

Antimicrobial Usage (AMU) Surveillance in Public Hospitals and Clinics - Hospital Authority Antimicrobial Dispensing Data (2021)

December 2022



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Background



Background

- The second Hong Kong Strategy and Action Plan 2023-2027 was issued in November 2022
- Activity 3.2.1 suggests collecting antimicrobial dispensing data from Hospital Authority (HA) and monitoring antimicrobial usage in public hospitals and clinics
- This presentation briefly accounts the surveillance findings for year 2021



Method



Scope of Data

- Antimicrobials dispensing records from the following HA services during 2016 to 2021 were included:
 - Non-inpatient service
 - Primary Care (GOPC)
 - Specialist Out-patient (Clinical)
 - Accident and Emergency (A&E)
 - Inpatient service
 - Medicine
 - Surgery
 - Orthopaedics and Traumatology (O&T)
 - Intensive Care Unit/ High Dependency Unit (ICU/ HDU)
 - Others



Definitions

- Surveillance period is defined by calendar year
- Anatomical Therapeutic Chemical (ATC) classification
 - This system is developed by WHO
 - It divides drugs into different groups according to the organ or system on which they act and their therapeutic, pharmacological and chemical properties
- Defined Daily Dose (DDD)
 - A standardised unit adopted by WHO to facilitate comparison of drug usage
 - Defined as “the assumed average maintenance dose per day for a drug used for its main indication in adults”
 - Each antimicrobial was assigned a DDD constant per route of administration
 - The 2022 version of WHO ATC DDD constants was adopted in this report but as there has been no change in DDD constants for those antimicrobials dispensed in HA captured by this surveillance system. As such, the DDD constants adopted for calculation for previous years remained the same as in the last report of 2020.



Antimicrobials Monitored

- Antimicrobials fall under the following WHO ATC classification (2021) were monitored:
 - J01 – Antibacterials for systemic use
 - P01AB – Nitroimidazole derivatives, agents against amoebiasis and other protozoal diseases
 - A07AA – Antibiotics, intestinal antiinfectives
- Antimicrobials administered by the following routes were included as recommended by WHO
 - Oral
 - Parenteral
 - Rectal
 - Inhalation
- Preparations for topical use were excluded



Broad-spectrum Antimicrobials (Big Guns)

The following 15 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



Measurement

- The following units* were used:

Unit of Measurement	Dispensing Quantity in HA
DDD	non-inpatient + inpatient service
DDD per 1,000 attendances	non-inpatient service
DDD per 1,000 patient-days	inpatient service

- The following measurements were calculated:
 - Overall dispensing quantity from 2016 to 2021
 - The five most dispensed antimicrobial groups (ATC) in 2021
 - The ten most dispensed antimicrobials in 2021
 - Dispensing quantity of broad-spectrum antimicrobials from 2016 to 2021

*The ATC/DDD Index (2022) published by the WHO Collaborating Centre for Drug Statistics Methodology was adopted

