

Antimicrobial Resistance (AMR) Surveillance on Stool Culture Specimen in Public Hospitals and Clinics - Hospital Authority AMR Data (2021)

February 2023



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Background



Background

- The second Hong Kong Strategy and Action Plan 2023-2027 was issued in November 2022
- Activity 1.2.1 suggests continuing AMR surveillance based on the Global Antimicrobial Resistance Surveillance System (GLASS), developed by the World Health Organization (WHO)
- This presentation briefly accounts the surveillance findings of stool specimens from 2016 to 2021





Method



WHO GLASS Recommendations (1)

- Based on *WHO GLASS Manual for Early Implementation (2015)*:
 - WHO Priority Organisms captured:
 - *Escherichia coli*
 - *Klebsiella pneumoniae*
 - Organisms other than the above were grouped as “Other spp.”
 - Location of onset
 - Community-onset organisms isolated from stool specimen collected in non-inpatient settings or within 48 hours after hospital admission
 - Hospital-onset organisms isolated from stool specimen collected more than 48 hours after hospital admission
 - Using 48 hours instead of 2 calendar days of WHO as agreed by HA



WHO GLASS Recommendations (2)

- Based on *WHO GLASS Manual for Early Implementation (2015)*:
 - Removal of duplicate results (deduplication)
 - For each surveillance period (one calendar year), only the first result would be reported for each patient per specimen type per organism for the same location of onset
 - Antimicrobial susceptibility test (AST) result being “Intermediate” or “Resistant” was considered as “non-susceptible”
 - AST results derived from < 10 isolates per calendar year were excluded from analysis



Scope of Data

- The following information was collected from patients who had stool culture:
 - Demographic data
 - Microbiology data
 - Organisms cultured
 - AST results
 - Susceptible (sensitive)
 - Non-susceptible (intermediate or resistant)



Broad-spectrum Antimicrobials (Big Guns)

- Where appropriate, AST results of the following broad-spectrum antimicrobials identified by experts in HA were examined because of their importance on treating resistant infections
 - Piperacillin/tazobactam
 - Ceftazidime
 - Cefoperazone/sulbactam
 - Cefepime
 - Ceftaroline fosamil
 - Ceftolozane/tazobactam
 - Ceftazidime/avibactam
 - Meropenem
 - Ertapenem
 - Imipenem/cilastatin
 - Vancomycin
 - Linezolid
 - Daptomycin
 - Colistin
 - Teicoplanin



Scope of Reporting

- Overview on patients with stool culture
 - Number of patients from whom a stool culture was taken
- Overview on WHO priority organisms isolated from stool
 - Number of patients with positive and negative culture results
 - Distribution of organisms by location of onset
- AST results on WHO priority organisms
 - Number and % of patients with non-susceptibility results
 - Trend of antimicrobial non-susceptibility
 - 2016 - 2021 trend



Statistical Analysis on AST Results

- 2016 – 2021 trend analysis
 - Year 2016 was chosen as the baseline for comparison as the Hong Kong Strategy and Action Plan on AMR was issued in 2017 and such decision was endorsed by the High Level Steering Committee
 - One-way Cochran-Armitage test was used to look for trend
 - $P < 0.05$ was considered statistically significant
 - $P < 0.01$ was considered statistically highly significant

