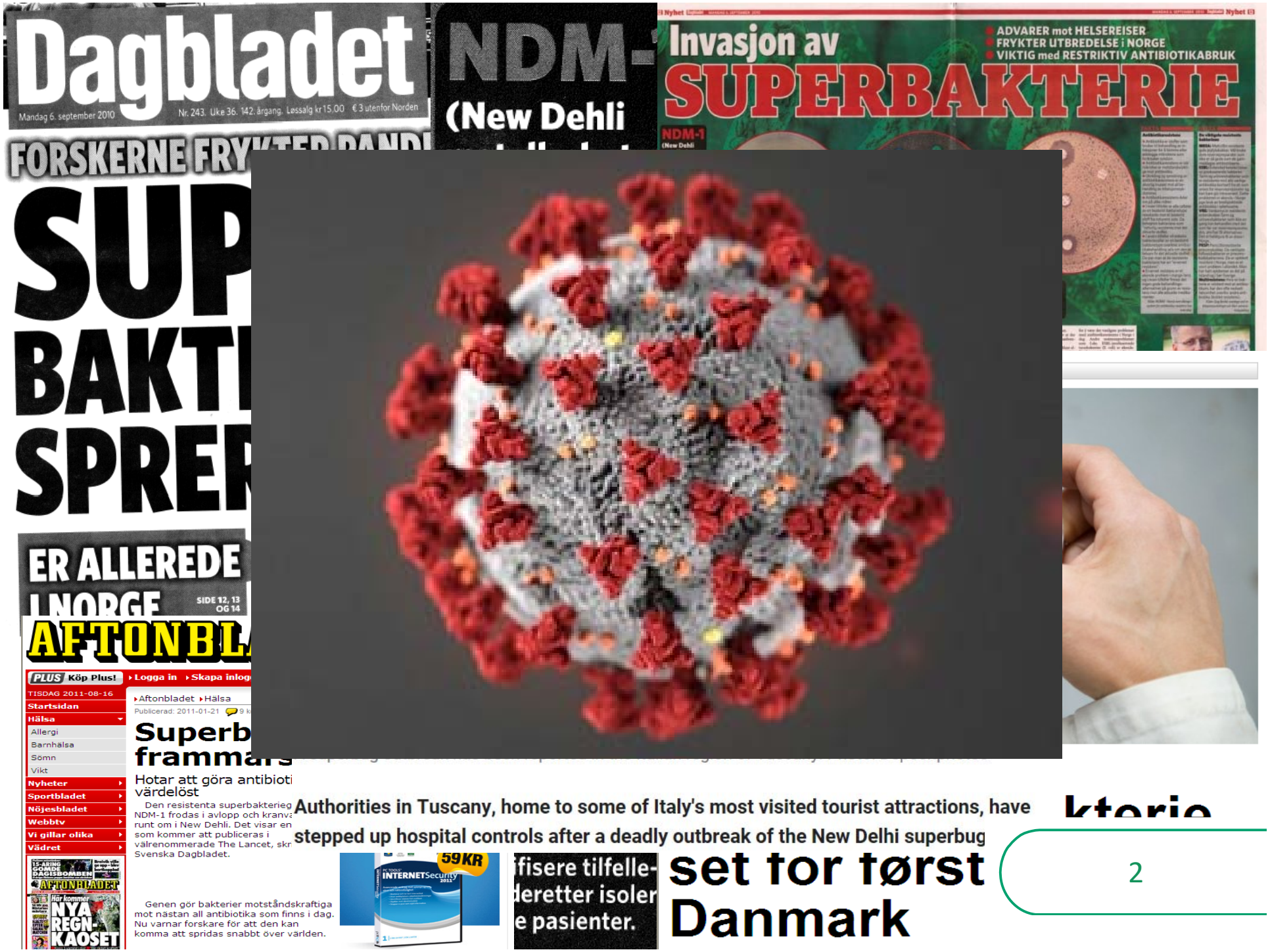
NORM / NORM – VET 2021 (og litt 2022)

Antibiotikabruk og resistens i Norge

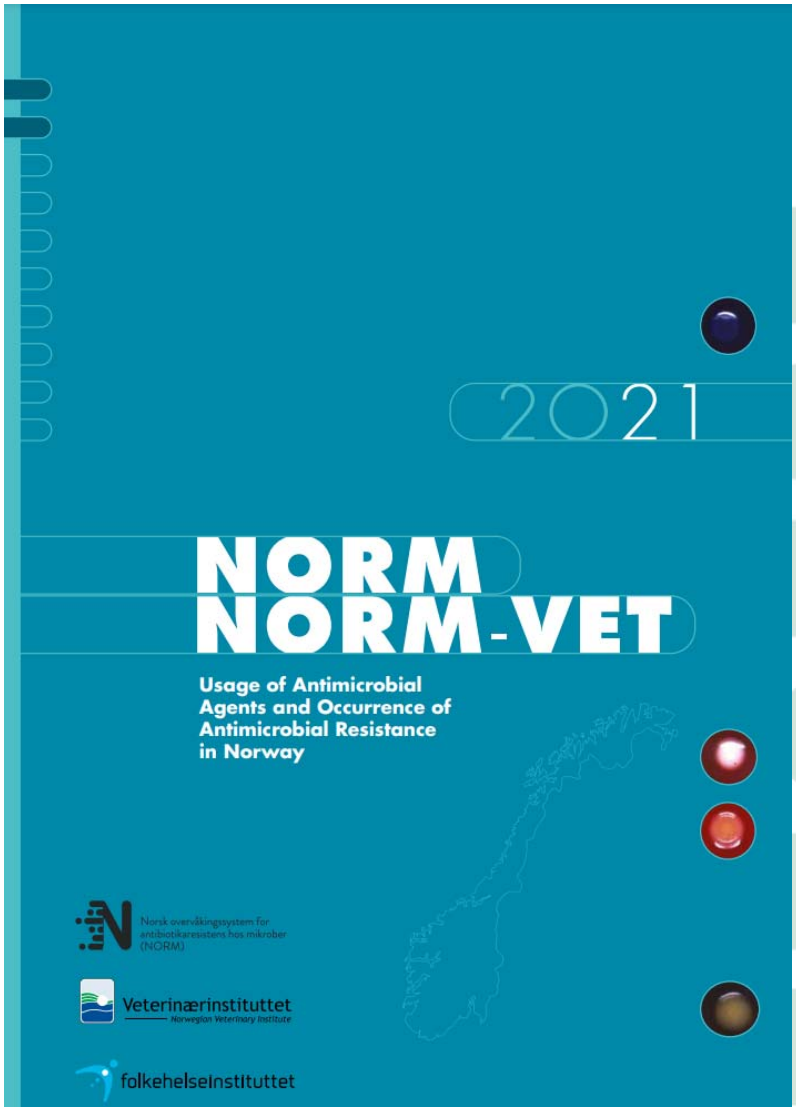
Gunnar Skov Simonsen

NORM – UNN HF

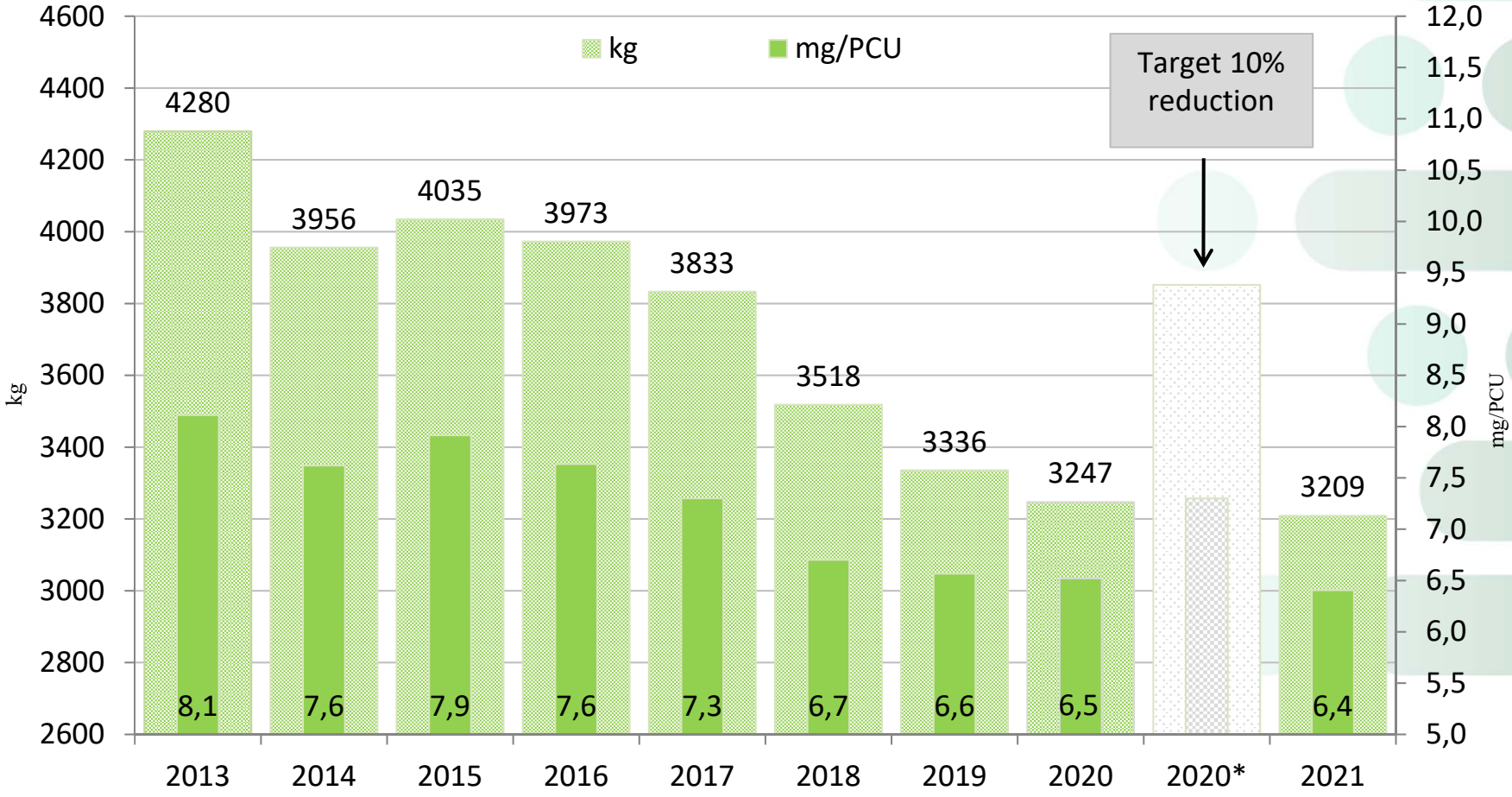
Norsk overvåkingssystem for antibiotikaresistens hos mikrober (NORM)


Dagbladet
Mandag 6. september 2010
Nr. 243. Uke 36. 142. årgang. Løssalg kr 15,00 € 3 utenfor Norden
NDM-
(New Dehli
Invasjon av
SUPERBAKTERIE
ADVARER mot HELSEREISER
FRYKTER UTBREDELSE i NORGE
VIKTIG med RESTRIKTIV ANTIBIOTIKABRUK
NDM-1
(New Dehli
FORSKERNE FRY
SUP
BAKT
SPRER
ER ALLEREDE
I NORGE
SIDE 12, 13 OG 14
AFTONBL
PLUS Köp Plus!
Logga in
Skapa inlog
TISDAG 2011-08-16
Startsidan
Hälsa
Allergi
Barnhälsa
Sömn
Vikt
Nyheter
Sportbladet
Nöjesbladet
Webbtv
Vi gillar olika
Vädret
Aftonbladet Hälsa
Publicerad: 2011-01-21
Superb
frammars
Hotar att göra antibioti
värdelöst
Den resistenta superbakteriegen NDM-1 frodas i avlopp och kranvatten runt om i New Dehli. Det visar en ny studie som kommer att publiceras i välrenommerade The Lancet, skriver Svenska Dagbladet.
Genen gör bakterier motståndskraftiga mot nästan all antibiotika som finns i dag. Nu varnar forskare för att den kan komma att spridas snabbt över världen.
Authorities in Tuscany, home to some of Italy's most visited tourist attractions, have stepped up hospital controls after a deadly outbreak of the New Delhi superbug
59 KR
INTERNET Security
ffisere tilfelle-
deretter isoler
e pasienter.
set for først
Danmark
ktorie

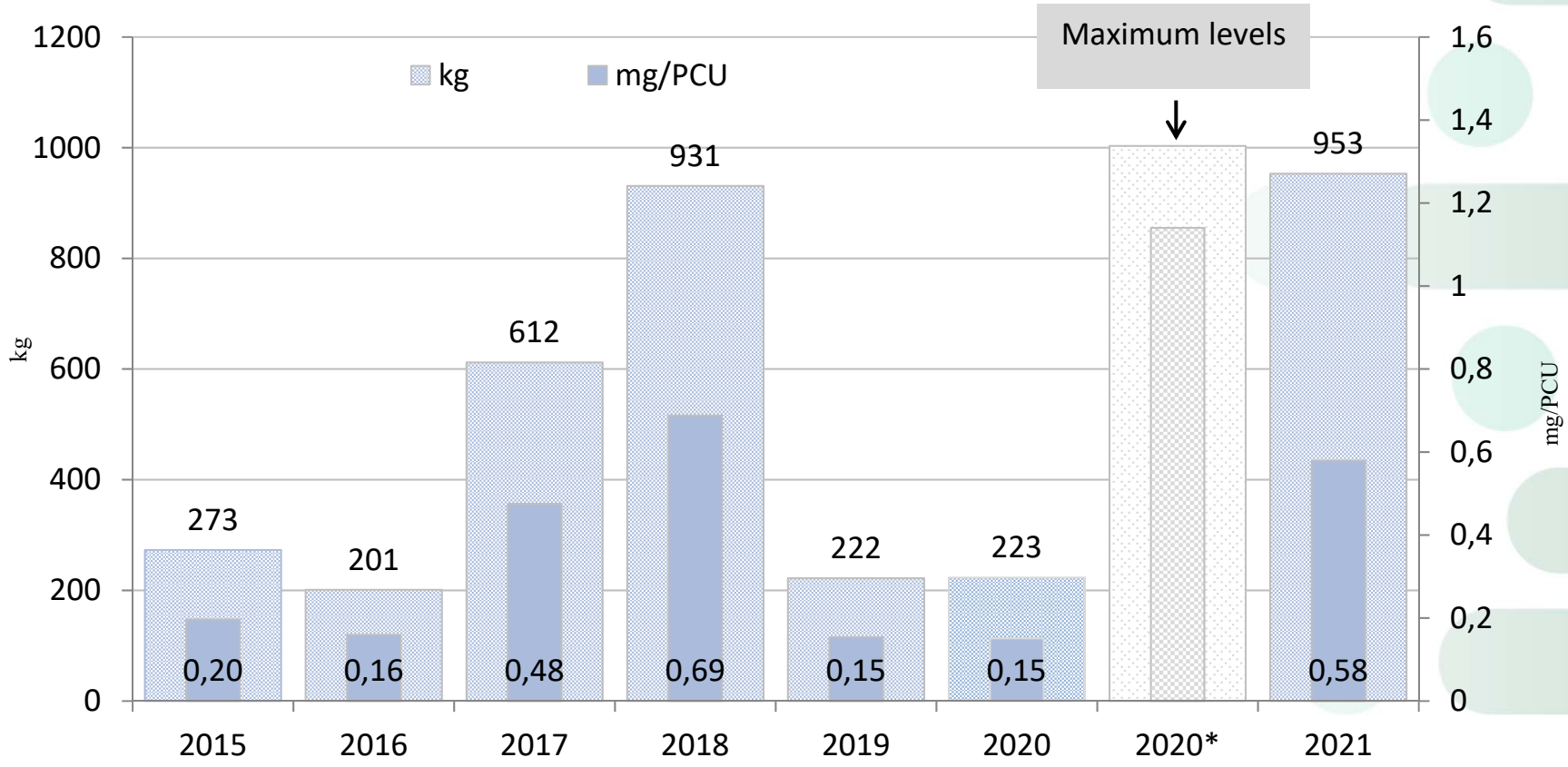
- Antibiotikaforbruket i Norge 2021
- Antibiotikaresistens i Norge 2021
- Mennesker og dyr
- Artikler om aktuelle tema



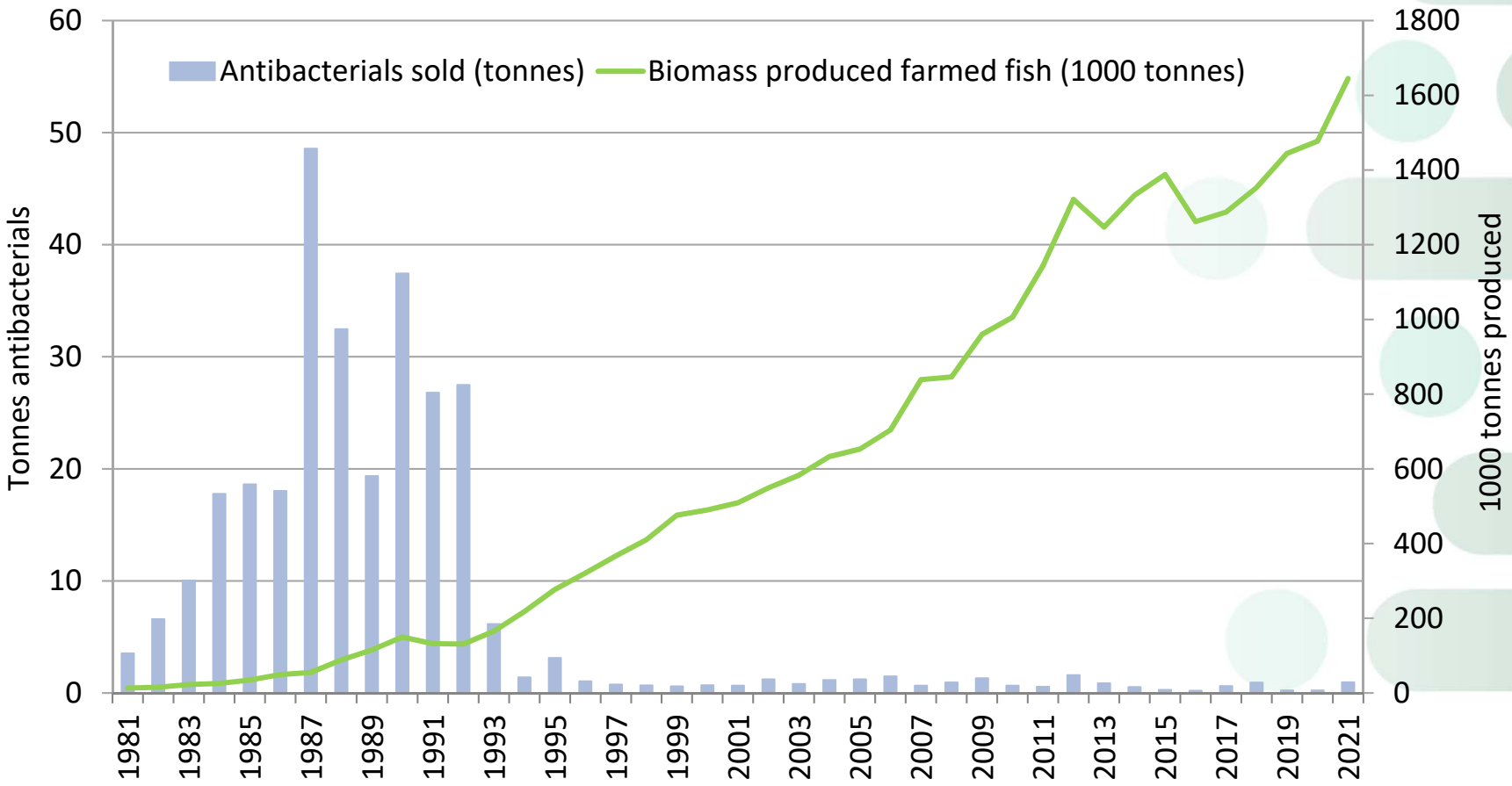
10 % redusert bruk av antibakterielle midler til produksjonsdyr



