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Claire Elson

Ellen Meier

Douglas Swanson

Rangaraj Selvarangan

Megan Gripka

*See next page for additional authors*

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**Authors**

Claire Elson, Ellen Meier, Douglas Swanson, Rangaraj Selvarangan, Megan Gripka, and Christopher M. Oermann

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# Development and Interim Analysis of a Cystic Fibrosis-Specific Antibioqram

E. Claire Elson, PharmD, BCPPS; Ellen Meier, CPNP, APRN; Doug Swanson, MD; Rangaraj Selvarangan, BVSc, PhD, D(ABMM); Megan Gripka, MT(ASCP)SM; Christopher M Oermann, MD

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### Background

- Antimicrobial therapy is essential to treat cystic fibrosis (CF) lung infections
- Empiric antimicrobial selection is generally based on previous culture information and, if available, an institution-specific antibiogram (ABGM)
- Most institutions' ABGMs exclude cultures from individuals with CF, imposing challenges with empiric antimicrobial selection and monitoring susceptibility patterns over time
- A CF-specific ABGM may help drive population-specific antimicrobial selection and improve antimicrobial stewardship

### Methods

- All respiratory cultures (expectorated sputum and throat swabs) obtained at Children's Mercy Kansas City (CMKC) from people with CF were included in analysis
- Data collected include demographic characteristics, microorganism isolated and susceptibility information
- Susceptibility information was reported for the following microorganisms: methicillin-susceptible *Staphylococcus aureus* (MSSA), methicillin-resistant *Staphylococcus aureus* (MRSA), *Pseudomonas aeruginosa* (PA), *Achromobacter* species, *Stenotrophomonas maltophilia*, and *Burkholderia cepacia* complex species
- For patients with multiple cultures growing the same microorganism, only the initial chronological isolate from each calendar year was included in analysis and ABGM development

### Results

- Interim analysis from 1/1/2015 to 12/31/2019

#### Selected Gram Positive CMKC and CF ABGM Results

	# of tested isolates (n)	% Susceptible Antibiotic Tested					
		CLIN	LZD	RIF	TET	TMP/SMX	VANC
MSSA (CMKC)	5962	79	100	100	96	96	100
MSSA (CF)	902	71	99	99	96	99	-
MRSA (CMKC)	2854	83	100	99	97	96	100
MRSA (CF)	348	39	99	94	97	99	100

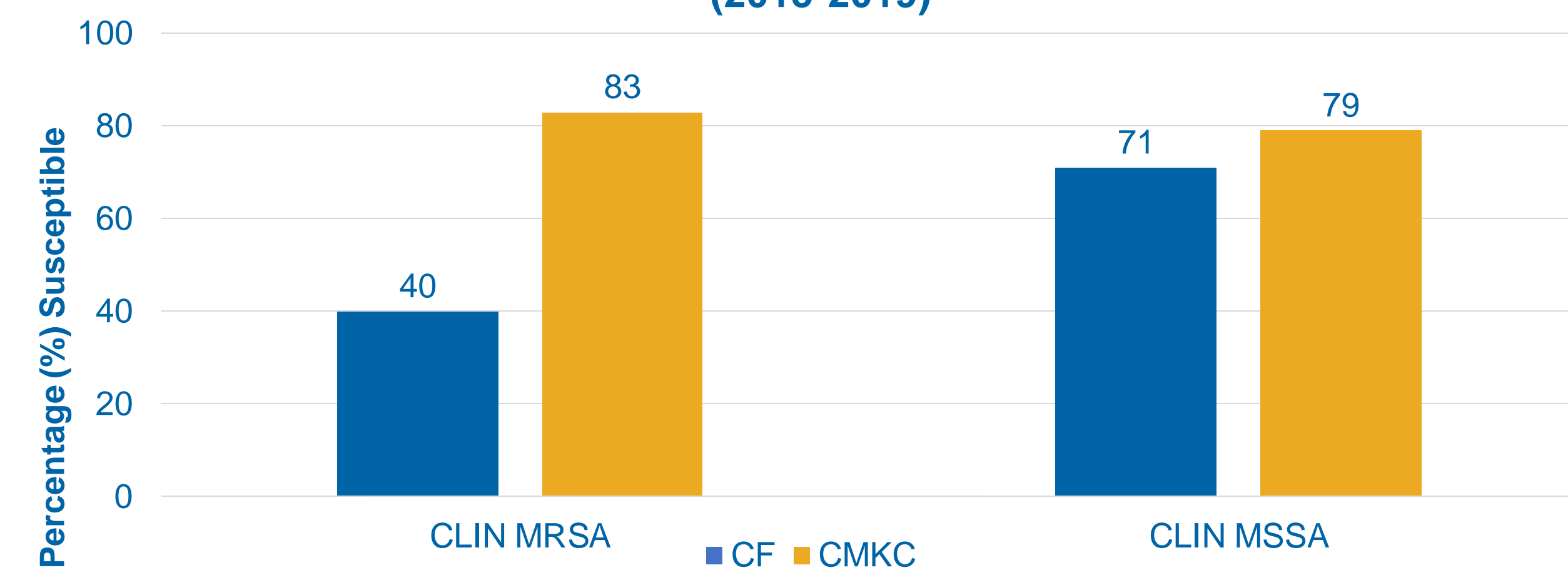
Key for Results:

AMK: amikacin, AZT: aztreonam, CFZ: ceftazidime, CIPRO: ciprofloxacin, CLIN: clindamycin, GENT: gentamicin, LZD: linezolid, MERO: meropenem, PIP/TAZO: piperacillin/tazobactam, RIF: rifampin, TET: tetracycline, TMP/SMX: trimethoprim/sulfamethoxazole, TOB: tobramycin

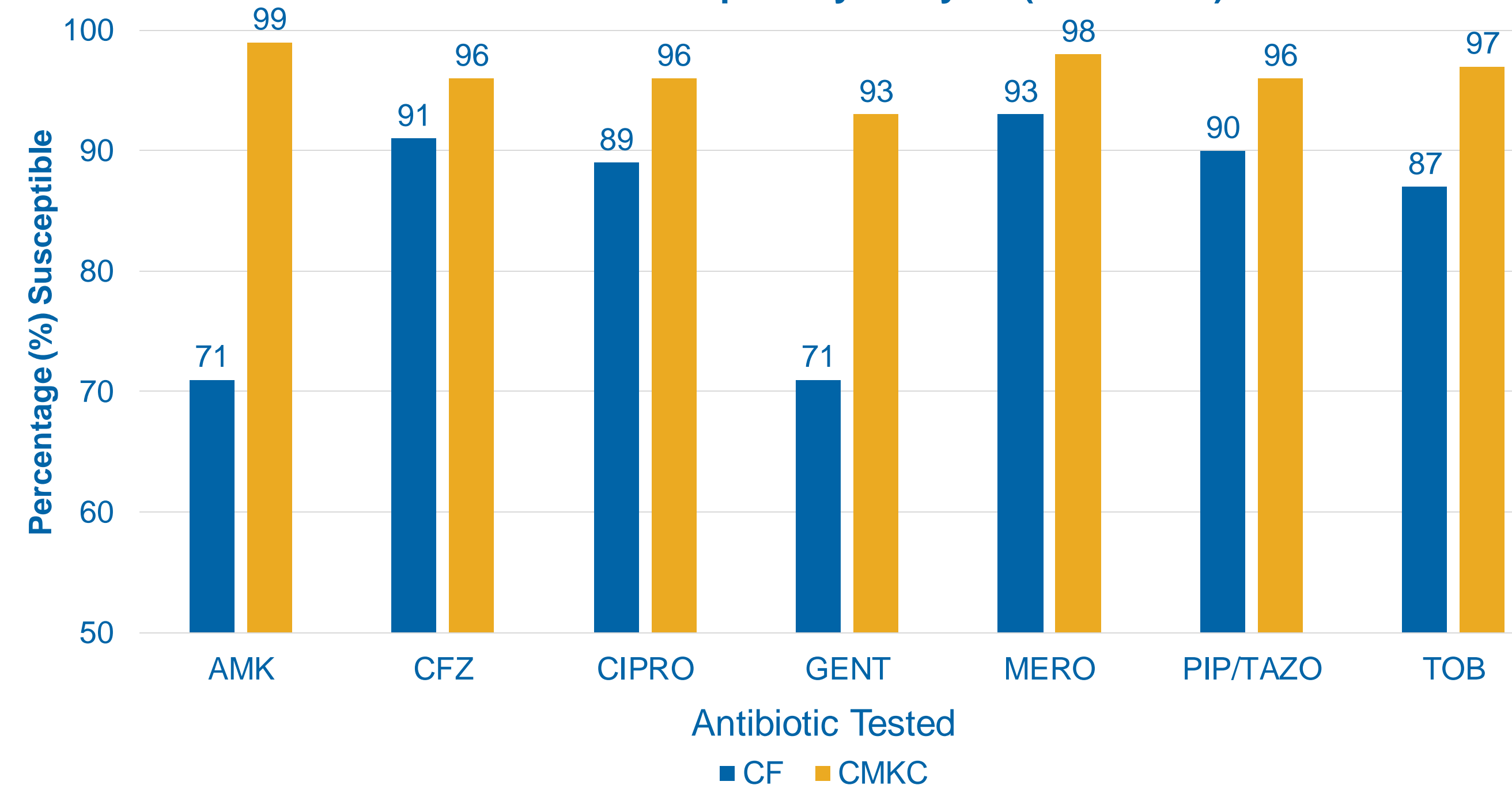
#### Selected Gram Negative CMKC and CF ABGM Results