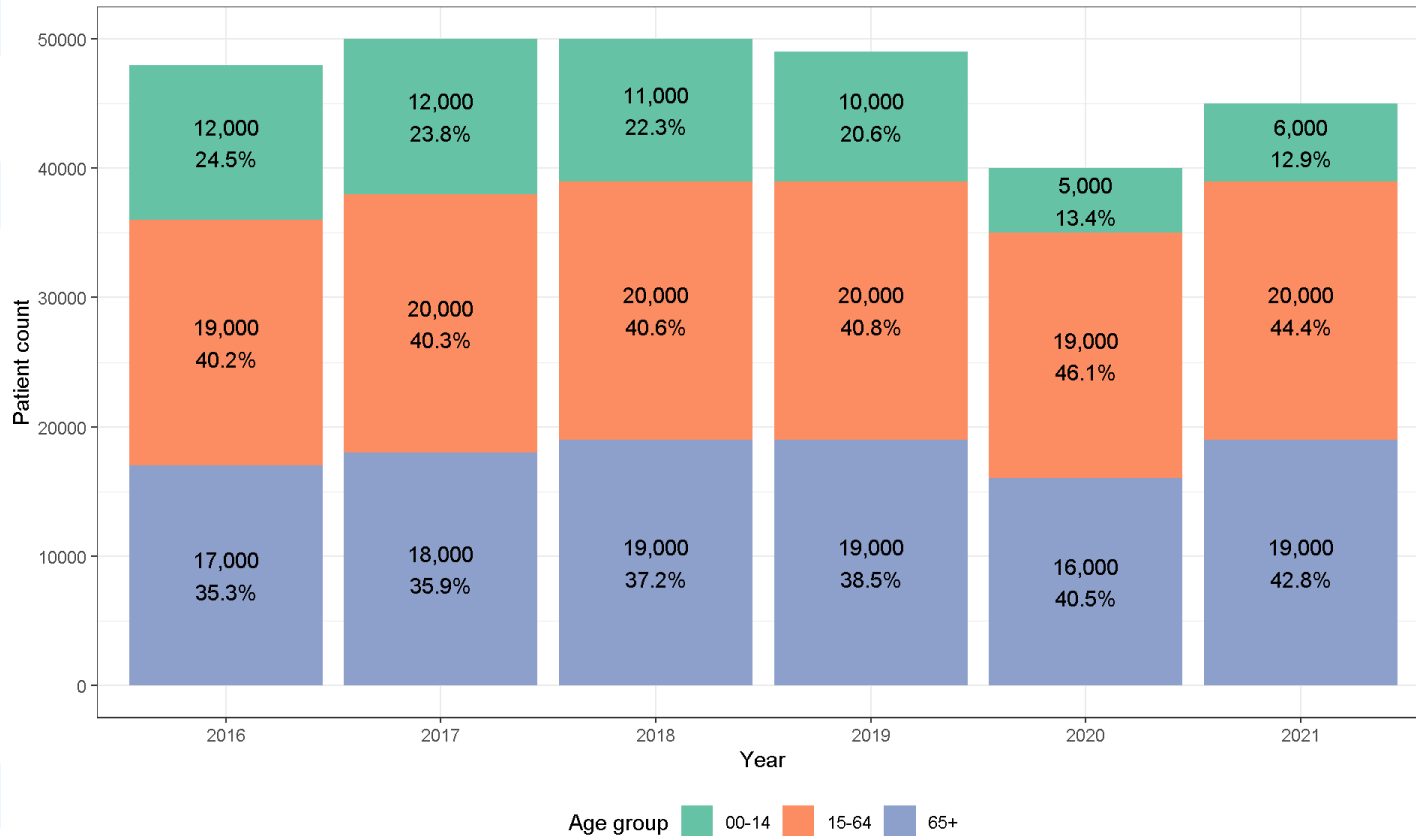


Results

1. Overview on patients with stool culture



Age distribution of patients with stool culture