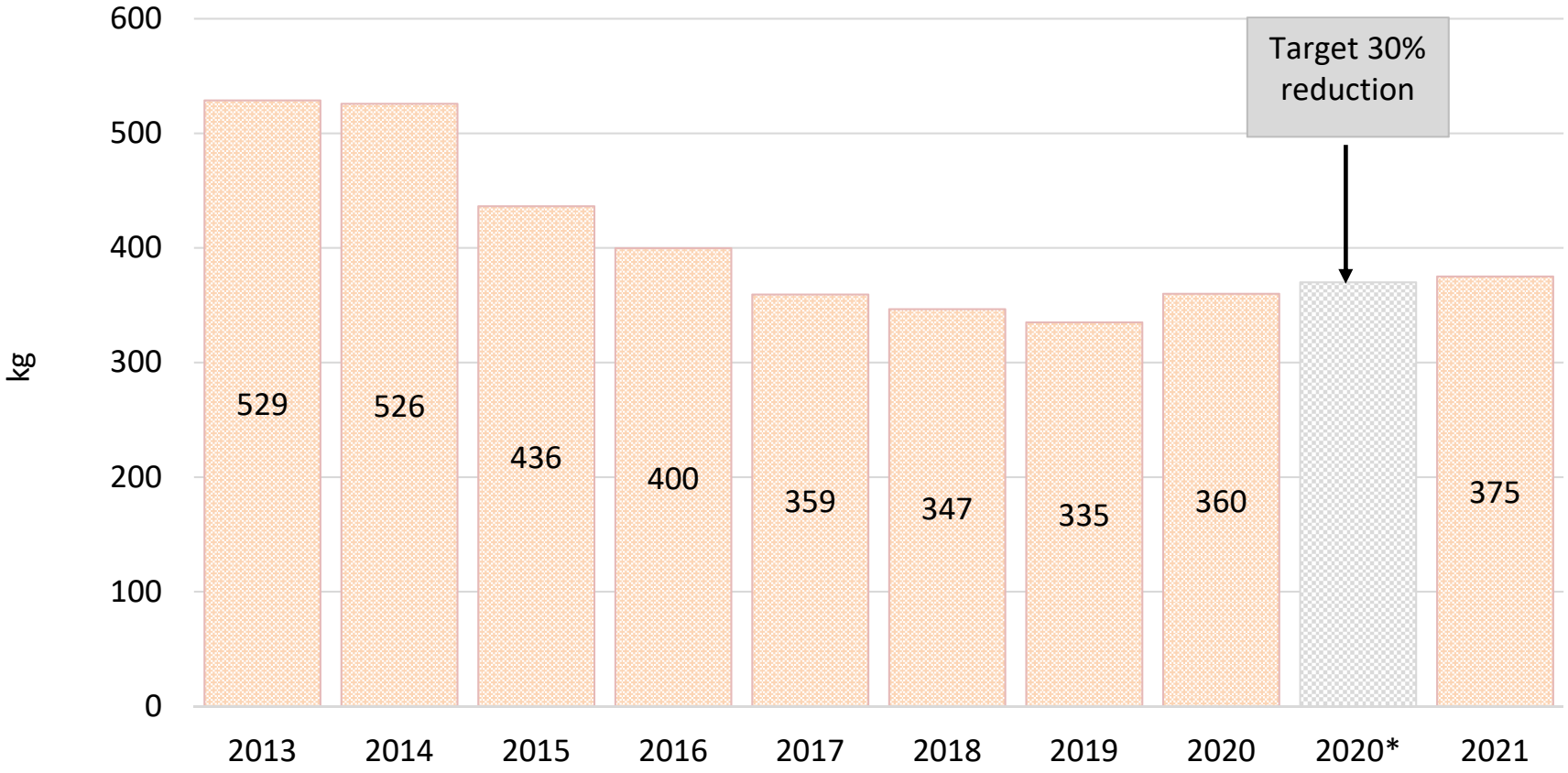
Forbruk til oppdrettsfisk likt eller lavere enn gjennomsnitt 2004 - 2014



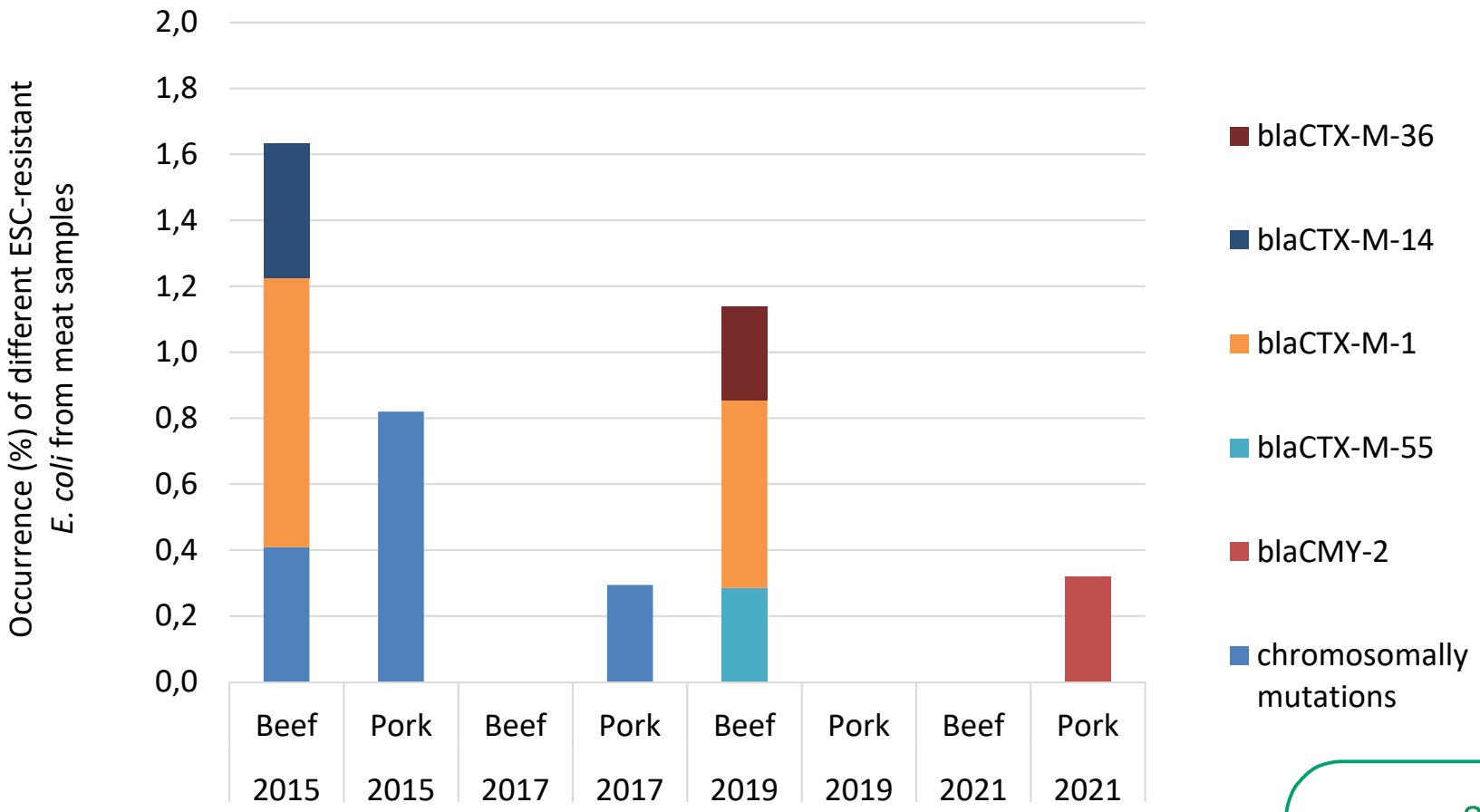
Forbruk til oppdrettsfisk likt eller lavere enn gjennomsnitt 2004 - 2014



30 % redusert bruk av antibakterielle midler til sports- og kjæledyr



Indikatorbakterier fra dyr og mat – *E. coli* fra kjøtt



Screening av norske svinebesetninger for MRSA

Year	No. MRSA positive herds detected by the MRSA surveillance programme (Total No. positive herds)	Herds investigated in the MRSA surveillance programme	MRSA typing* (No. isolates)
2014	1 (5)	986	CC398 t034 (2), CC398 t011 (3)
2015	4 (34)	821	CC398 t034 (25), CC1 t177 (9)
2016	1 (8)	872	CC398 t034 (8)
2017	2 (6)	826	CC7 t091 (2), CC8 t024 (2), CC130 t843 (1), CC425 t6292 (1)
2018	0	716	
2019	1 (9)	722	CC398 t034 (3), CC398 t011 (5), CC130 t843 (1)
2020	0	641	
2021	0	763	
Total	84 (9)		CC398 t034 (60), CC398 t011 (8), CC1 t177 (9), CC7 t091 (2), CC8 t024 (2), CC130 t843 (2), CC425 t6292 (1)

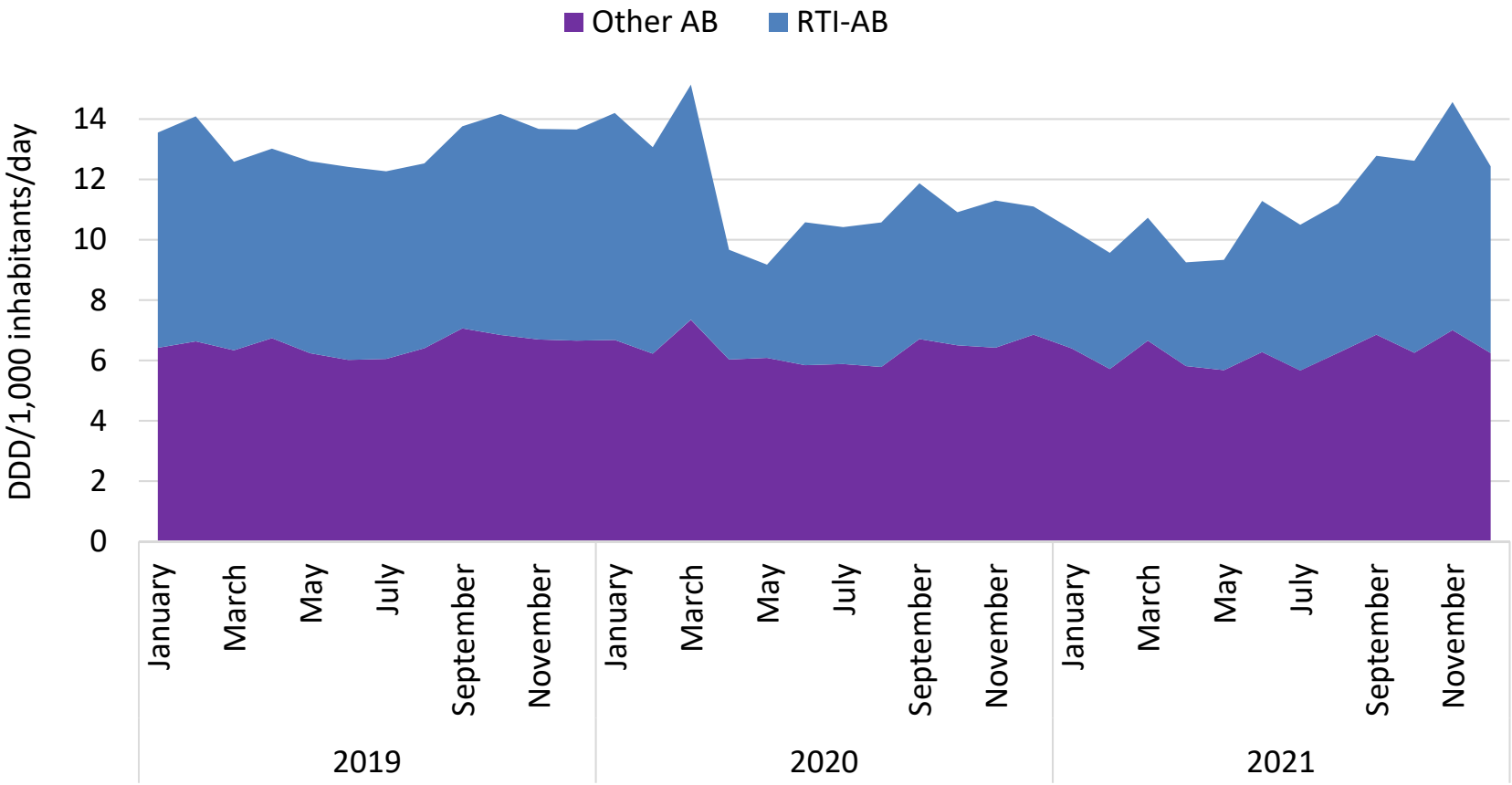
* *mecC*-gene detected for CC130 t843 and CC425 t6292, *mecA*-gene detected for the others.

Bruk av antibiotika til mennesker

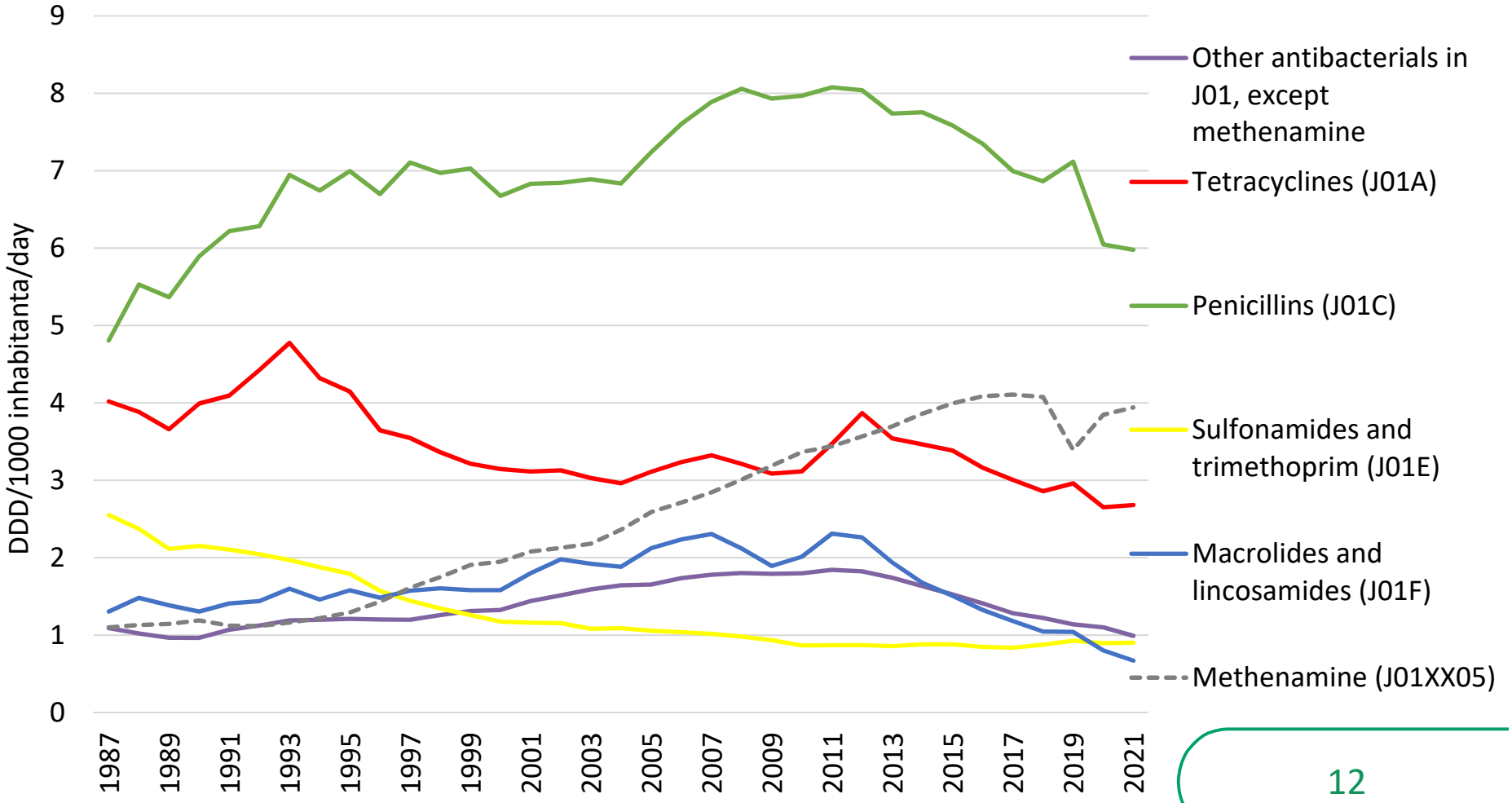
		Year					Change (%)	
ATC	Groups of substances	2013	2015	2017	2019	2021	2020-2021	2012-2021
J01A	Tetracyclines	3.54	3.39	3.01	2.96	2.68	+1	-31
J01B	Amphenicols	<0.001	<0.001	<0.001	<0.001	<0.001	-	-
J01CA	Penicillins with extended spectrum	2.82	2.73	2.47	2.53	2.19	-1.5	-21
J01CE	Beta-lactamase sensitive penicillins	4.09	3.88	3.61	3.56	2.70	-2	-37
J01CF	Beta-lactamase resistant penicillins	0.79	0.89	0.84	0.93	0.95	+1	+6
J01CR	Combination of penicillins, incl. beta-lactamase inhibitors	0.05	0.08	0.07	0.10	0.13	+17	+259
J01D	Cephalosporins, monobactams, carbapenems	0.50	0.43	0.38	0.37	0.34	-8	-37
J01E	Sulfonamides and trimethoprim	0.86	0.88	0.84	0.93	0.90	+1	+4
J01F	Macrolides, lincosamides and streptogramins	1.94	1.51	1.18	1.04	0.67	-16	-70
J01G	Aminoglycosides	0.07	0.08	0.09	0.10	0.07	-25	-6
J01M	Quinolones	0.71	0.60	0.45	0.36	0.27	-9	-63
J01X*	Other antibacterials	0.45	0.41	0.36	0.32	0.31	-8	-35
J01	**Total excluding methenamine**	**15.8**	**14.9**	**13.3**	**13.2**	**11.2**	**-2**	**-33**
J01XX05	Methenamine	3.70	3.99	4.11	3.39	3.94	+2	+10
J01	**Total all antimicrobial agents**	**19.5**	**18.9**	**17.4**	**16.6**	**15.2**	**-1**	**-26**

*J01X includes glycopeptides, colistin, fusidic acid, metronidazol (i.v.), nitrofurantoin, fosfomycin, linezolid, daptomycin and tedizolid. Methenamin excluded.

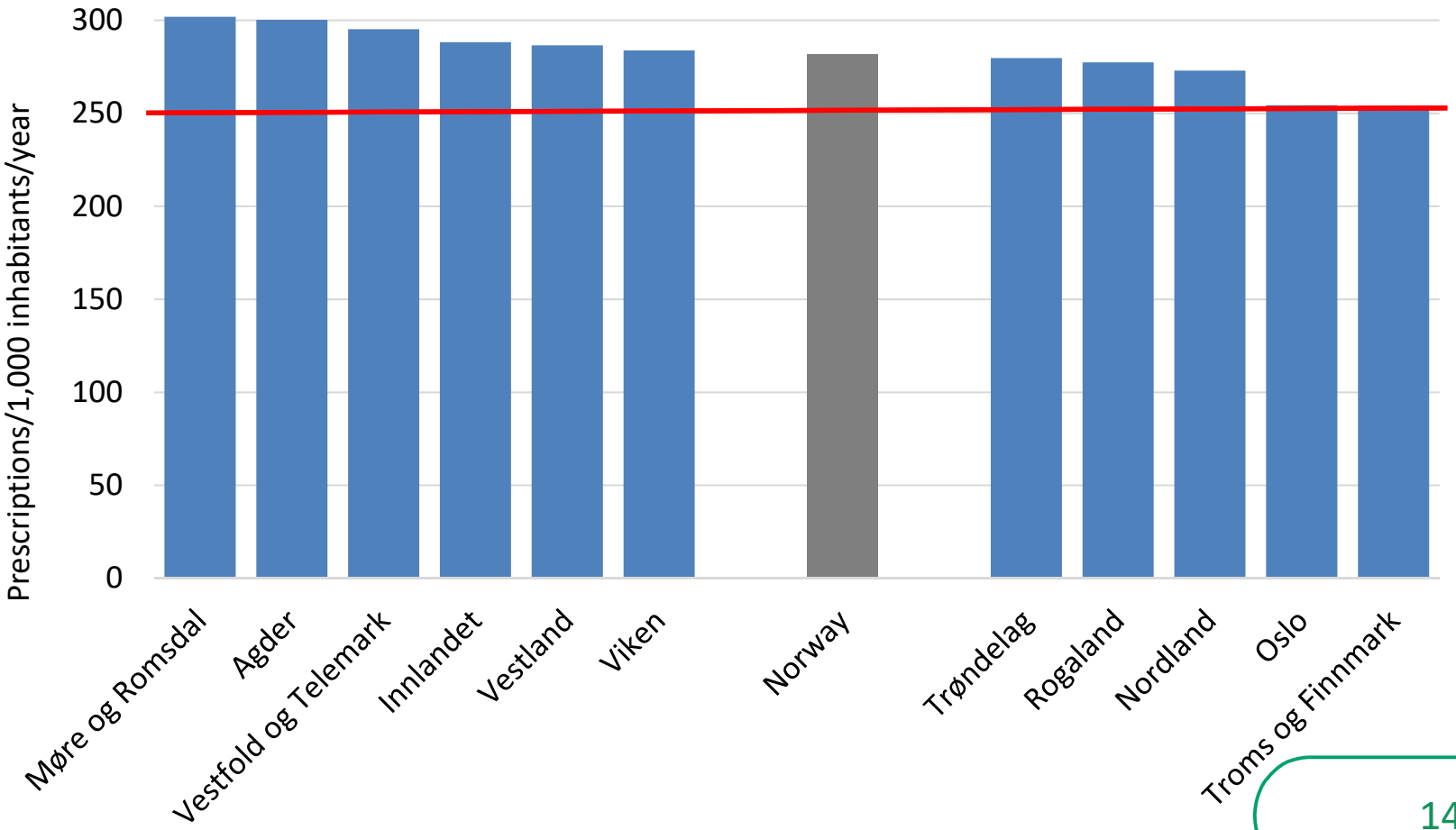
Månedlig salg av antibiotika i Norge 2019 - 2020