	# of tested isolates (n)	% Susceptible Antibiotic Tested							
		AMK	AZT	CFZ	CIPRO	GENT	MERO	PIP/TAZO	TOB
PA CMKC	1268	99	96	96	96	93	98	96	97
PA CF (All)	480	71	79	91	90	71	93	91	87
PA CF (Sputum)	305	62	76	88	85	63	89	87	82
PA CF (Throat)	175	86	84	97	97	84	100	98	95

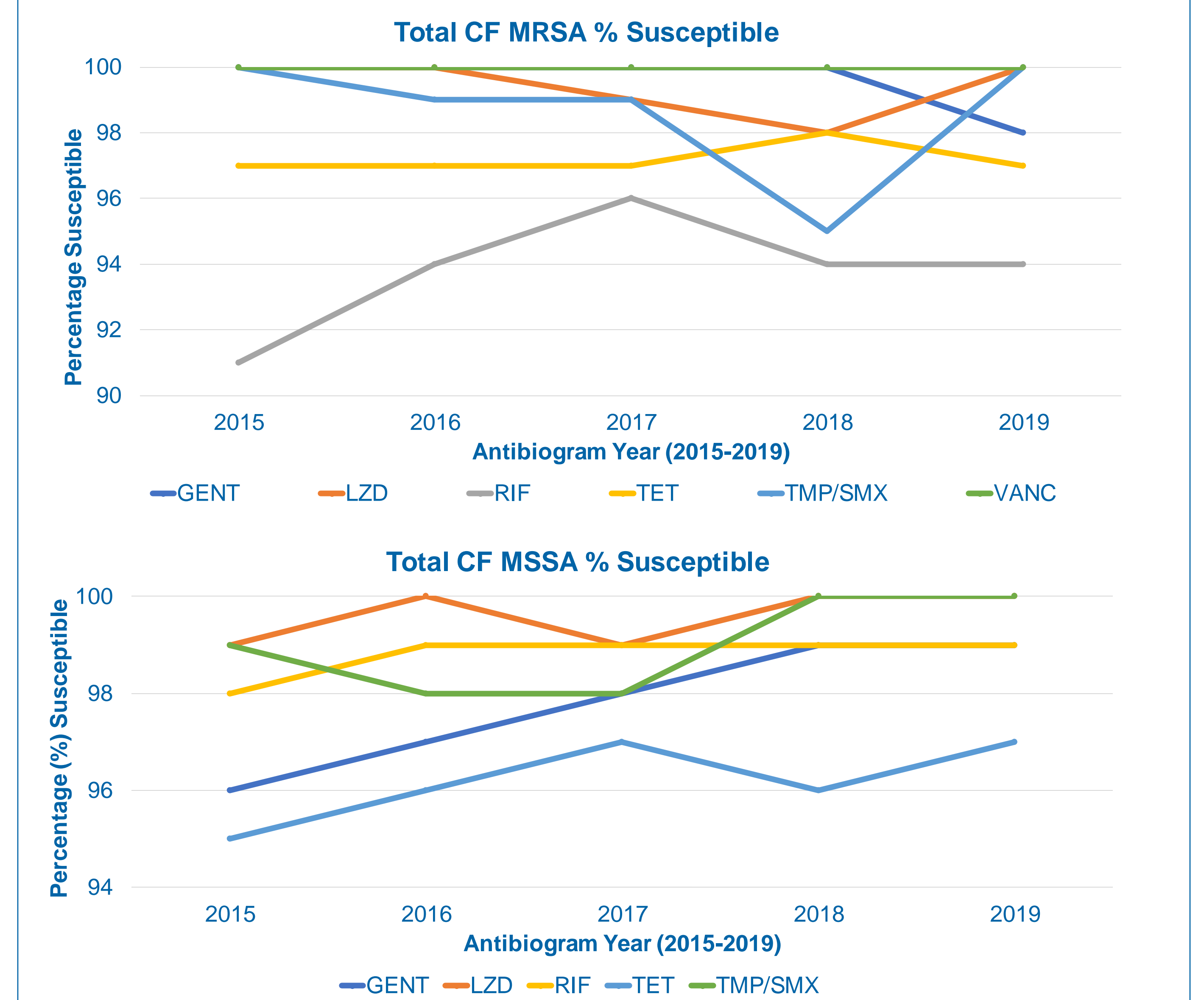
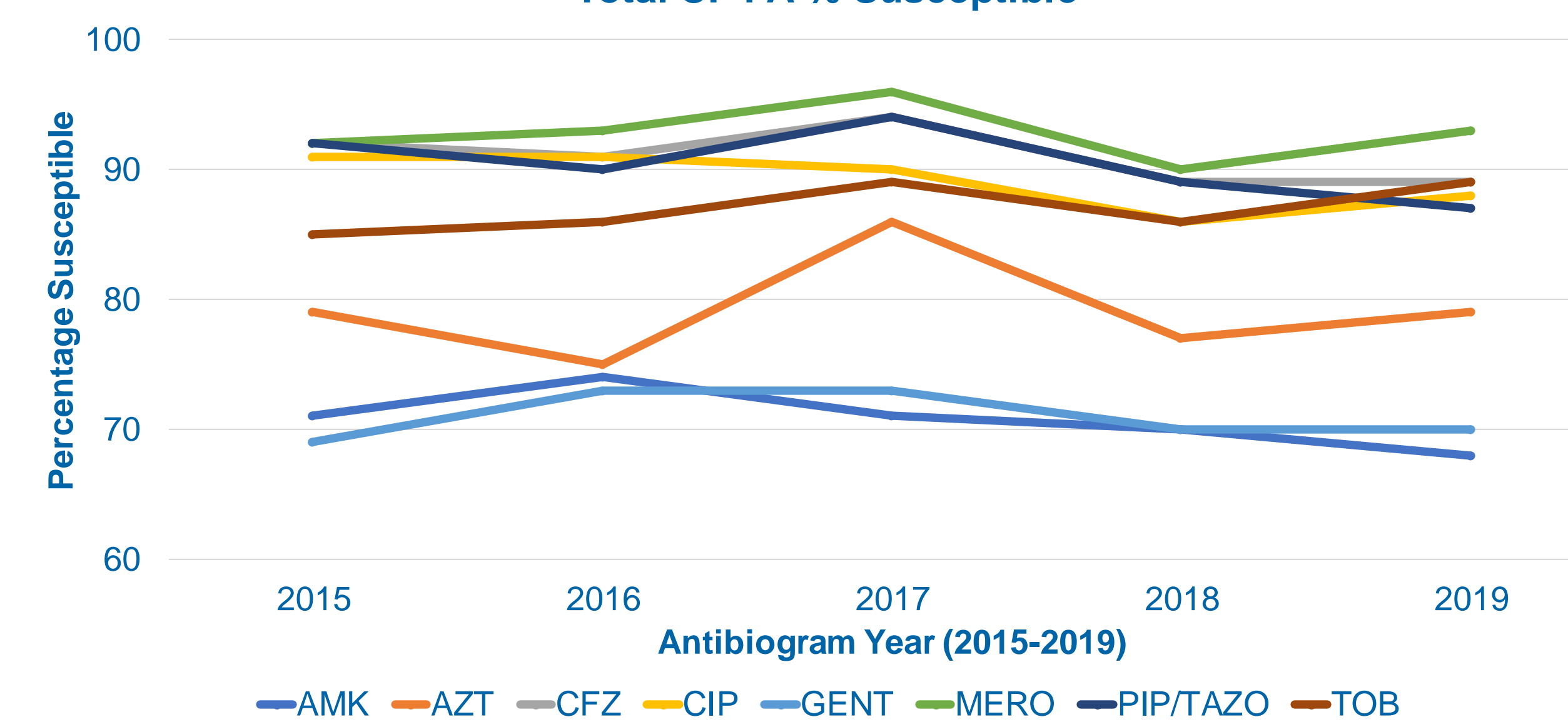
#### Clindamycin (CLIN) Susceptibility Testing MRSA and MSSA (2015-2019)



#### Pseudomonas Susceptibility Analysis (2015-2019)



#### Total CF PA % Susceptible



### Conclusions

- Gram-negative and gram-positive microorganisms tested were less susceptible in the CF population
  - This may be associated to increased antimicrobial exposure among people with CF
- Organisms from CF sputum cultures were generally less susceptible than those from CF throat cultures
  - This may be associated more expectorated sputum samples in individuals with advanced lung disease, increased frequency of antibiotic therapy and increased age
- The CF-specific ABGM demonstrated significantly fewer MRSA and MSSA isolates susceptible to clindamycin ( $p < 0.0001$ )
- The mean CMKC proportion of MRSA was higher than the CF proportion (33% versus 27.5% of SA isolates)
- The CF-specific ABGM demonstrated significantly fewer PA isolates susceptible to aminoglycosides including amikacin ( $p < 0.0001$ ), gentamicin ( $p < 0.0001$ ), and tobramycin ( $p = 0.0165$ )
- In the five-year analysis, there did not appear to be any clinically significant changes in susceptibility
- The differences in susceptibility patterns seen with the CF ABGM compared to CMKC ABGM have important implications for empiric antimicrobial selection and will allow for monitoring trends in resistance over time

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