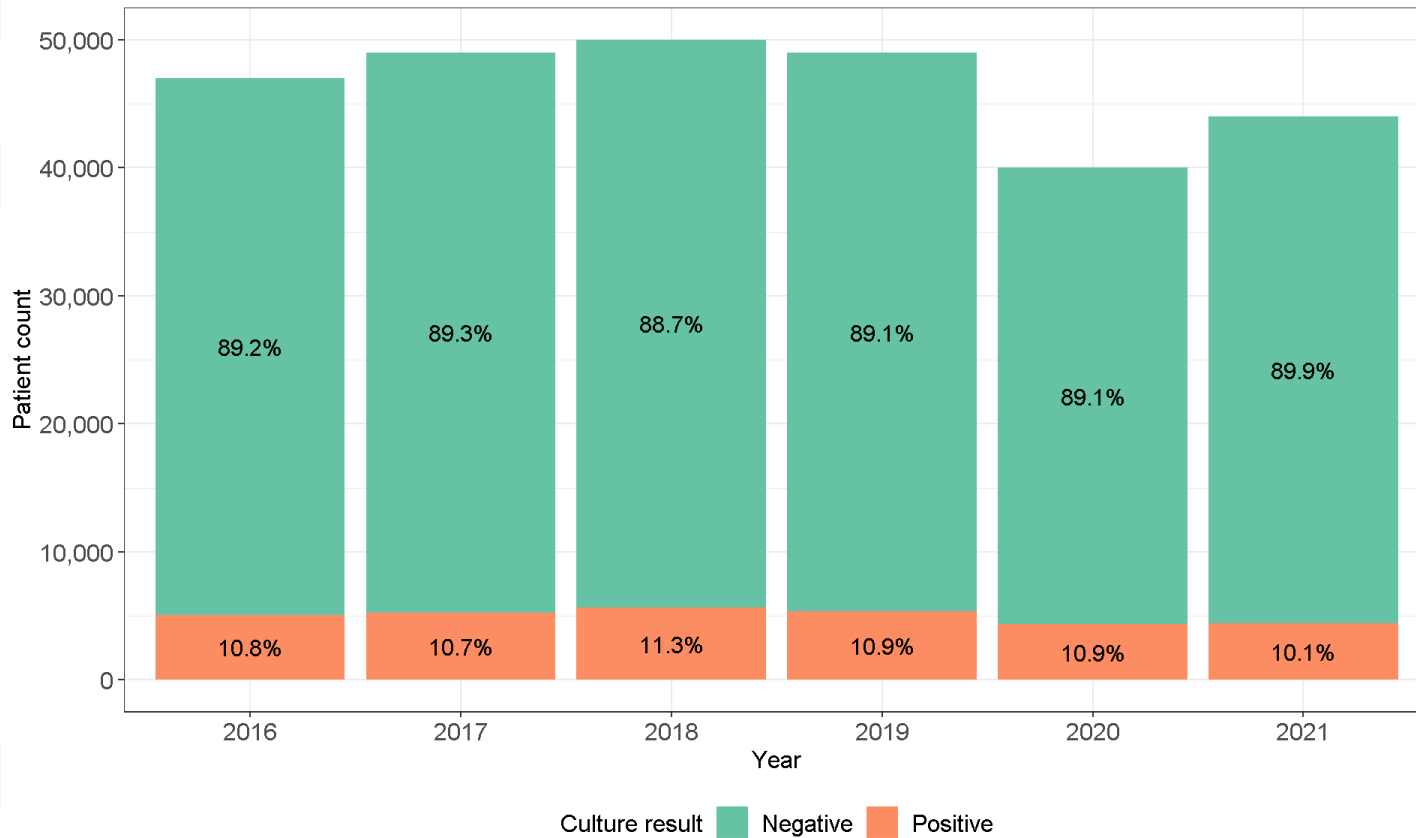


- No. of patient with stool culture increased from 40,000 in 2020 to 45,000 in 2021 (13% increase)

(Patient count rounded to nearest thousand)