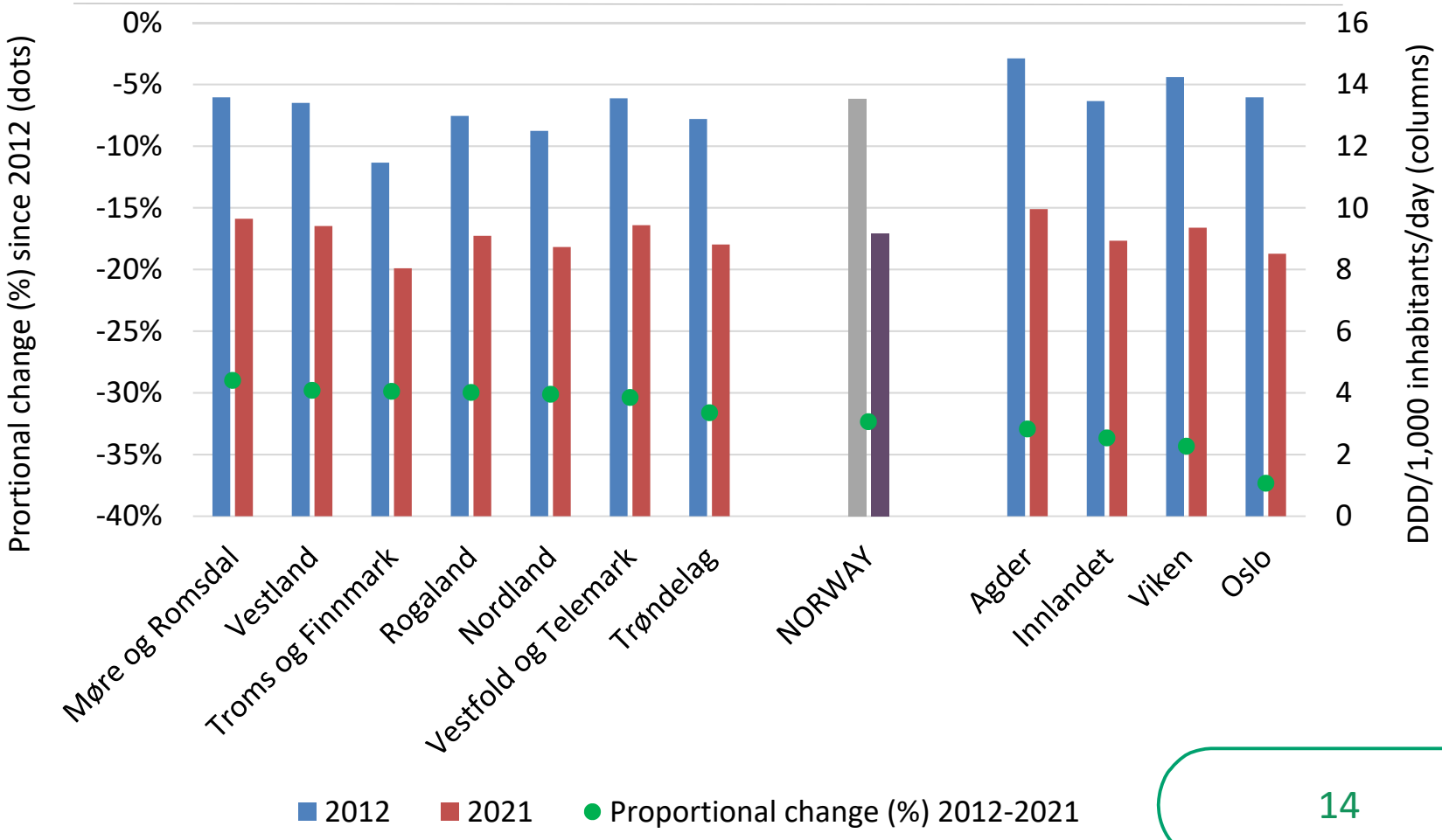
Bruk av antibiotika til mennesker



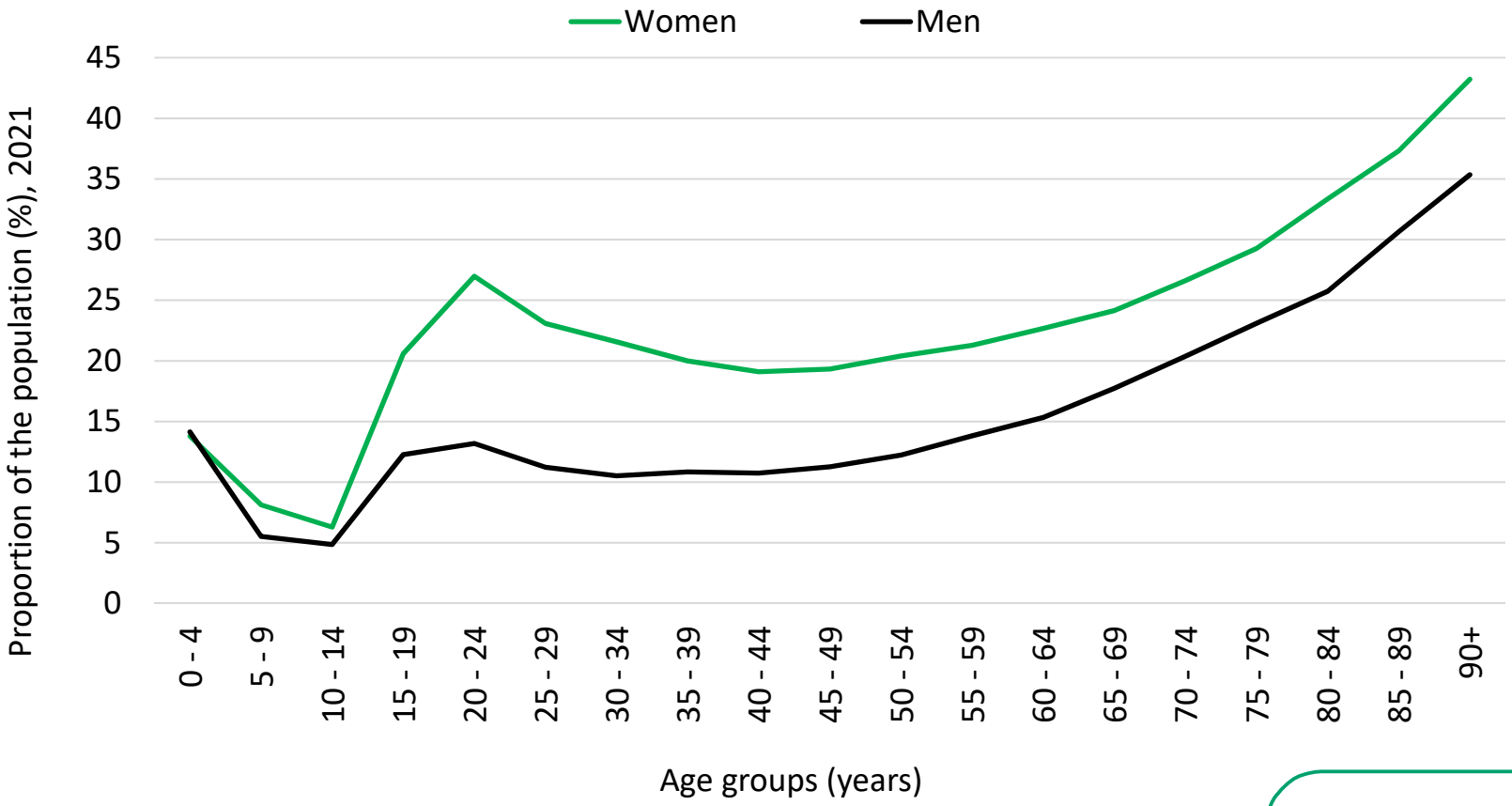
Geografisk fordeling av antibiotikabruk



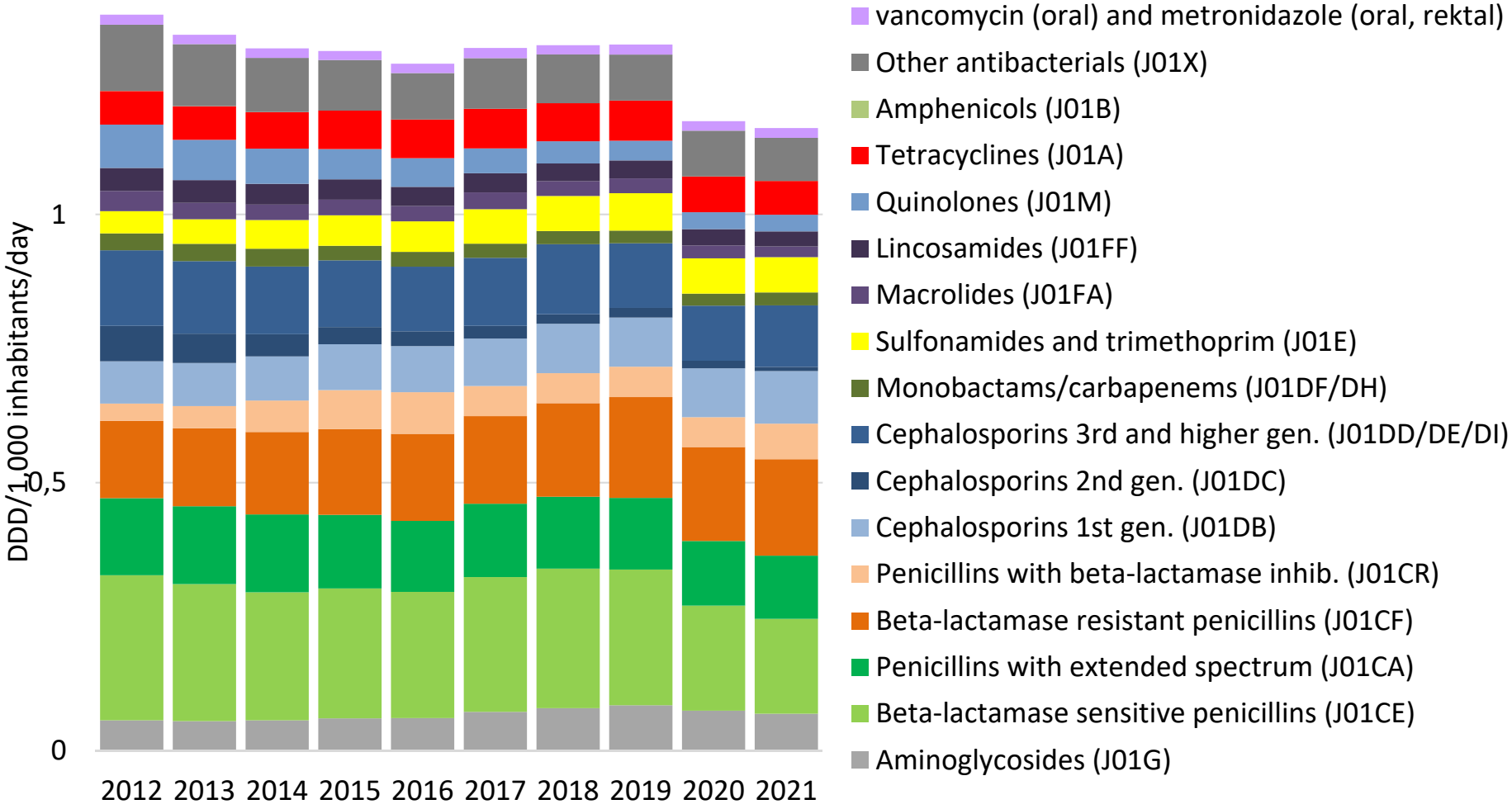
Geografisk fordeling av antibiotikabruk



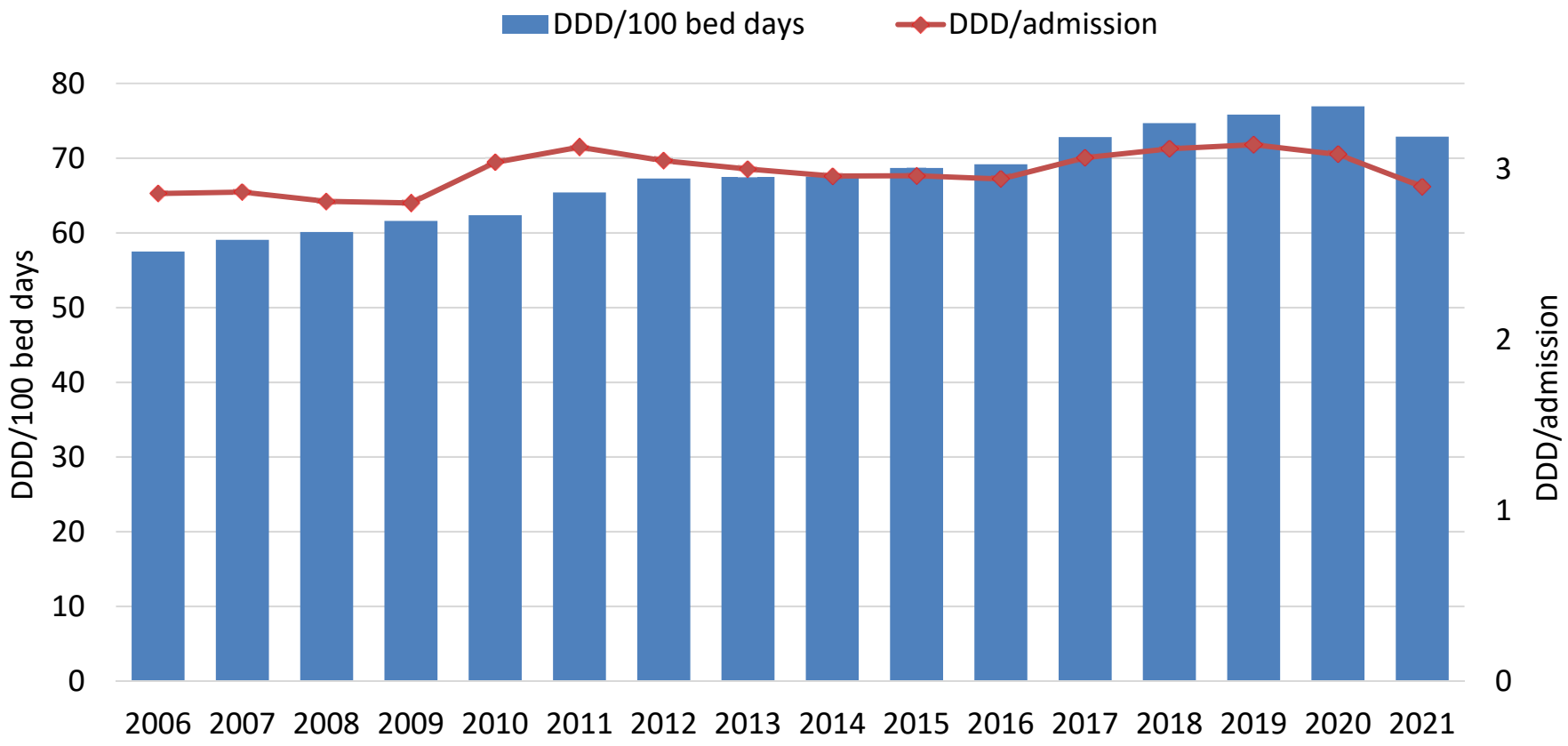
Kjønns- og aldersfordeling av antibiotikabruk



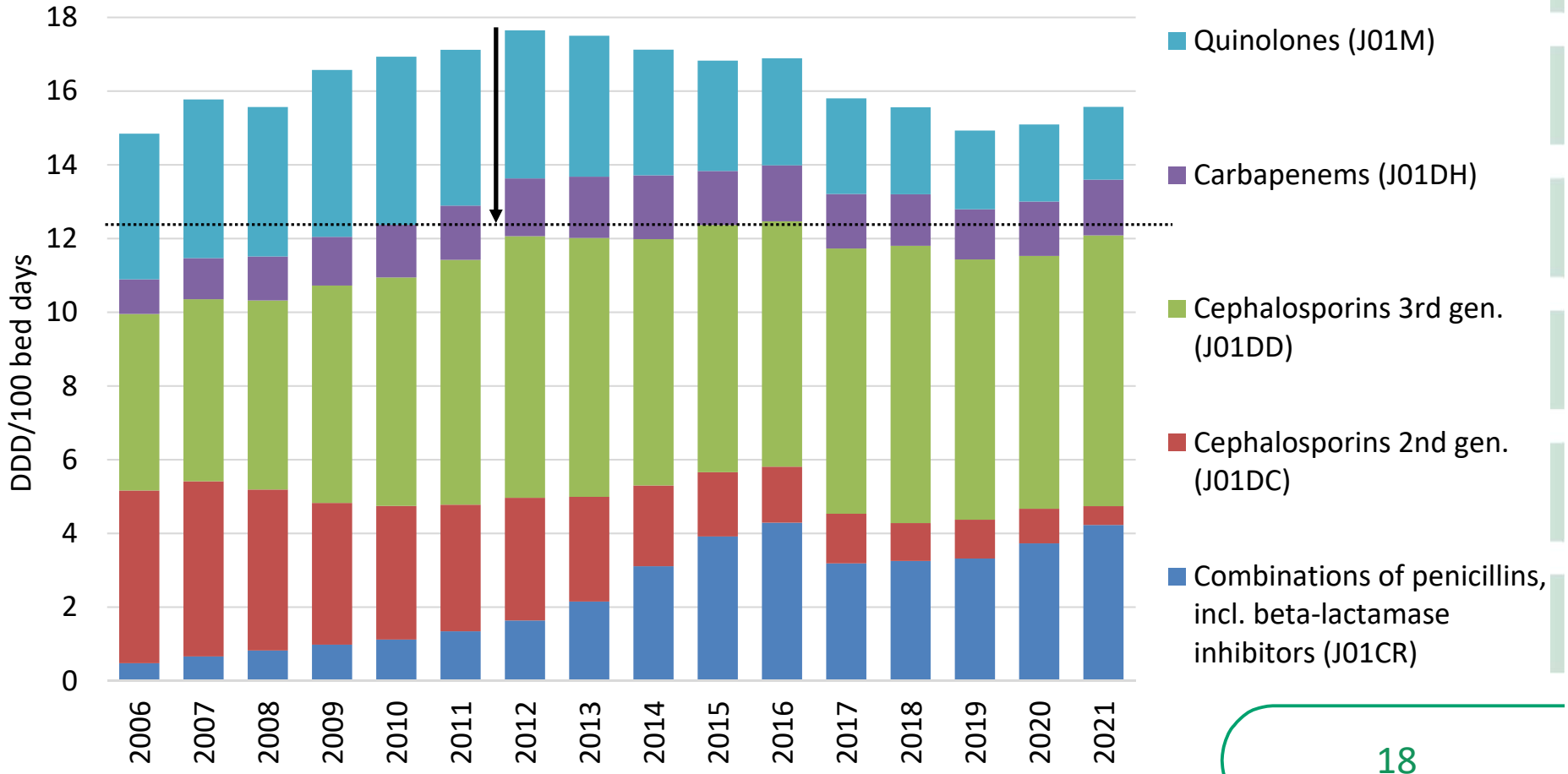
Antibiotikabruk på sykehus



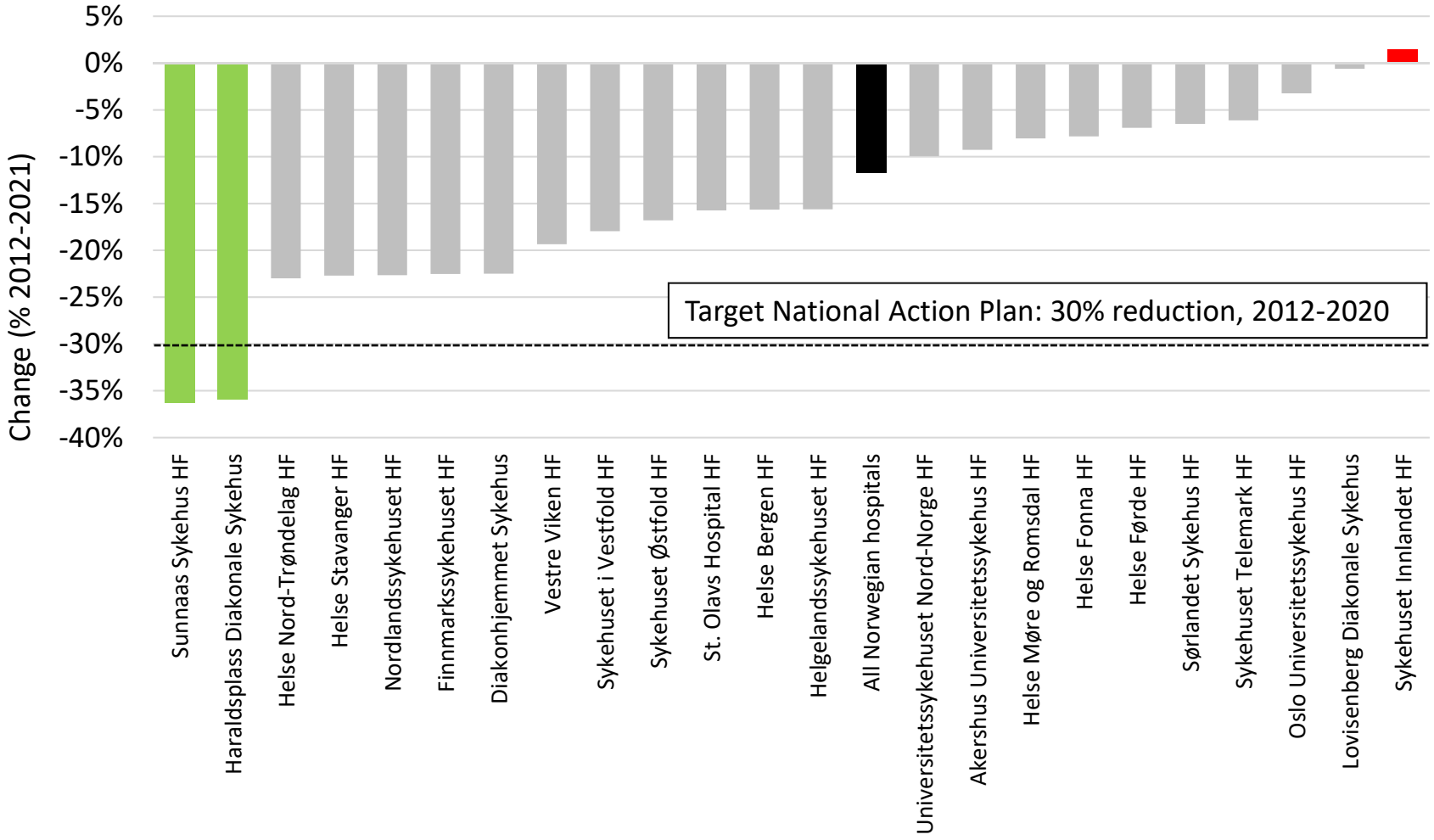
Antibiotikabruk på sykehus



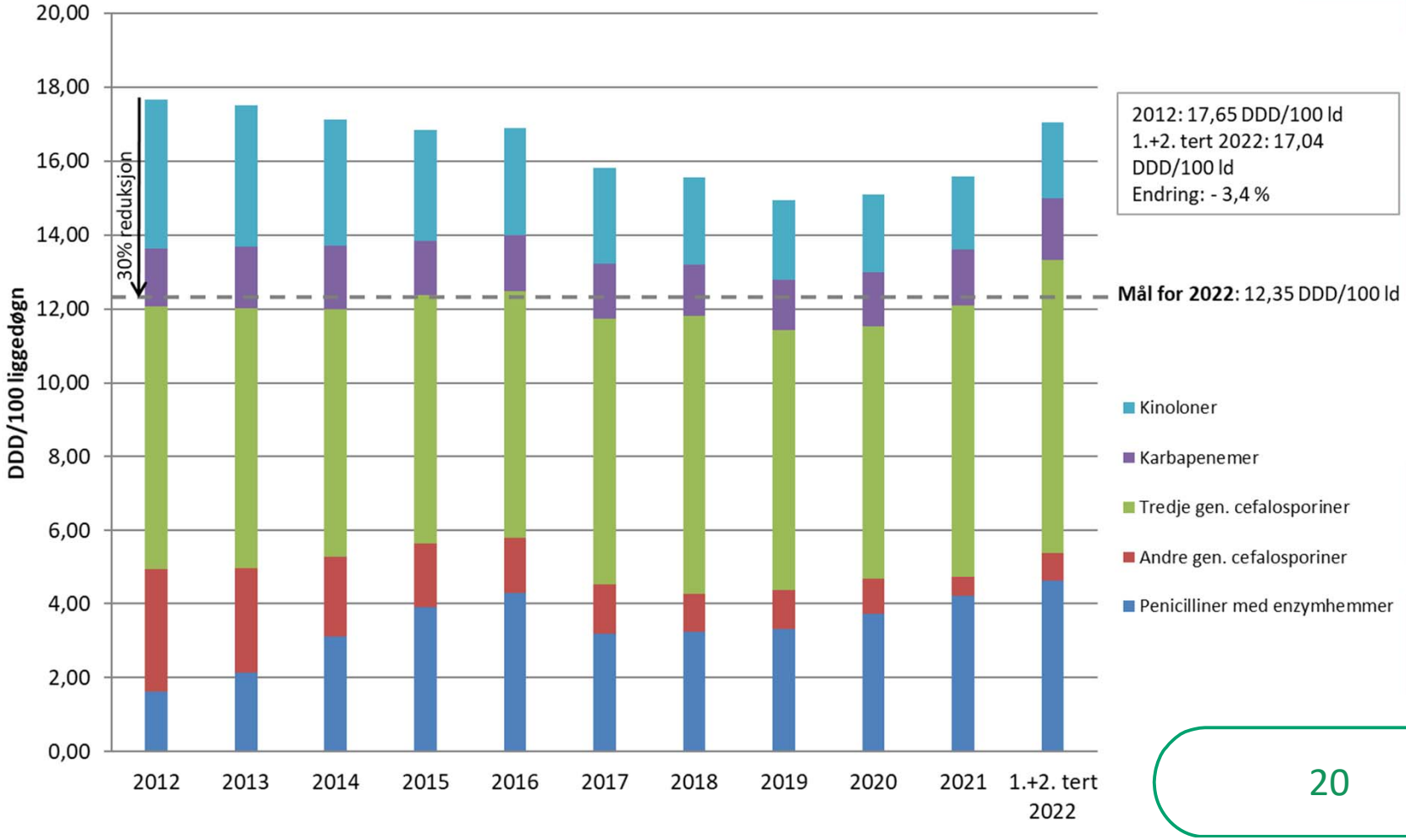
Regjeringens mål om reduksjon av antibiotikabruk



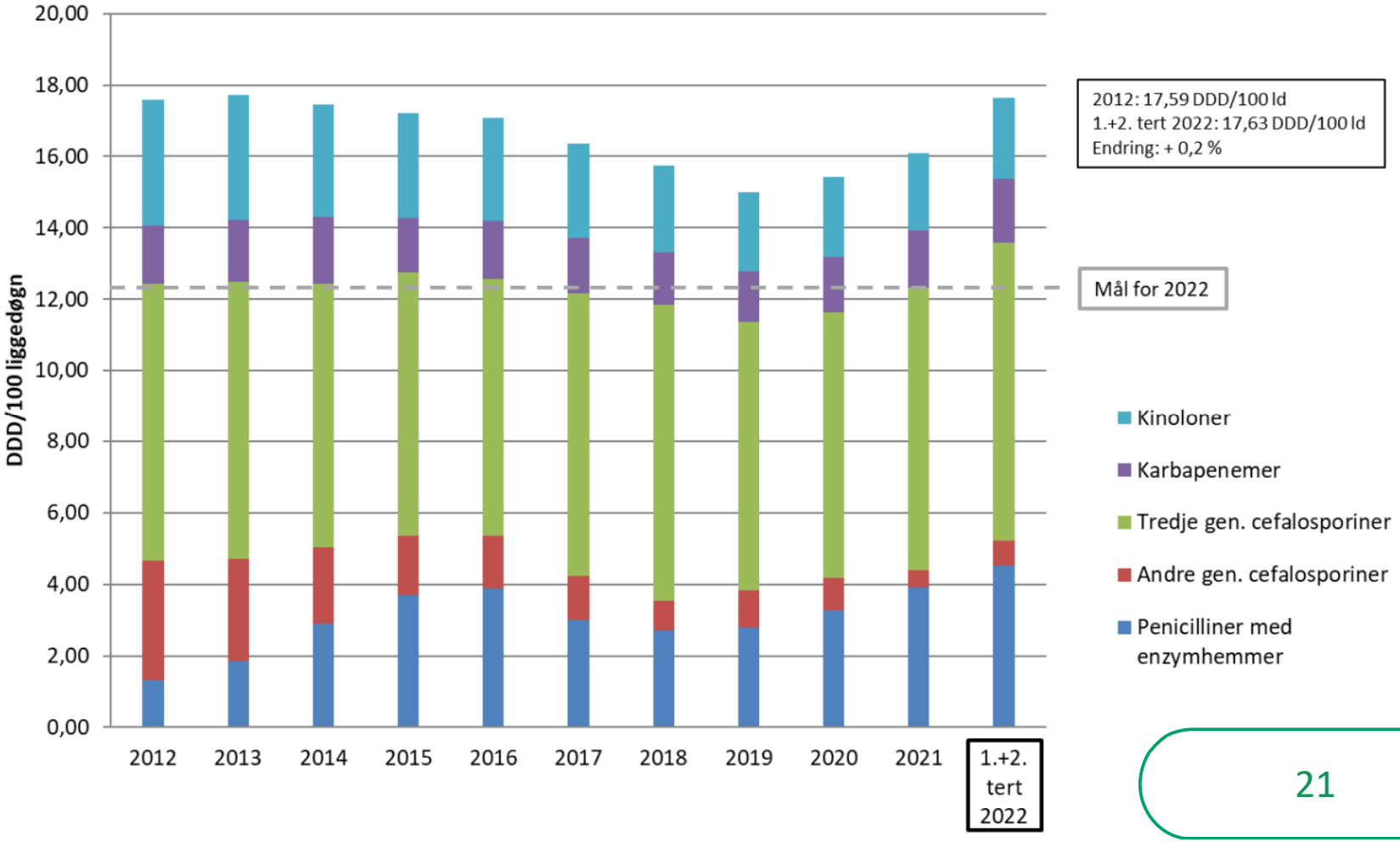
Regjeringens mål om reduksjon av antibiotikabruk



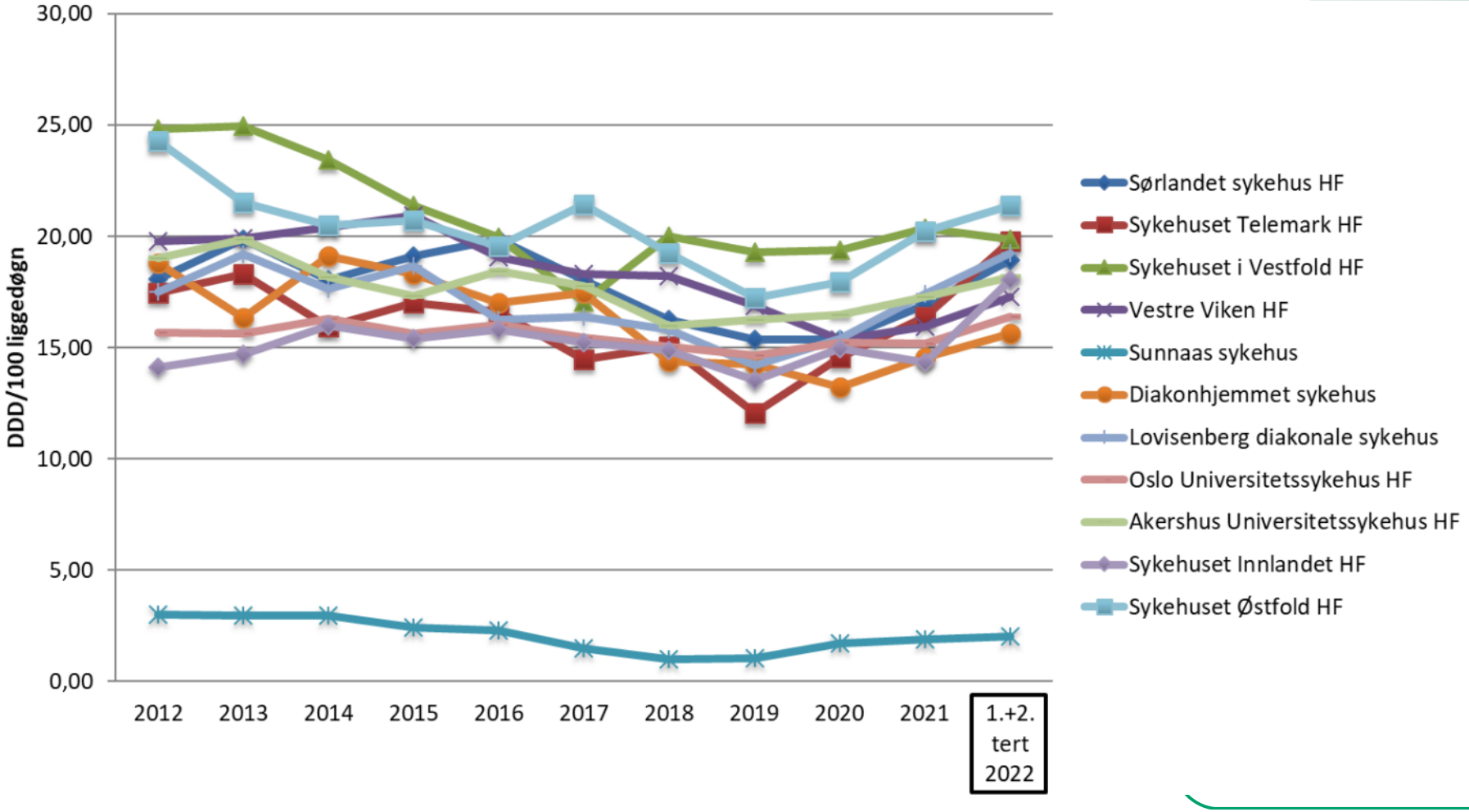
Status per utgangen av 2. tertial 2022 - Norge