Percentage of Patients with Positive Stool Culture



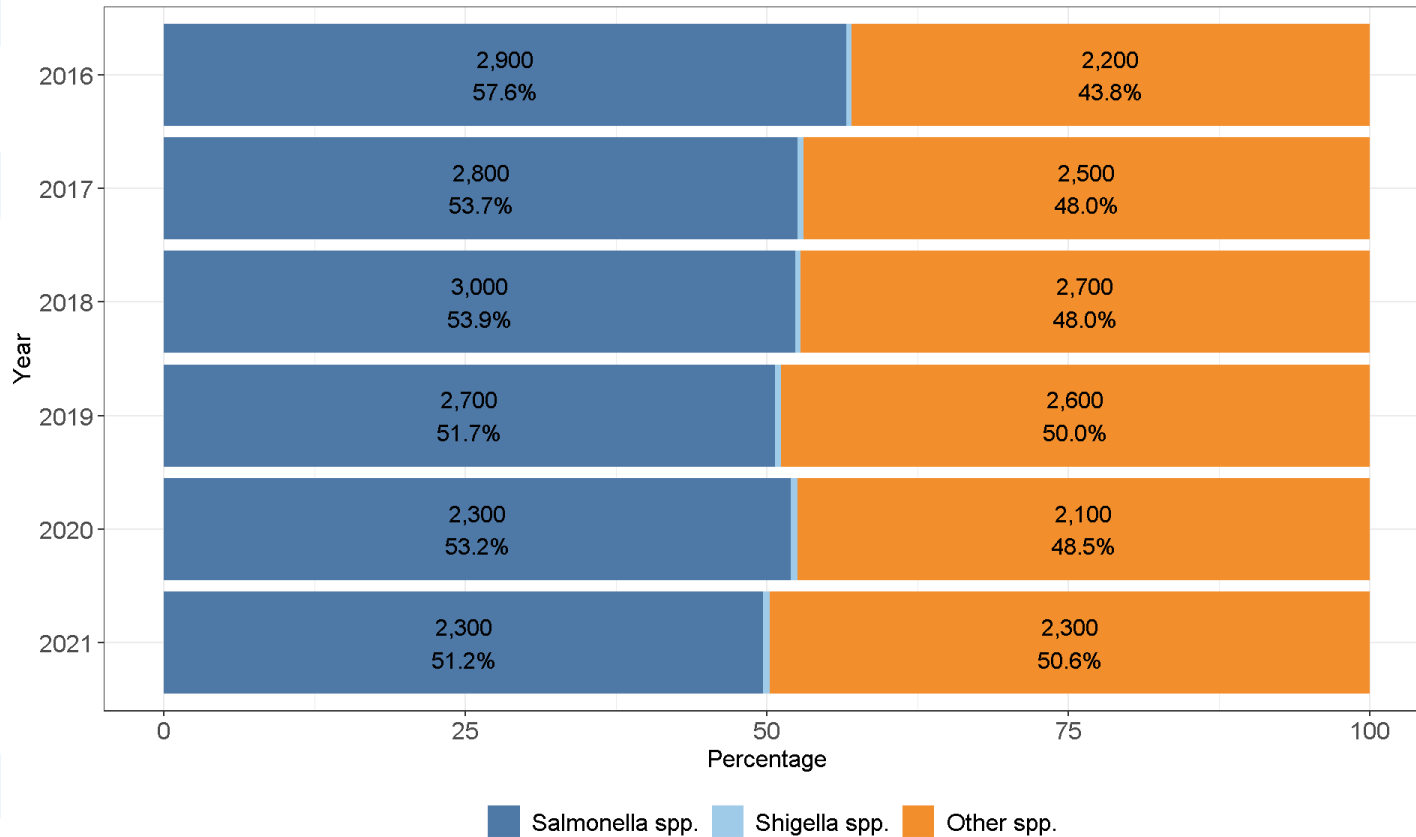
- % patients with positive stool culture remained stable over the past years at around 10 – 11%

Results

2. Overview on WHO priority organisms isolated from stool



Distribution of Organisms by Year



- The most common WHO priority organism cultured from stool remained to be *Salmonella* spp. from 2016 to 2021