Status per utgangen av 2. tertial 2022 – Helse Sør-Øst

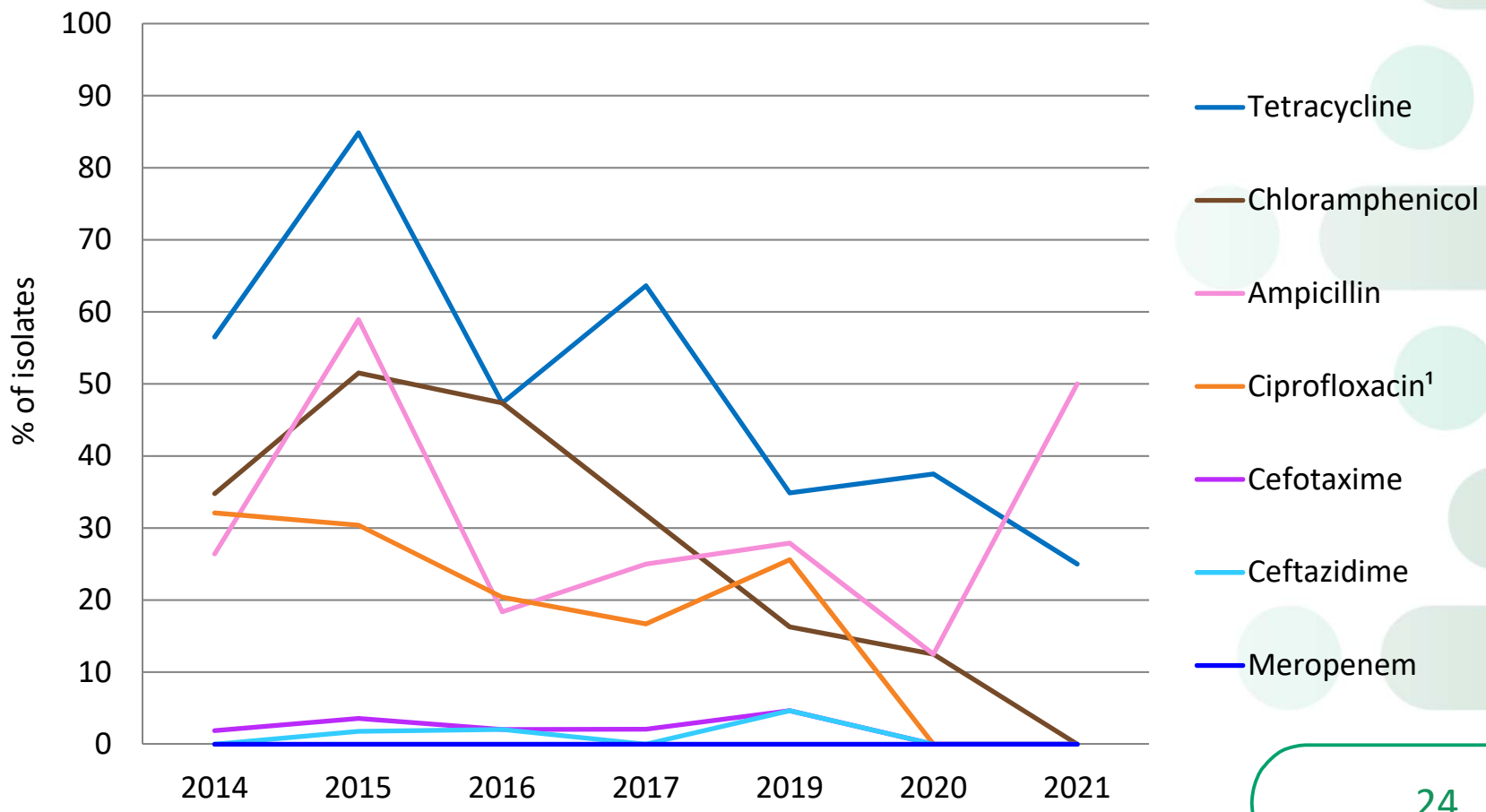


Status per utgangen av 2. tertial 2022 – HSØ per sykehus

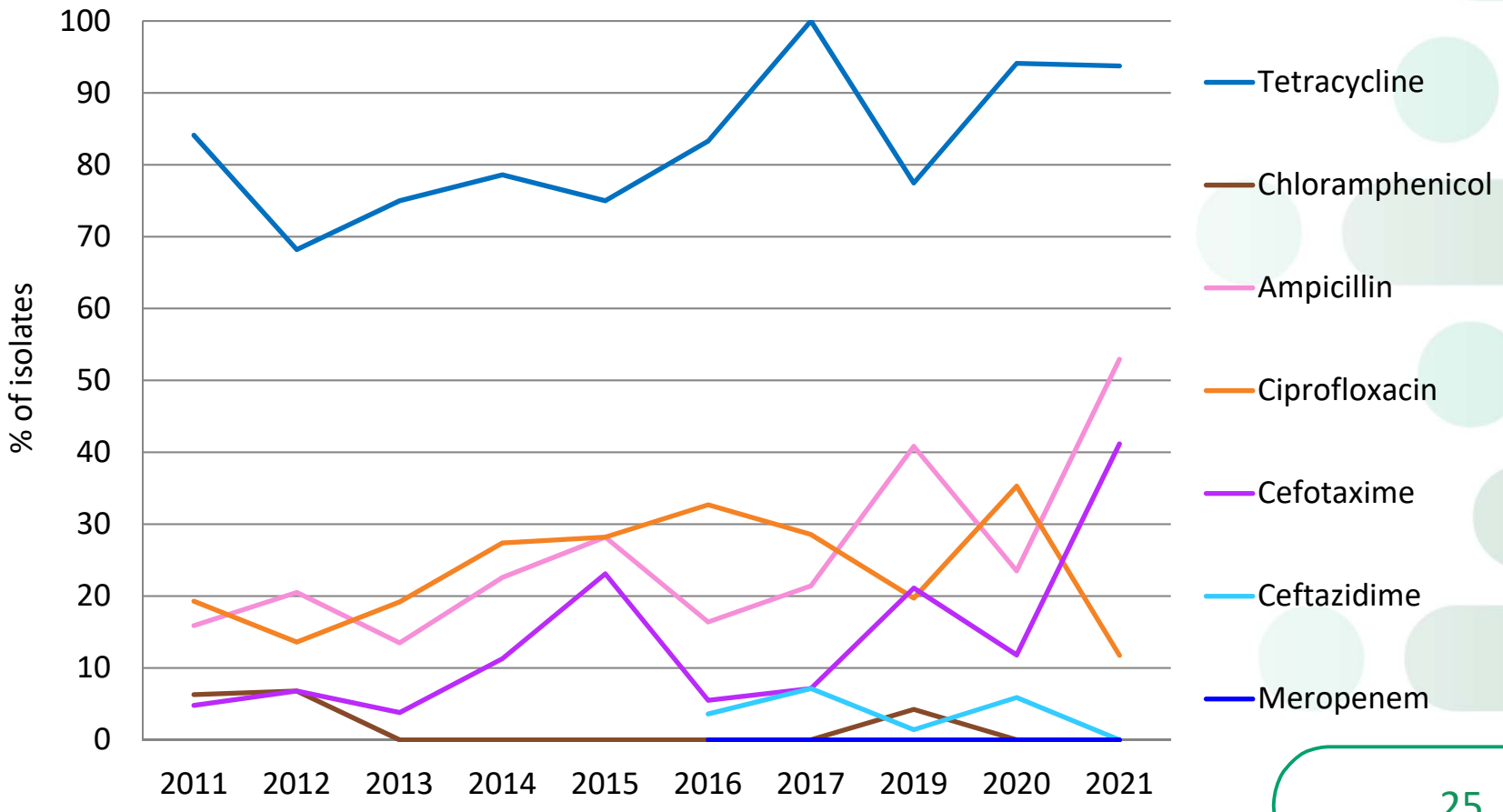


Species	No. of isolates 2021	% of all isolates					% of all isolates excluding skin flora				
		2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Staphylococcus aureus	2,012	10.1	11.1	11.0	10.6	10.5	13.1	14.2	13.9	13.7	13.8
Coagulase negative staphylococci	4,071	20.9	19.5	18.7	20.4	21.1	-	-	-	-	-
Streptococcus pneumoniae	312	2.7	3.3	3.1	1.6	1.6	3.6	4.2	4.0	2.1	2.1
Streptococcus pyogenes	80	1.2	1.2	1.0	0.8	0.4	1.5	1.5	1.2	1.0	0.5
Streptococcus agalactiae	299	1.4	1.5	1.8	1.7	1.6	1.8	1.9	2.2	2.1	2.0
Beta-haemolytic streptococci group C and G	460	1.5	2.0	2.0	2.3	2.4	2.0	2.5	2.5	2.9	3.1
Viridans- and non-haemolytic streptococci	982	5.5	5.1	5.0	5.4	5.1	7.2	6.4	6.4	7.0	6.7
Enterococcus faecalis	719	3.6	3.4	3.4	3.5	3.7	4.7	4.4	4.3	4.5	4.9
Enterococcus faecium	268	1.4	1.2	1.3	1.1	1.4	1.9	1.5	1.7	1.4	1.8
Other Gram-positive aerobic and facultative anaerobic bacteria	810	3.5	3.1	3.7	3.5	4.2	2.2	2.0	2.3	2.4	2.7
Escherichia coli	4,479	24.9	25.5	25.4	24.7	23.2	32.2	32.6	32.2	32.0	30.7
Klebsiella spp.	1,473	7.0	6.8	7.4	7.5	7.7	9.1	8.7	9.4	9.6	10.1
Enterobacter spp.	358	1.9	1.9	1.7	1.7	1.9	2.4	2.4	2.1	2.2	2.4
Proteus spp.	265	1.5	1.6	1.6	1.6	1.4	2.0	2.0	2.0	2.1	1.8
Other *Enterobacteriaceae*	359	2.3	3.4	2.2	2.3	1.9	3.0	4.3	2.7	3.0	2.5
Pseudomonas spp.	364	1.4	1.7	1.8	1.9	1.9	1.8	2.1	2.3	2.4	2.5
Other Gram-negative aerobic and facultative anaerobic bacteria	377	2.0	1.0	2.1	1.8	2.0	2.6	1.3	2.6	2.3	2.6
Bacteroides spp.	442	2.3	1.9	1.9	2.2	2.3	2.9	2.4	2.4	2.9	3.0
Other anaerobic bacteria	876	3.7	3.7	3.8	4.2	4.6	4.4	4.2	4.4	4.9	5.4
Yeasts	209	1.2	1.1	1.1	1.2	1.1	1.6	1.4	1.4	1.5	1.4
Total	**19,215**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

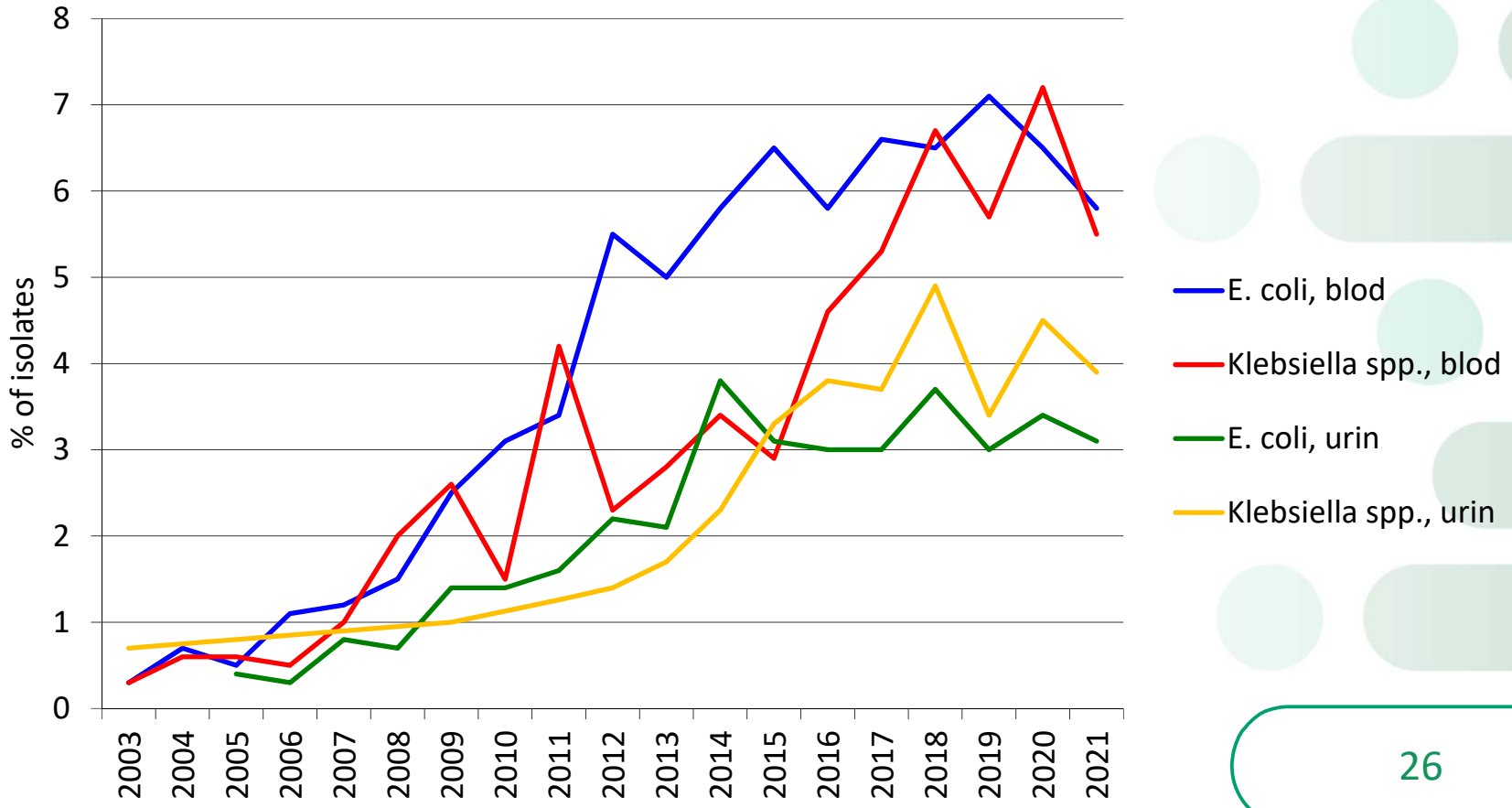
Samonella Typhimurium – Innelands smitte til mennesker



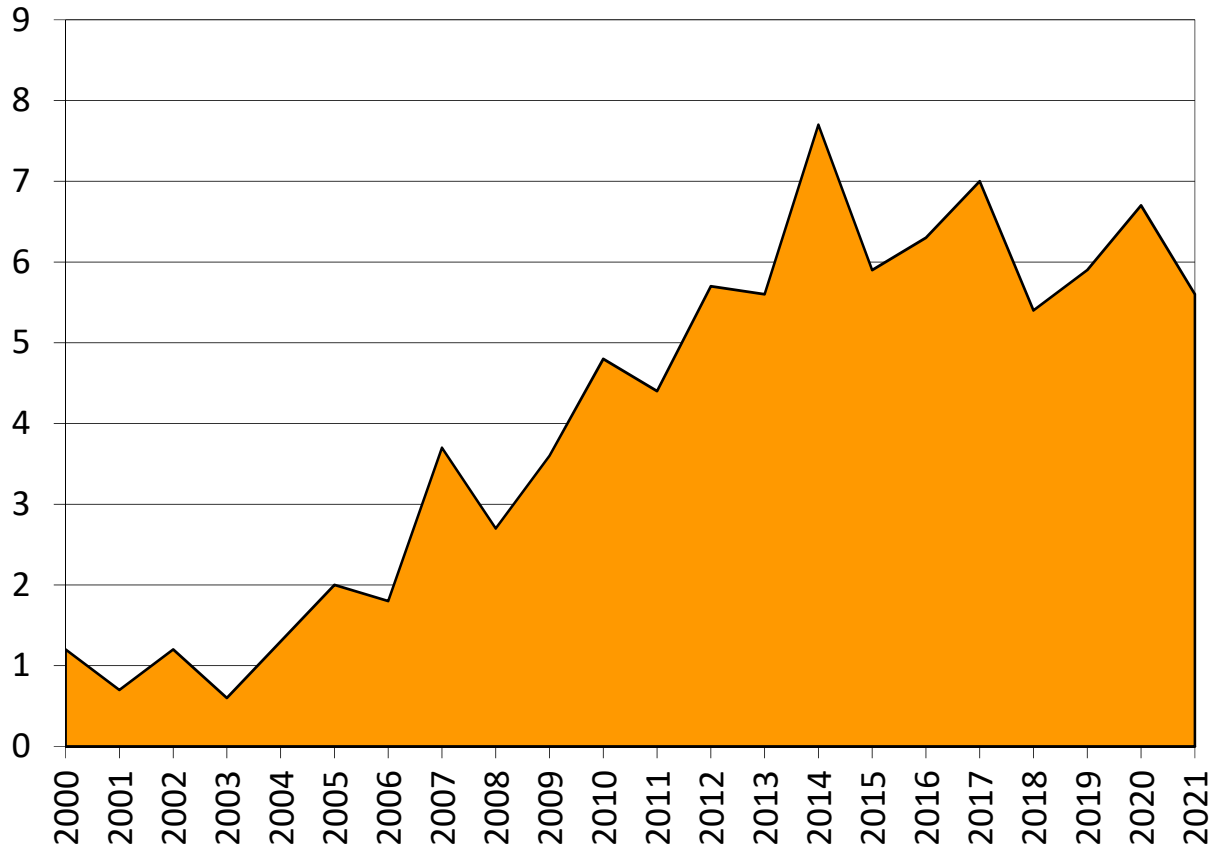
Shigella sonnei – Alle isolater fra mennesker



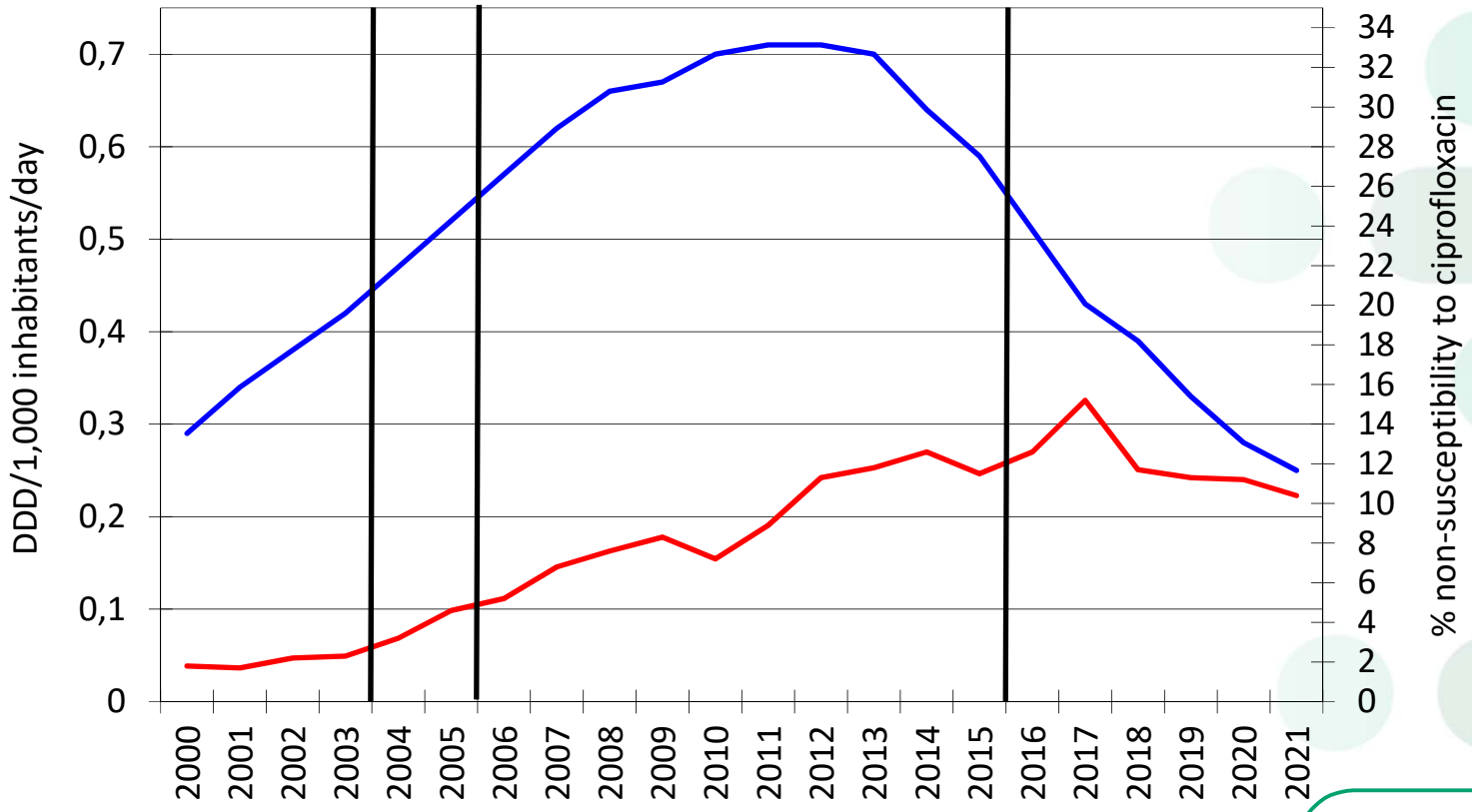
E. coli og *K. pneumoniae* ESBL i blodkultur og urin



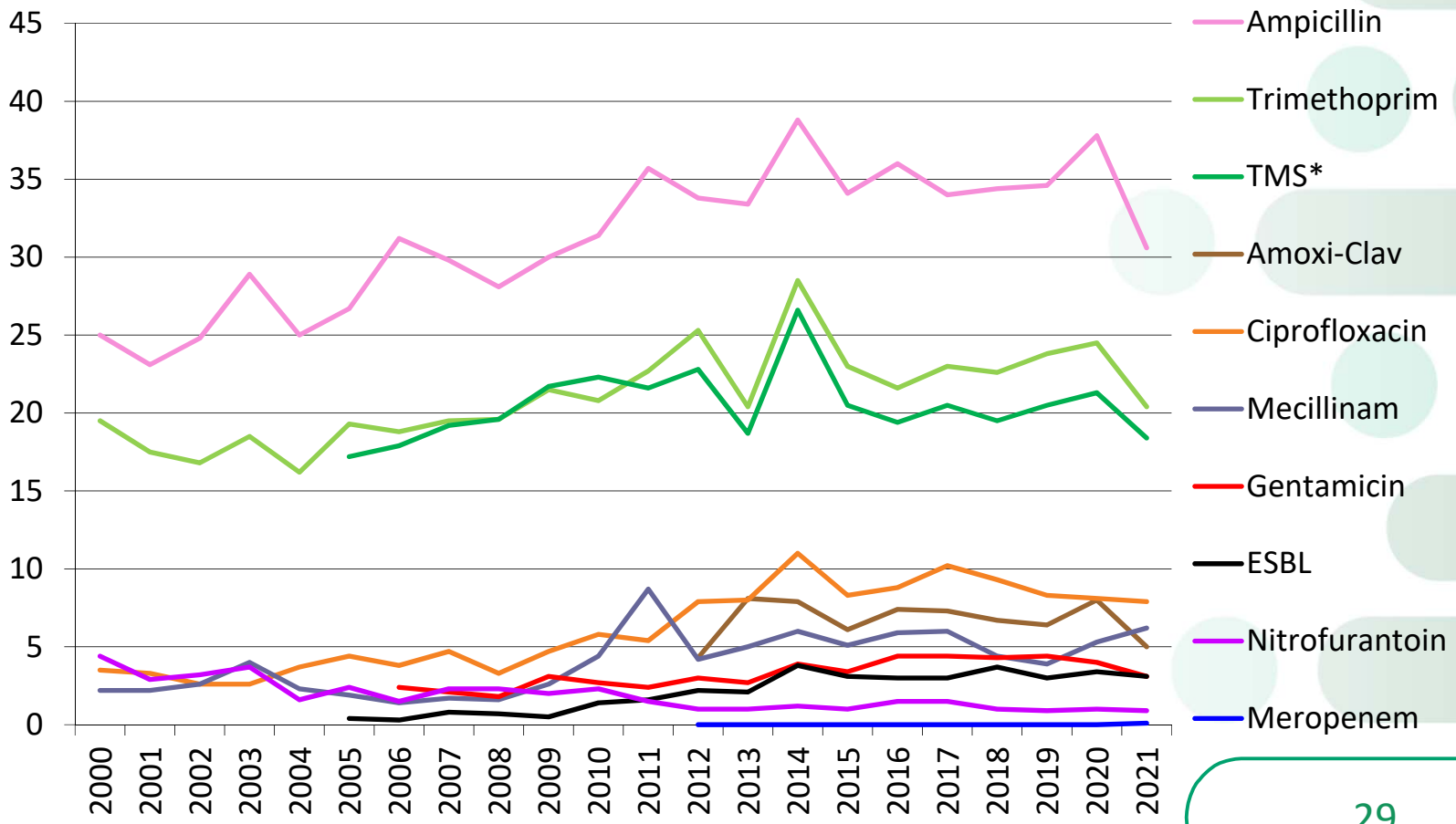
E. coli i blod - Resistens mot gentamicin



E. coli i blod – Forbruk versus resistens for ciprofloxacin



E. coli i urin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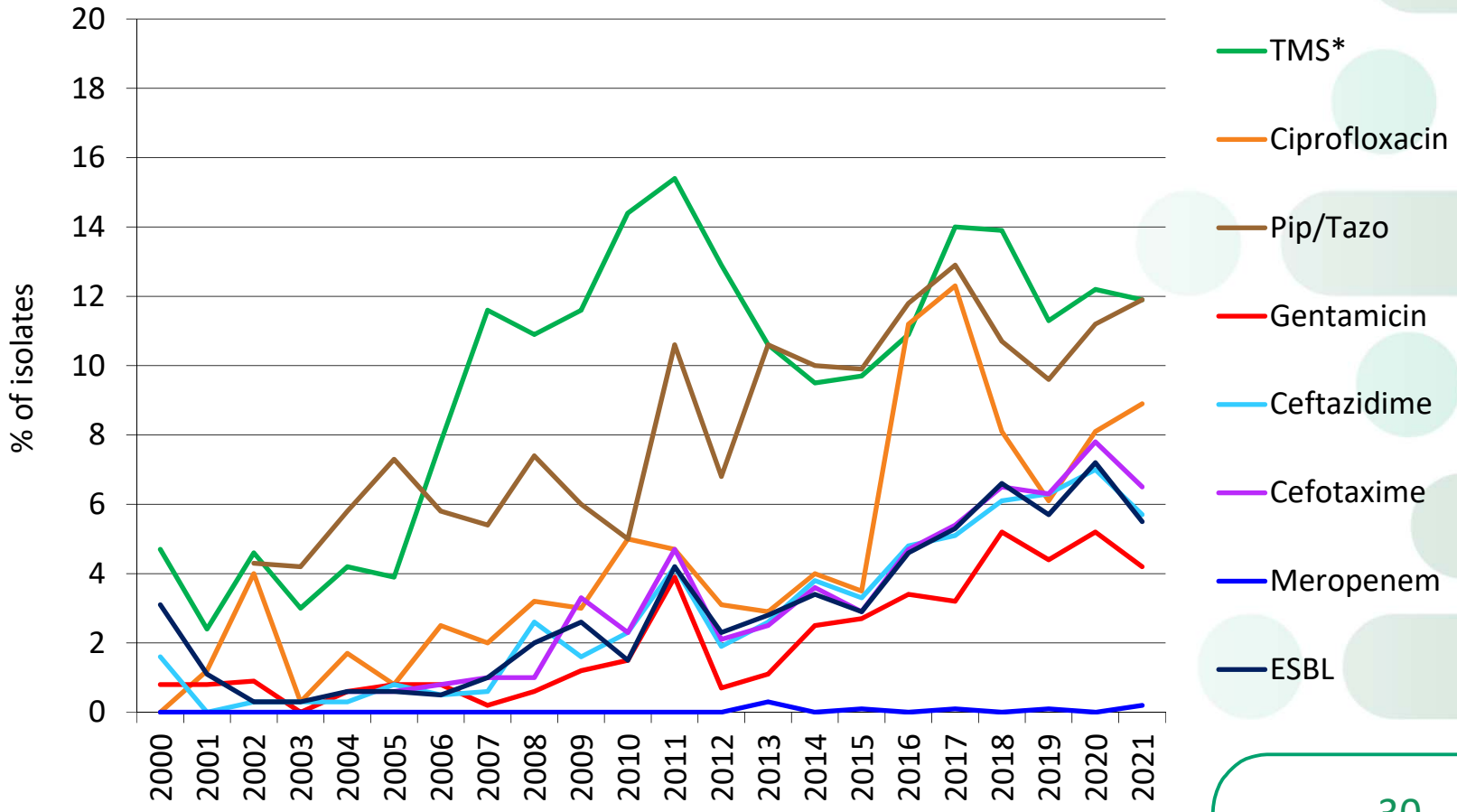
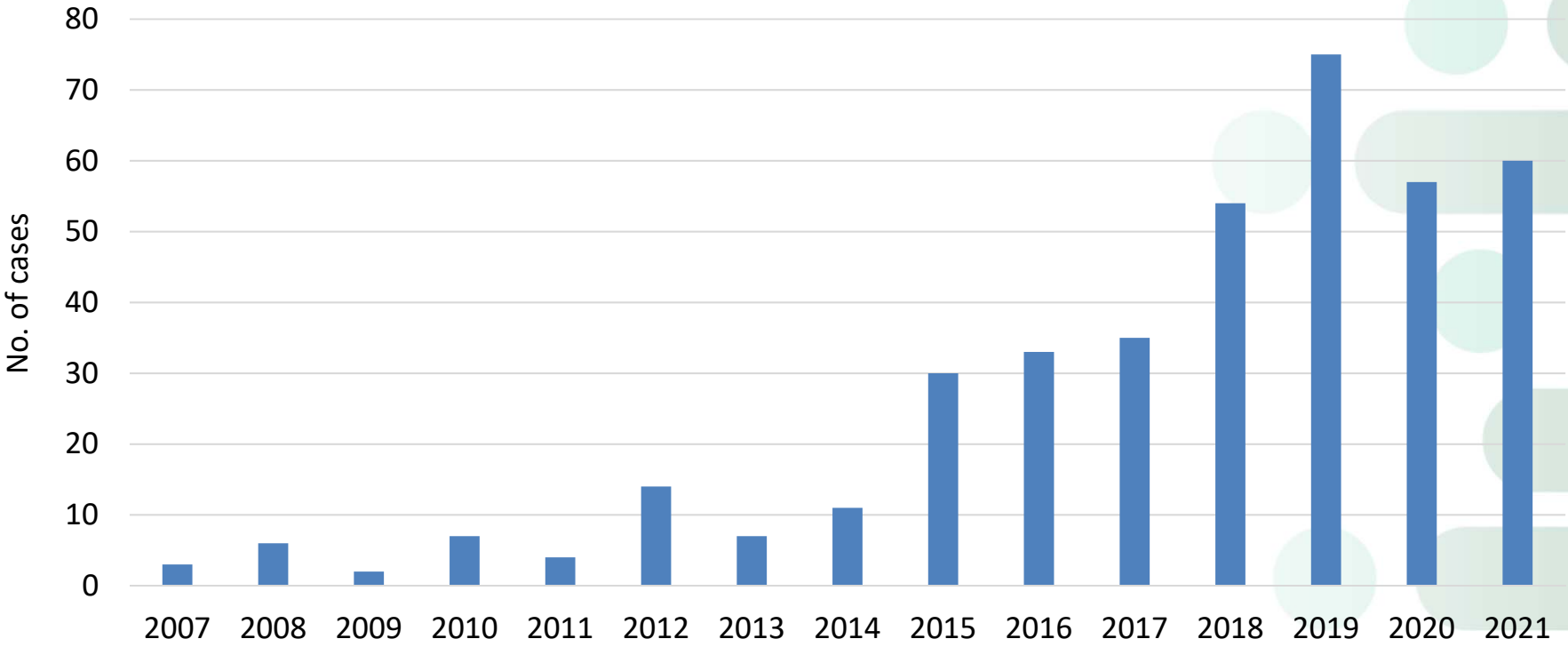
Ampicillin
Trimethoprim
TMS*
Amoxi-Clav
Ciprofloxacin
Mecillinam
Gentamicin
ESBL
Nitrofurantoin
Meropenem

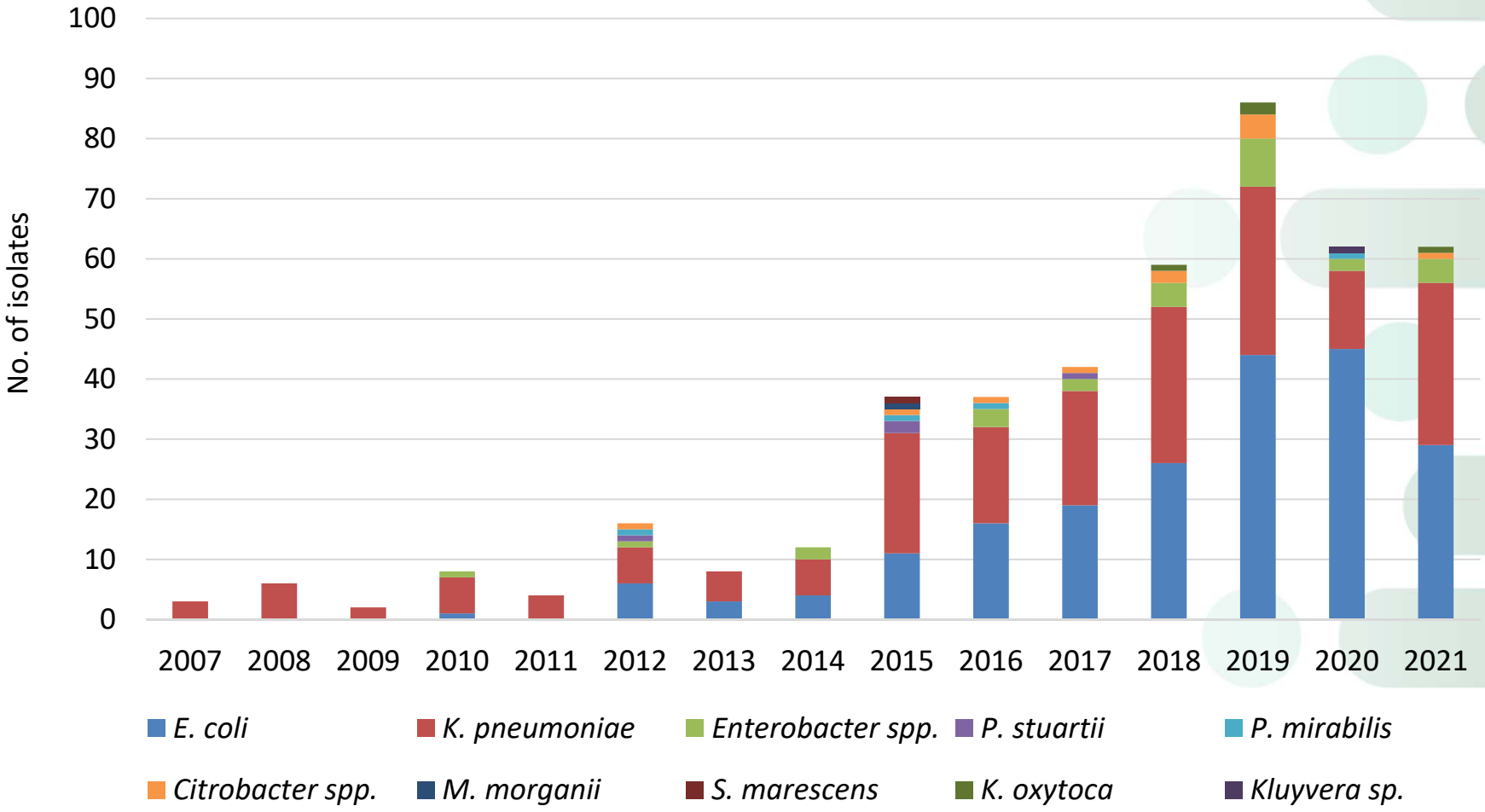
Klebsiella spp. i blod



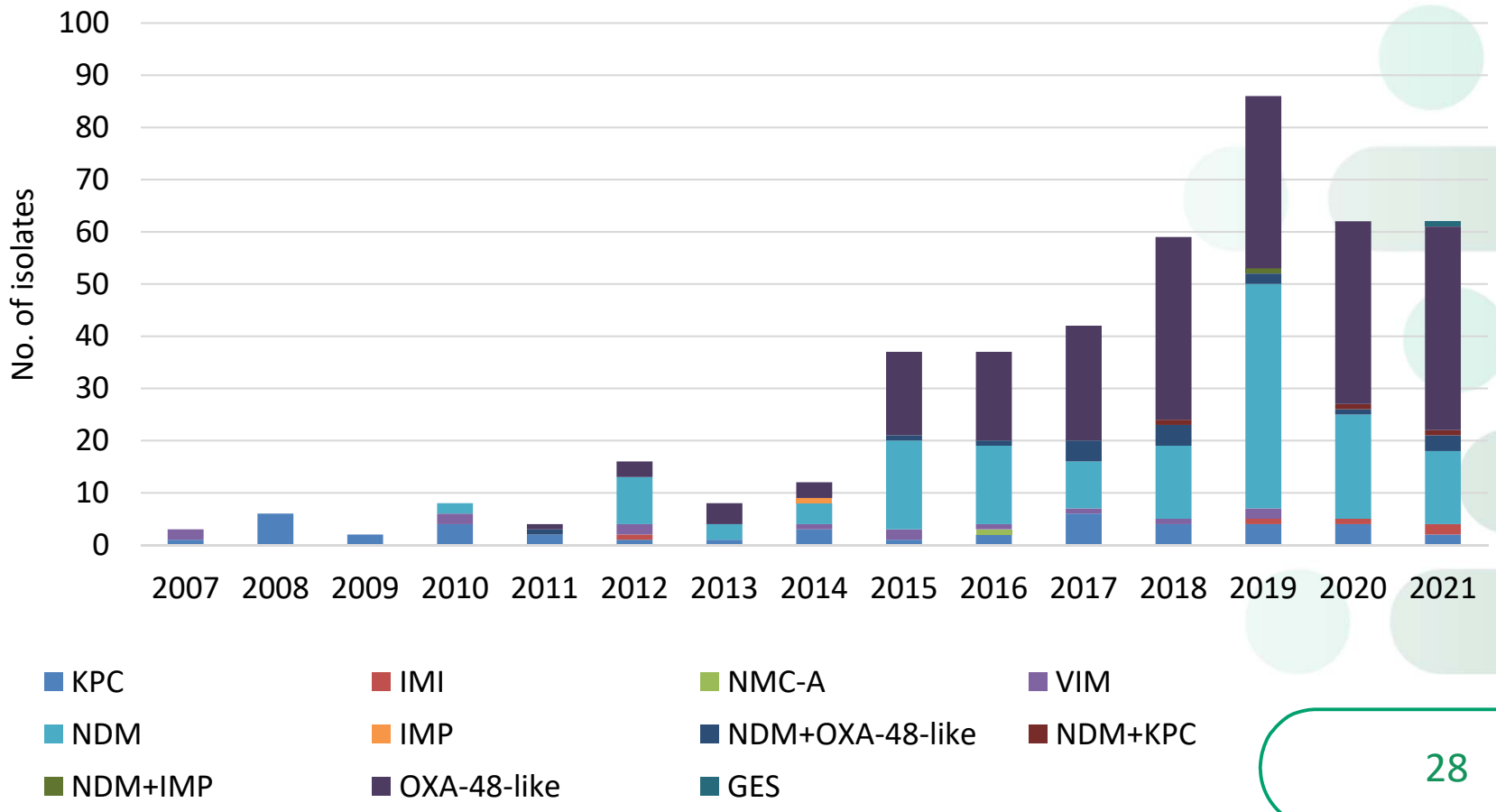
Karbapenemaseproduserende *Enterobacterales* – Antall pasienter



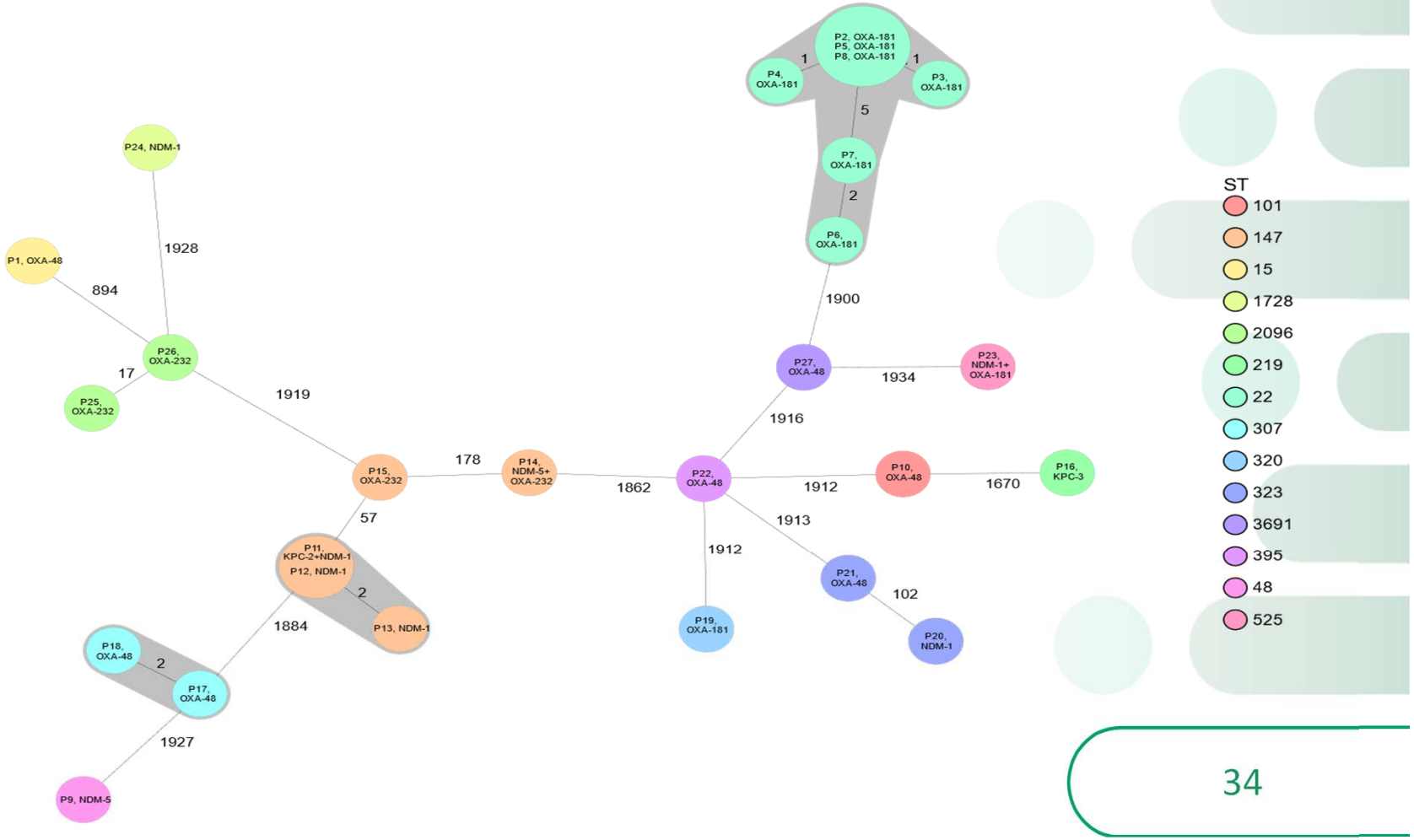
Karbapenemaseproduserende *Enterobacterales* - Speciesfordeling



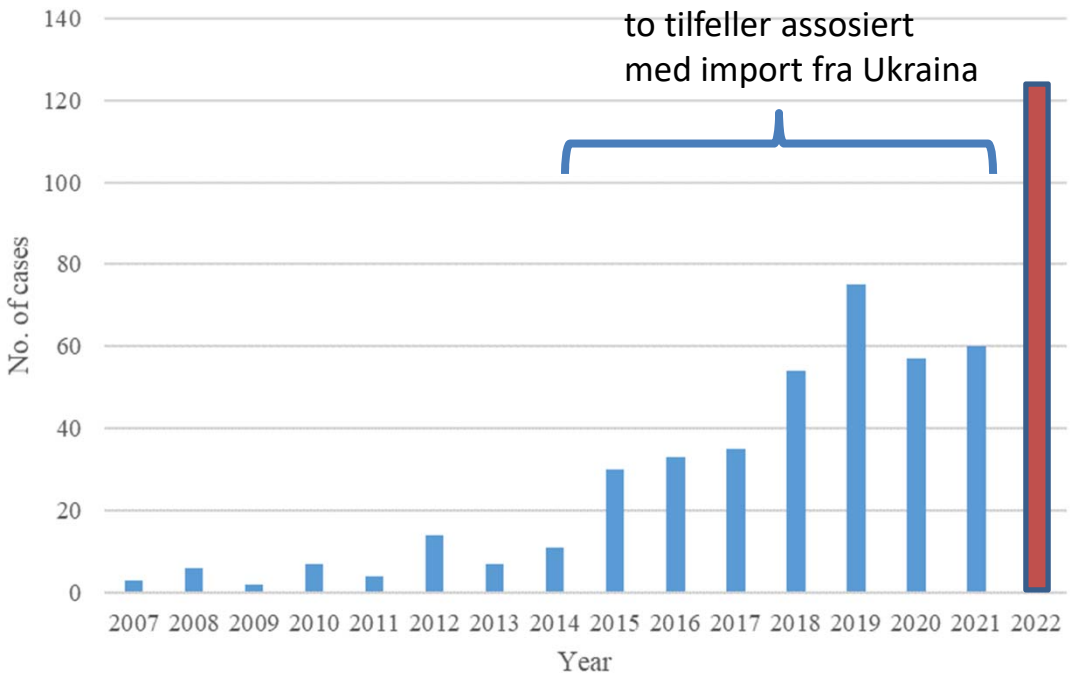
Karbapenemaseproduserende *Enterobacterales* - Genotyper



Karbapenemaseproduserende *K. pneumoniae*



Karbapenemaseproduserende *Enterobacterales* fra Ukraina 2022

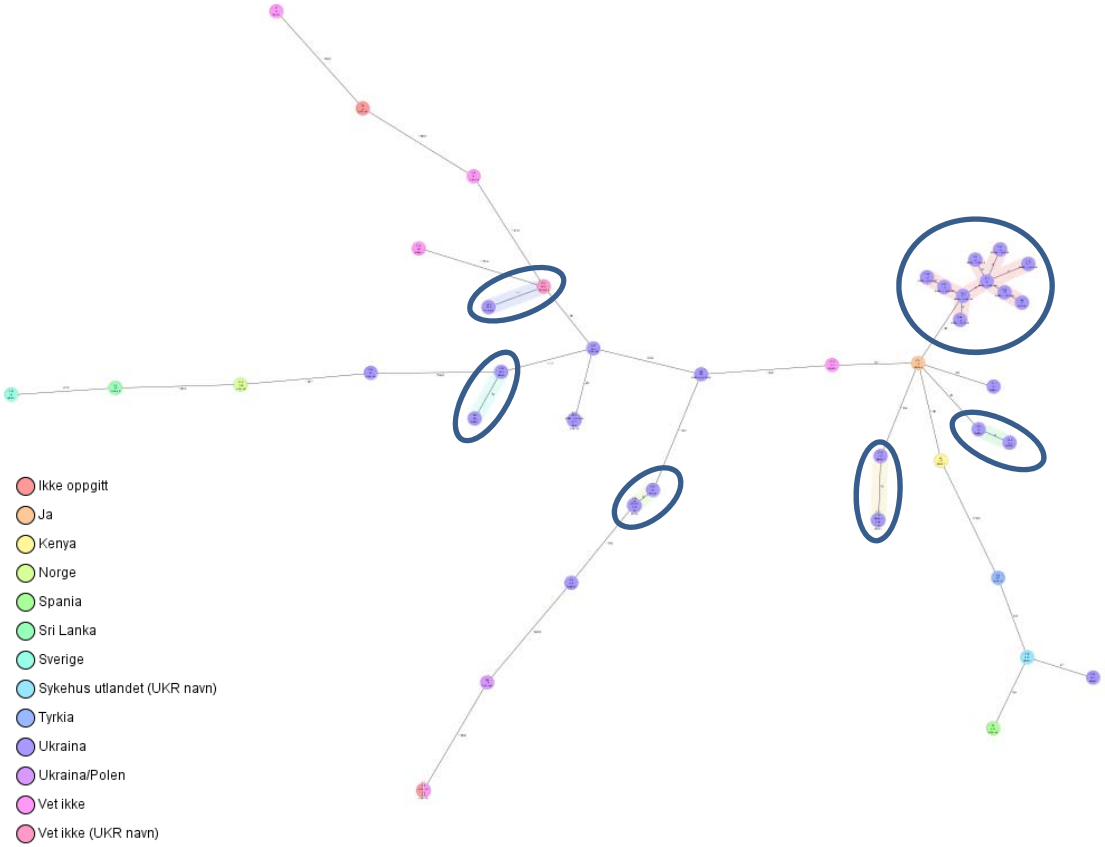


2022: 26% av tilfellene -> Ukraina

- *E. coli* ST156, NDM-5
- *K. pneumoniae* ST395, NDM-5 + OXA-232
- *K. pneumoniae* ST147, NDM-1 + OXA-48
- *K. pneumoniae* ST147, NDM-1
- *P. aeruginosa* ST1047, IMP-1
- *A. baumannii* ST400, (GES-11)
- *E. faecium* ST117, VanA

K-res et al. upubliserte data, pr. 15.11.2022

Spredning av CP *K. pneumoniae* før eller etter ankomst til Norge?