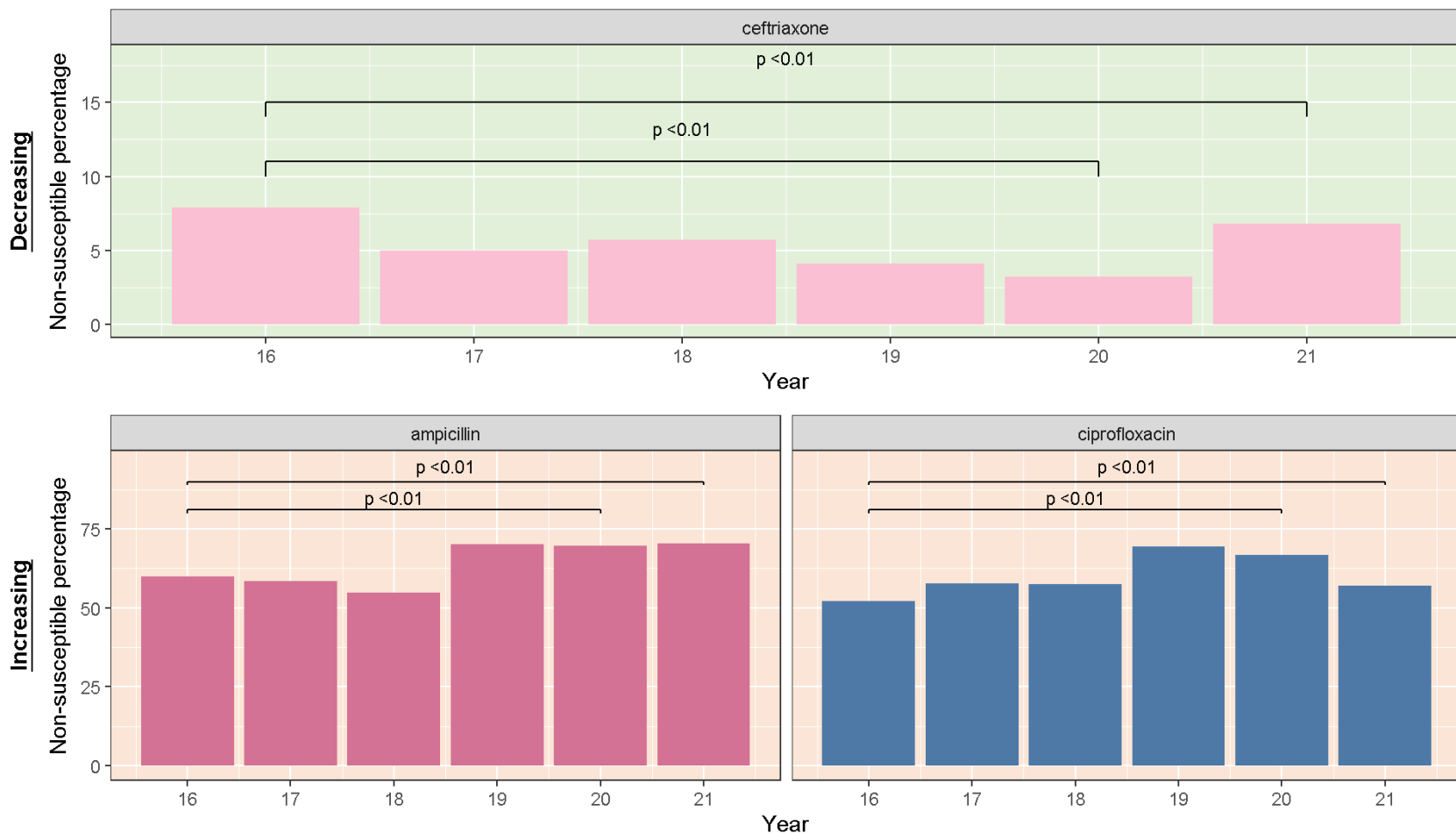
Results

3. AST results for WHO priority organisms isolated from stool



Significant change in trend for *Salmonella* spp. (16 to 21)

Community (Undifferentiated-onset)