Haukeland, Stavanger, Drammen, Sørlandet, Østfold, OUS Ullevål, St. Olavs Hospital

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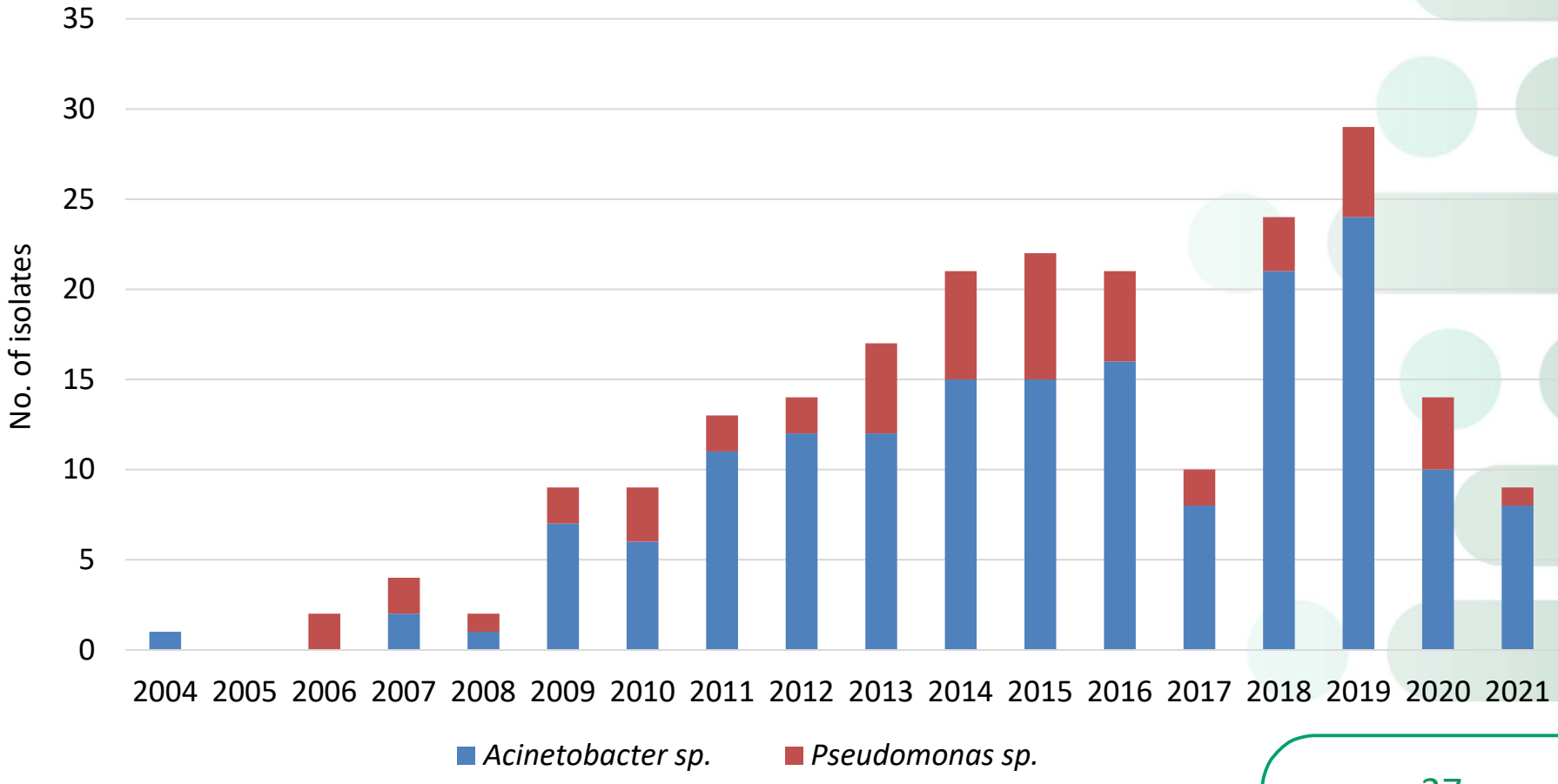
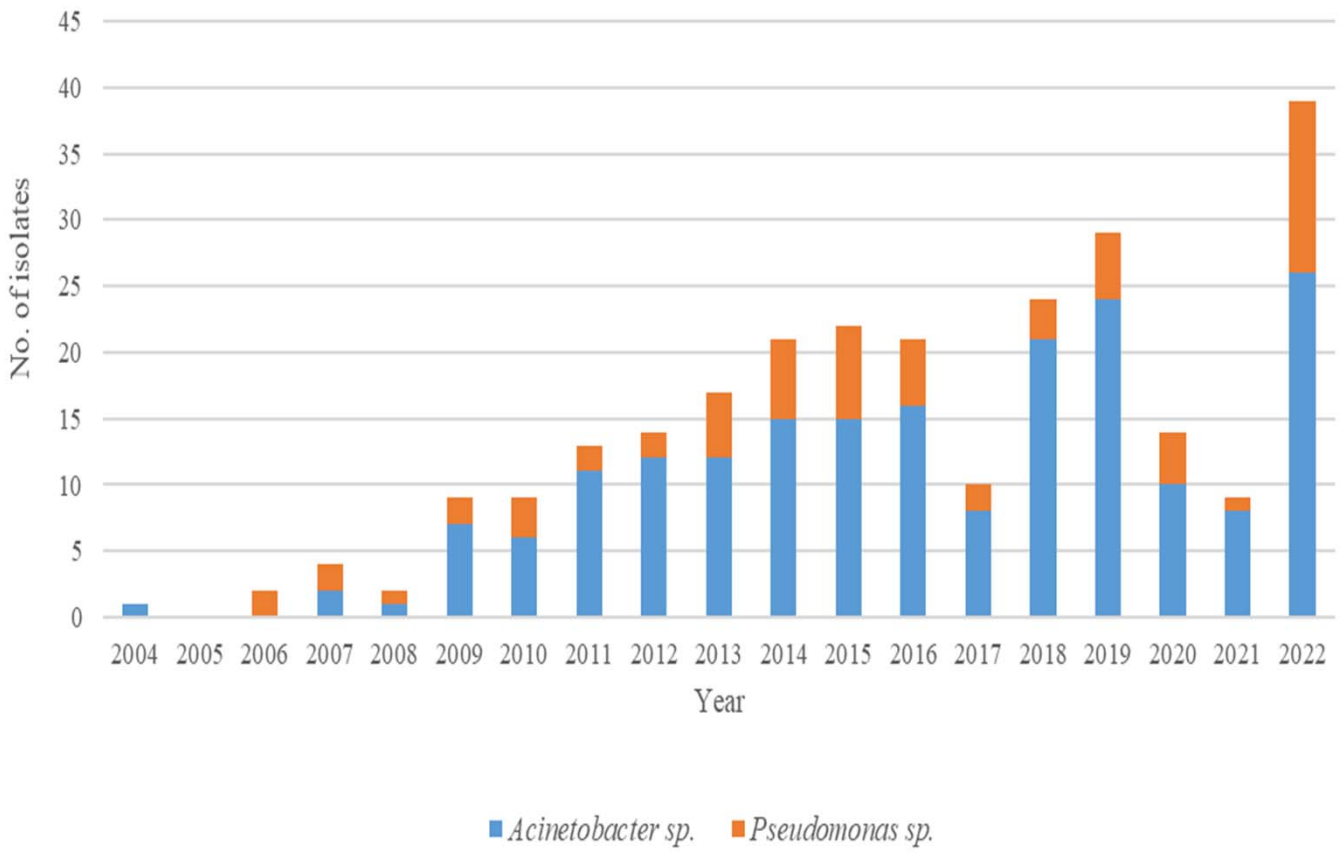
Karbapenemaseproduserende *P. aeruginosa* og *A.baumannii*



Karbapenemaseproduserende *P. aeruginosa* og *A. baumannii*



Acinetobacter 2022:
12/26 tilfeller Ukraina

Pseudomonas 2022:
9/13 tilfeller Ukraina

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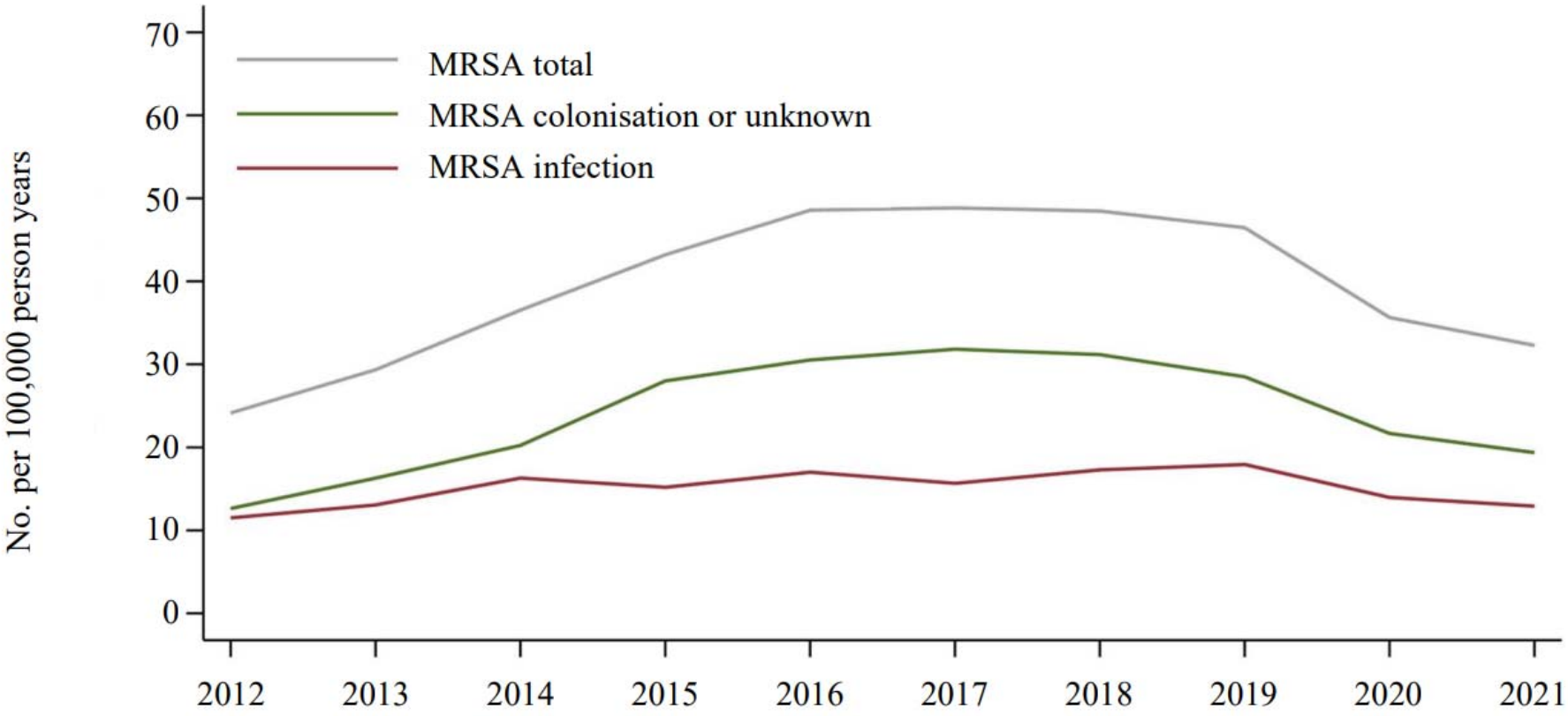
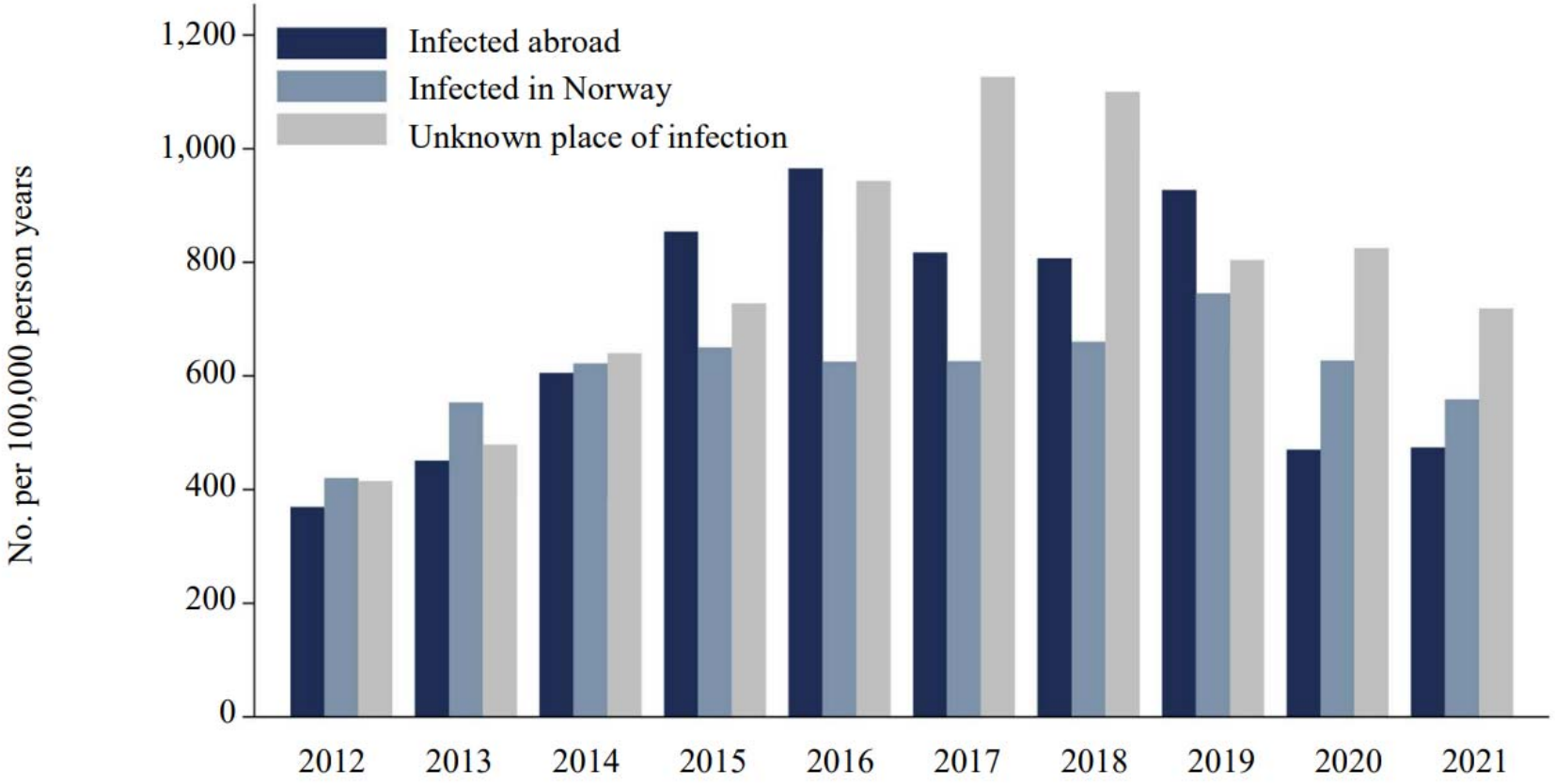
MRSA – Infeksjon / kolonisering per 100 000



MRSA – Infeksjon / kolonisering per 100 000 etter smittested

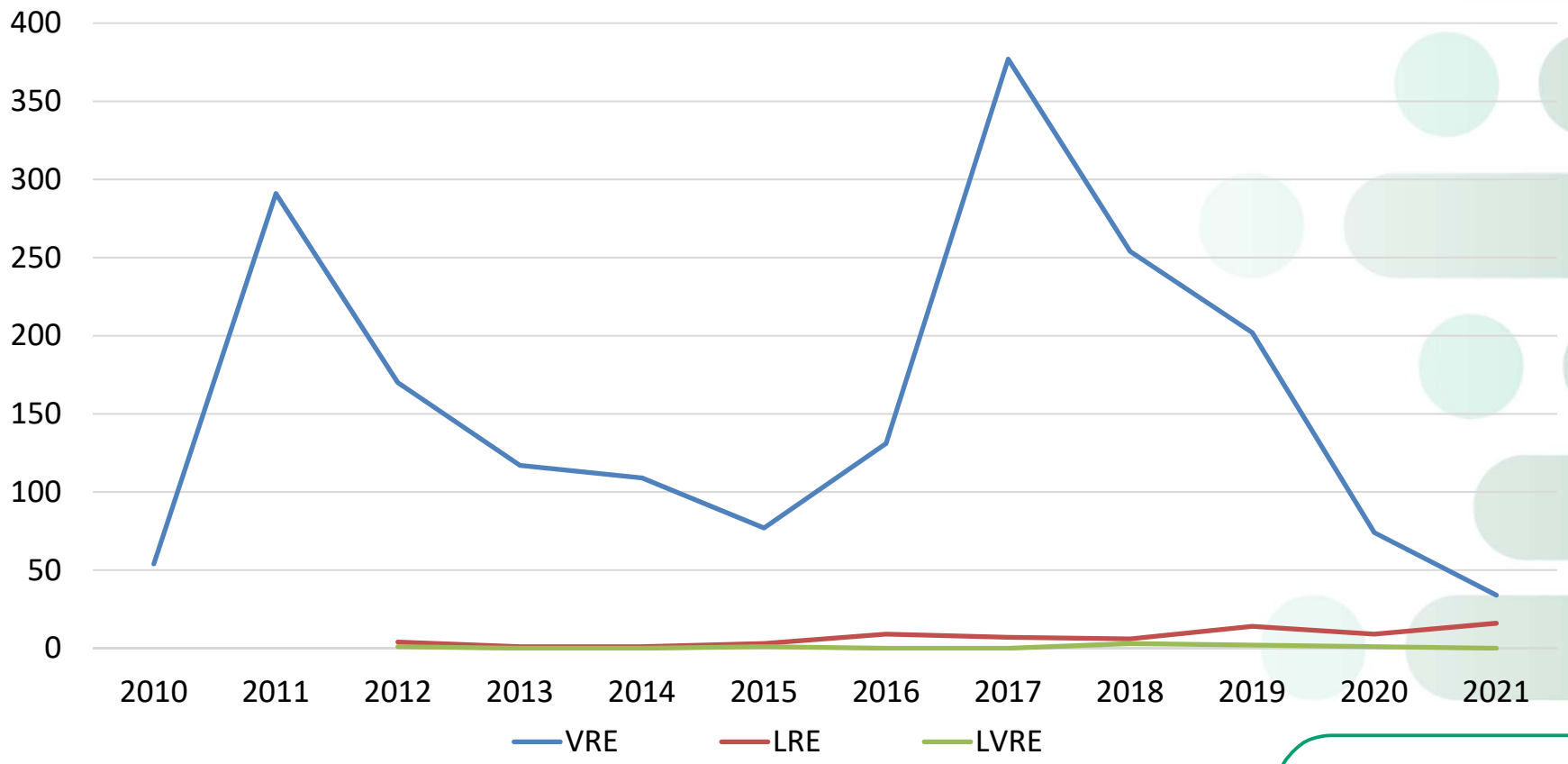


MRSA – Følsomhet for andre antibiotika

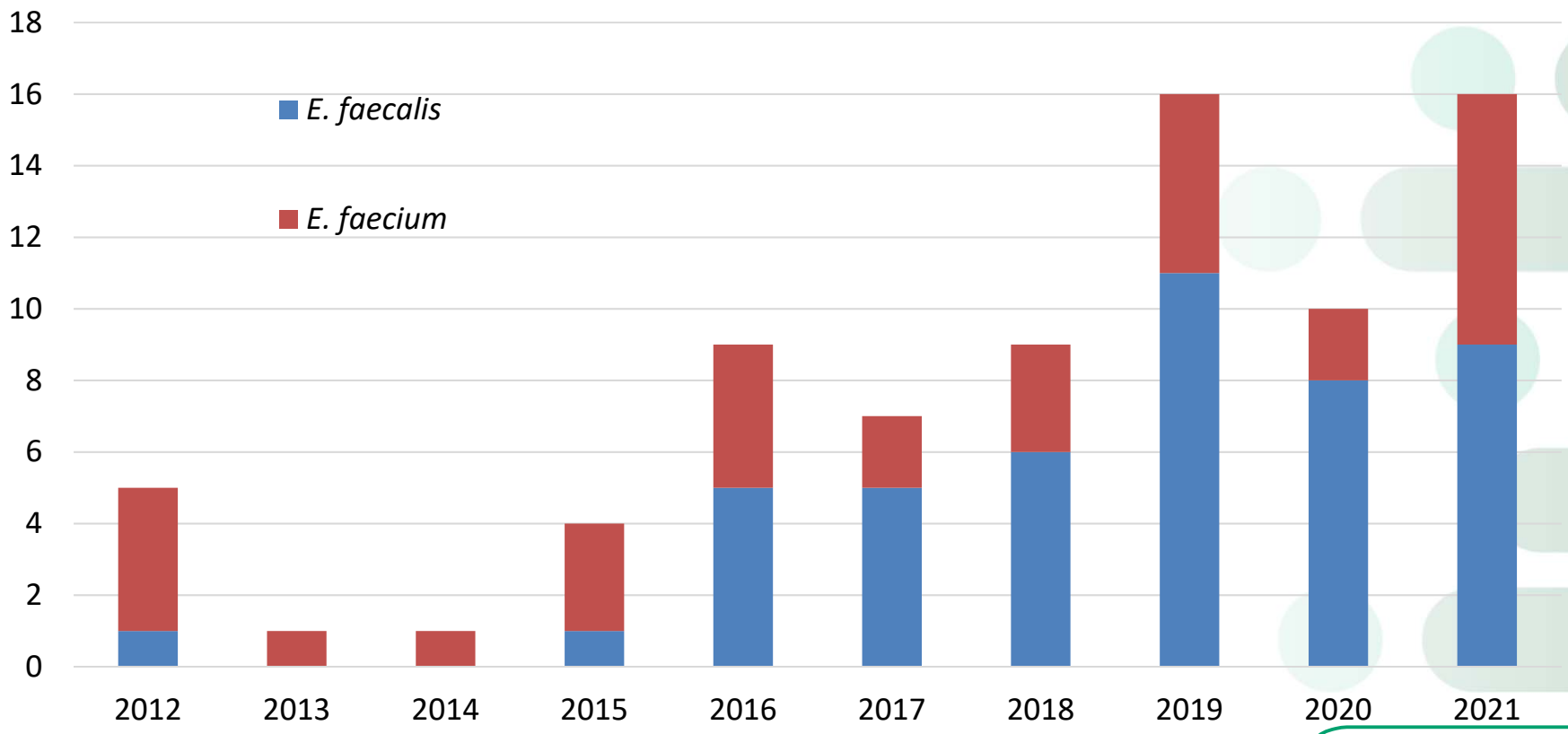
	Breakpoints (mg/L)		Proportion of isolates (%)		
	S	R	S	I	R
Erythromycin	≤ 1	> 2	64.0	0.3	35.7
Clindamycin*	≤ 0.25	> 0.5	81.1	1.9	17.0
Fusidic acid	≤ 1	> 1	85.3	-	14.7
Trimethoprim-sulfamethoxazole**	≤ 2	> 4	96.2	1.7	2.1
Tetracycline	≤ 1	> 2	74.3	0.4	25.3
Gentamicin	≤ 1	> 1	87.5	-	12.5
Rifampicin	≤ 0.06	> 0.5	98.5	0.6	0.9
Mupirocin	≤ 1	> 256	95.2	4.6	0.2
Ciprofloxacin	≤ 0.001	> 1	0.0	75.0	25.0
Linezolid	≤ 4	> 4	100.0	-	0.0
Vancomycin	≤ 2	> 2	100.0	-	0.0

S=Susceptible with standard exposure, I=Susceptible with increased exposure, R=Resistant. *Proportion of isolates resistant to clindamycin are given in total. Of these, 11.5% were inducibly clindamycin resistant. **Breakpoints for the trimethoprim-sulfamethoxazole combination are given for the trimethoprim component only.

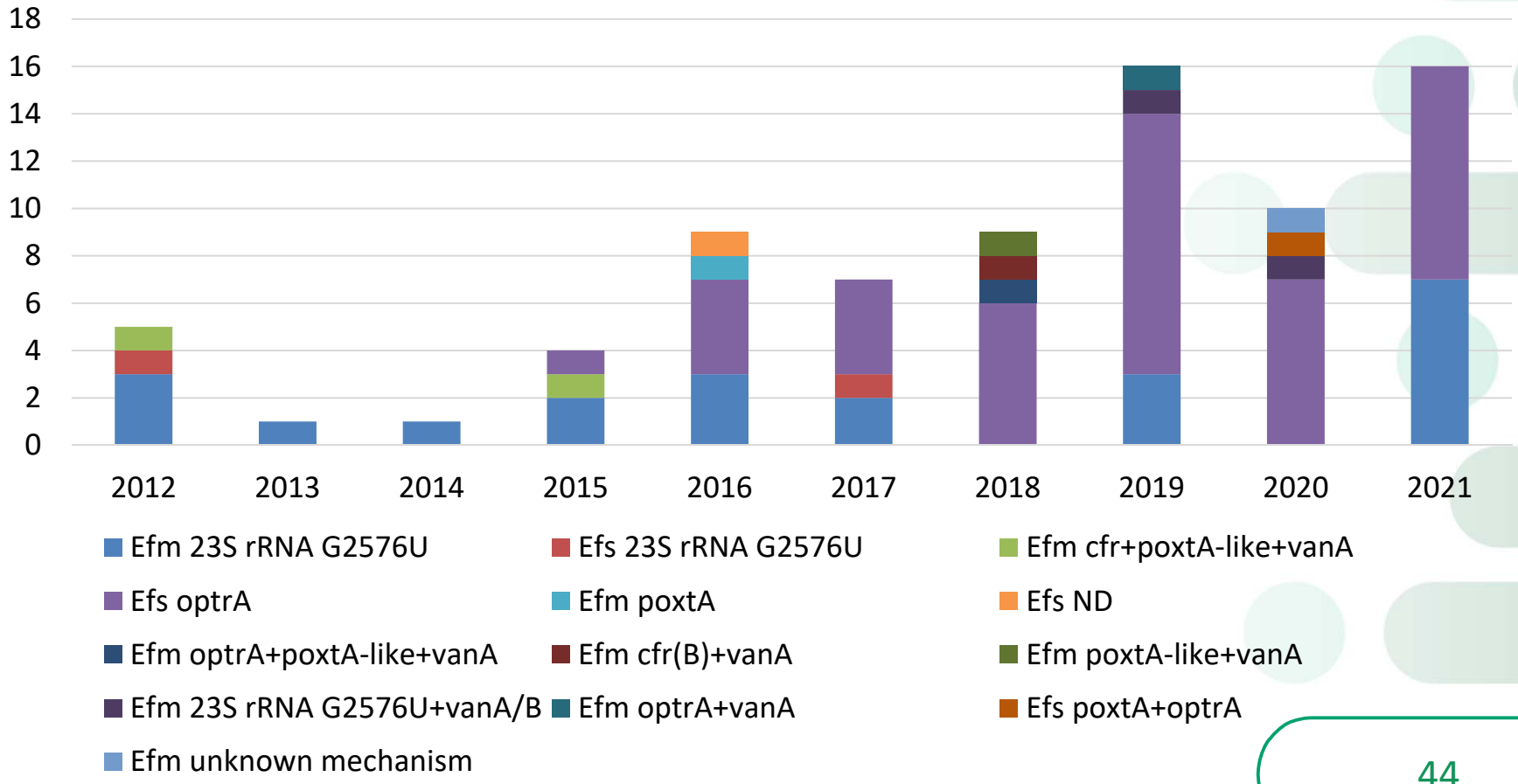
Vankomycin- og linezolidresistente enterokokker



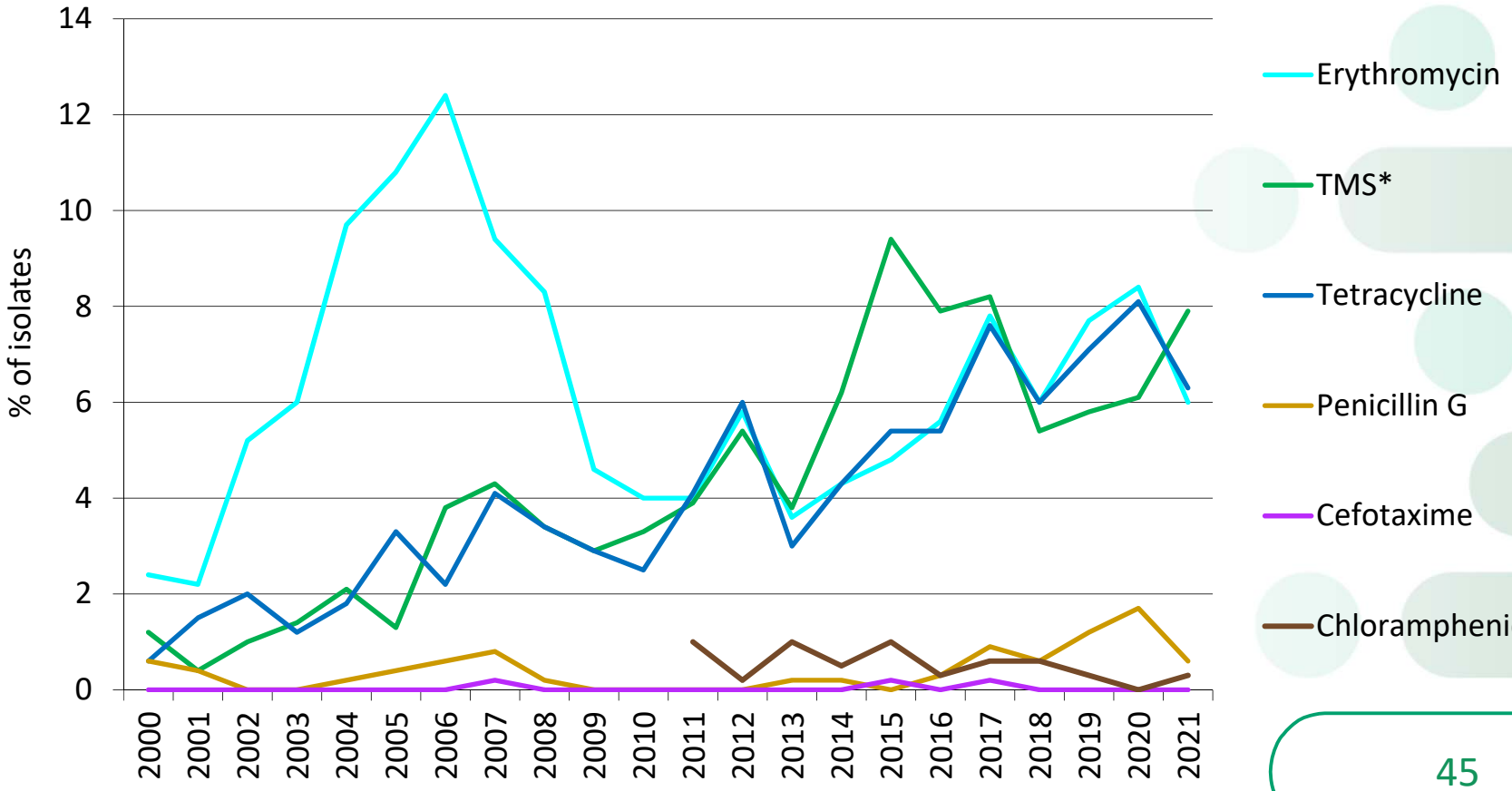
Linezolidresistente enterokokker



Species og resistensmekanismer hos linezolidresistente enterokokker



Streptococcus pneumoniae i blod



Streptococcus agalactiae (GBS) i blod

	Breakpoints (mg/L)		Proportion of isolates (%)		
	S	R	S	I	R
Penicillin G*	≤ 0.25	> 0.25	100.0	-	0.0
Erythromycin	≤ 0.25	> 0.5	77.3	0.0	22.7
Clindamycin	≤ 0.5	> 0.5	84.3	-	15.7
Tetracycline	≤ 1	> 2	20.0	0.0	80.0
Vancomycin	≤ 2	> 2	100.0	-	0.0

Mycobacterium tuberculosis – Alle materialer

Origin of birth	No. of cases	No. of isolates	Resistance to antimicrobial agents				
			Isoniazid 125 (133)	Rifampicin 131 (138)	Ethambutol 122 (133)	Pyrazinamide 123 (133)	MDR-TB 125 (133)
Norway	26 (29)	21 (25)	1 (2)	1(0)	1 (1)	1 (0)	1 (0)
Europe excl. Norway	17 (10)	16 (9)	3 (0)	3 (0)	3 (0)	3 (0)	3 (0)
Asia	56 (57)	41 (47)	4 (7)	3 (2)	0 (1)	2 (2)	2 (1)
Africa	52 (62)	43 (52)	7 (6)	5 (0)	2 (0)	3 (0)	4 (0)
America	3 (1)	3 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	154 (159)	124 (134)	15 (15)	12 (2)	6 (2)	9 (2)	10 (1)
Proportion resistant isolates (%)			12.0 (11.3)	9.2 (1.4)	4.9 (1.5)	7.3 (1.5)	8.0 (0.8)

MDR-TB: Multi-drug resistant tuberculosis, resistant to at least rifampicin and isoniazid. RR-TB: Rifampicin resistant tuberculosis, with or without resistance to other first line drugs (isoniazid, ethambutol, pyrazinamide)

Candida albicans og *Candida glabrata* i blod

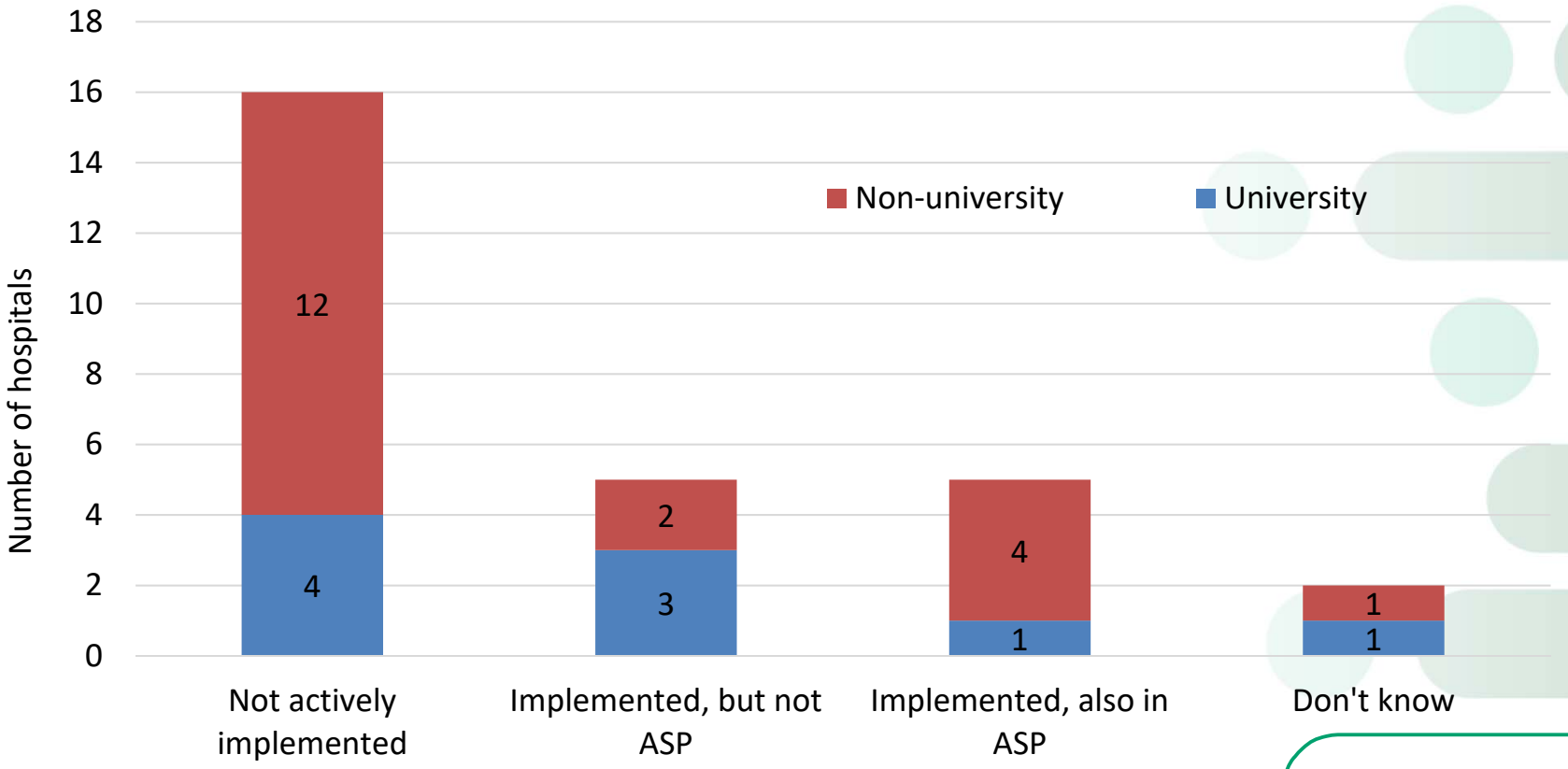
	Breakpoints (mg/L)		Proportion of isolates (%)		
	S	R	S	I	R
Amphotericin B	≤ 1	> 1	100.0	-	0.0
Fluconazole	≤ 2	> 4	99.1	0.0	0.9
Voriconazole	≤ 0.06	> 0.25	100.0	0.0	0.0
Anidulafungin	≤ 0.03	> 0.03	100.0	-	0.0
Micafungin*	≤ 0.016	> 0.016	100.0	-	0.0

	Breakpoints (mg/L)		Proportion of isolates (%)		
	S	R	S	I	R
Amphotericin B	≤ 1	> 1	100.0	-	0.0
Fluconazole	≤ 0.001	> 16	0.0	88.9	11.1
Anidulafungin	≤ 0.06	> 0.06	100.0	-	0.0
Micafungin	≤ 0.03	> 0.03	100.0	-	0.0

Resistens mot bredspektrede kombinasjonsregimer

Antibiotic drug combiantions		Proportion of invasive isolates resistant (%)									
		E. coli (n=2,212)	*Klebsiella* spp. (n=1,045)	ESBL *Enterobacterales** (n=185)	*H. influenzae* (n=63)	*Enterococcus* spp. (n=715)	*S. pneumoniae* (n=315)	*S. pyogenes* (n=78)	*S. agalactiae* (n=300)	*S. aureus* (n=1,455)	MRSA* (n=1,895)
Benzylpenicillin	Gentamicin	5.6	4.2	41.6	30.2[1]	-	0.6	0.0	0.0	0.5	12.5
Benzylpenicillin	Ciprofloxacin	10.4	8.9	68.1	0.0	-	0.0	0.0	0.0	8.8	25.0
Clindamycin	Gentamicin	5.6	4.2	41.6	100.0	100.0	3.8	11.5	15.7	0.1	1.1
Ampicillin	Gentamicin	4.9	4.2	41.6	20.6	11.3[3]	X	0.0[4]	0.0[4]	0.5	12.5
Piperacillin/tazobactam	Gentamicin	0.8	2.5	16.8	0.0[2]	11.3[3]	X	0.0[4]	0.0[4]	0.2[5]	12.5
Cefotaxime		6.1	6.5	95.7	0.0	100.0	0.0	0.0[4]	0.0[4]	0.8[6]	100.0
Piperacillin/tazobactam		5.2	11.9	29.2	0.0[2]	19.0[3]	X	0.0[4]	0.0[4]	0.8[6]	100.0
Meropenem		0.0	0.2	1.1	0.0	100.0	X	0.0[4]	0.0[4]	0.8[6]	100.0

Bruk av procalcitonin ved norske sykehus



THAT'S A GOOD QUESTION!