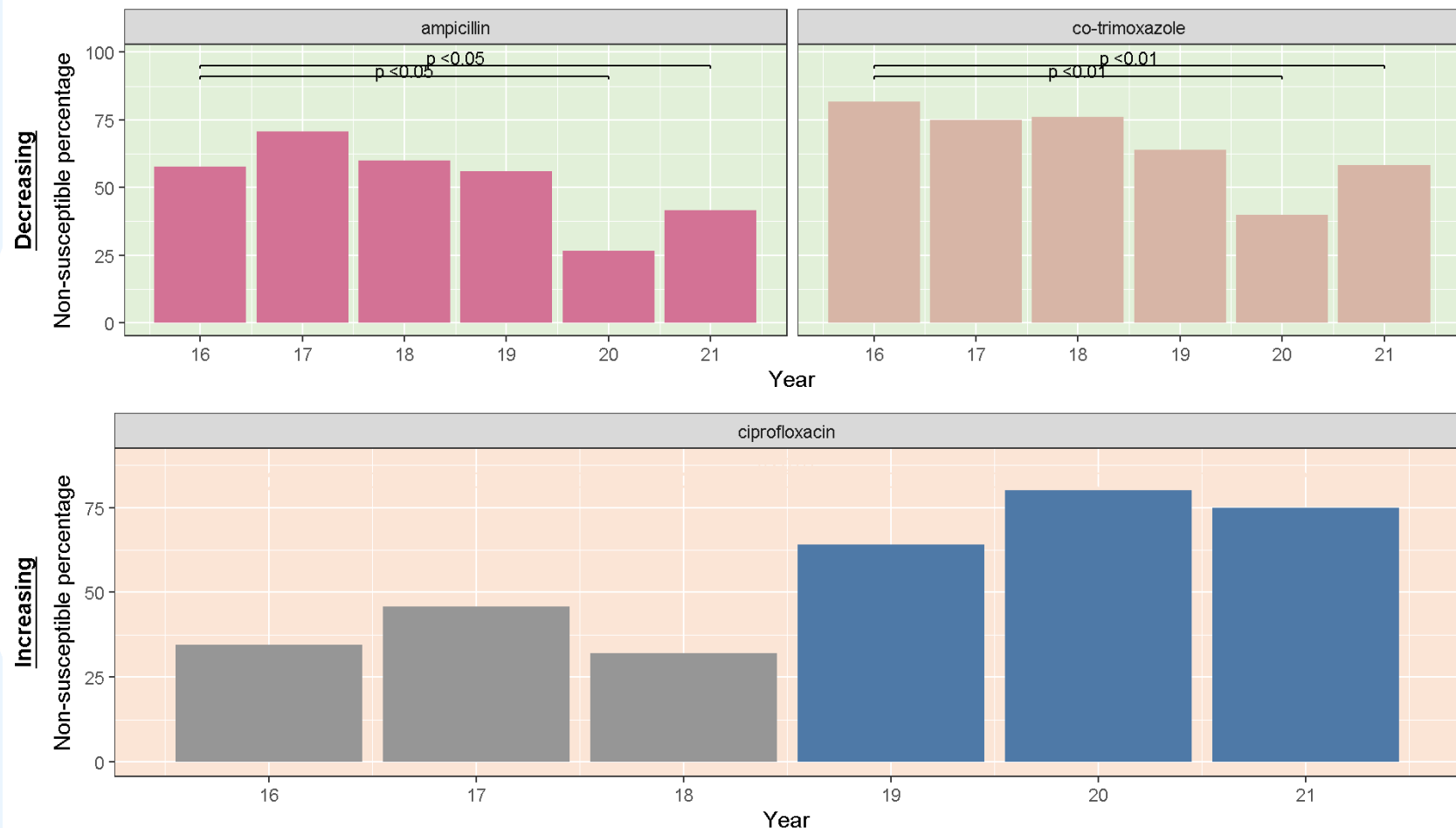


‡ Revised fluoroquinolones interpretive criteria for Enterobacteriaceae (except *Salmonella* spp.) was released by CLSI in 2019. The increase in 2019 and thereafter compared with 2018 and before may be contributed by a change in CLSI criteria.

- Although an increasing trend was still seen for ampicillin, NS% for ampicillin plateaued from 2019 to 2021

Significant change in trend for *Shigella* spp. (16 to 21)

Community (Undifferentiated-onset)



‡ Revised fluoroquinolones interpretive criteria for Enterobacteriaceae (except *Salmonella* spp.) was released by CLSI in 2019. The increase in 2019 and thereafter compared with 2018 and before may be contributed by a change in CLSI criteria.

- NS% trend for *Shigella* spp. should be interpret with caution due to small sample size (<50 patients were tested annually)



Remarks on Interpretation of Results

- CLSI guidelines for sensitivity testing involving levofloxacin interpretive criteria for Enterobacteriaceae (except *Salmonella* spp.) has been updated in 2019. In case laboratories in HA chose to apply the criteria for reporting in 2019, some *Shigella* isolates previously categorised as sensitive to levofloxacin / ciprofloxacin using the old criteria would become non-susceptible following a change in zone size requirement under the 2019 criteria.
- Laboratories of different hospitals might use different panels for AST. This could result in bias of results toward those laboratories performing a major proportion of a particular AST especially if number of isolates tested is small.
 - In the report, the issue of small number of isolates is partially addressed, in accordance of recommendation by WHO GLASS, that non-susceptibility results derived from <10 isolates were not included for analysis.



Summary Table on Key Findings (Stool)

WHO priority organism	Proportion of isolates being non-susceptible to antimicrobials, 2016 vs 2021	
	Community (Undifferentiated)-onset	
<i>Salmonella</i> spp.	↓	Ceftriaxone (7.9% → 6.8%)
	↑	Ampicillin (59.9% → 70.4%)
	↑	Ciprofloxacin (52.1% → 56.9%)
<i>Shigella</i> spp.	↓	Ampicillin (57.6% → 41.7%)
	↓	Co-trimoxazole (81.8% → 58.3%)



Summary



Summary

👍 Upward trend of non-susceptibility continued in 16-21 but showed sign of decrease:

Salmonella spp. – ampicillin



Recommendations

- Increasing trend of non-susceptibility was observed for the following drug-bug combinations:
 - Salmonella spp. towards ampicillin and ciprofloxacin
 - Shigella spp. towards ciprofloxacin
- Further monitoring would be warranted