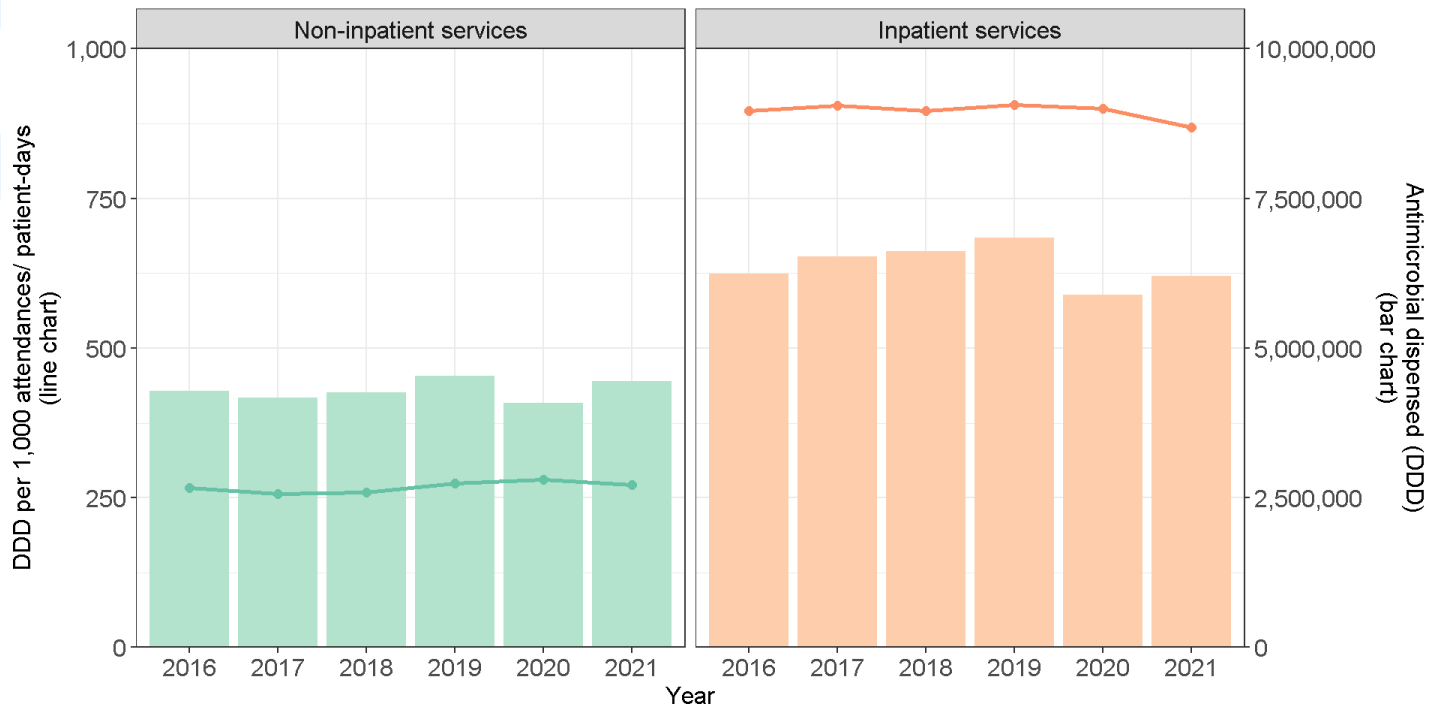


Results

1. Total antimicrobials dispensed in public hospitals and clinics by service type



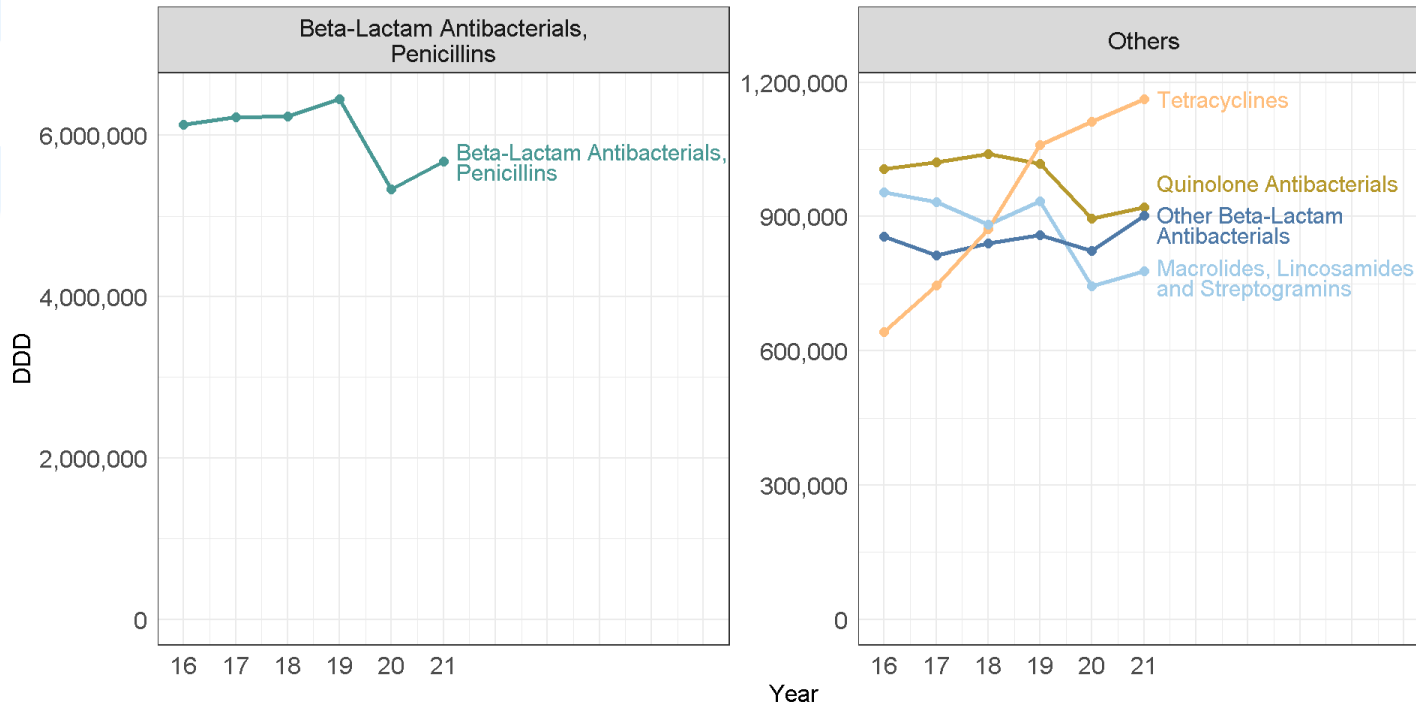
Total Antimicrobials Dispensed in Public Hospitals and Clinics by Service Type



- For inpatient services, total antimicrobial dispensing volume remained lower than pre-COVID era (2016-2019)
 - Probably due to reduced admission caused by COVID-19
- For non-inpatient services, total antimicrobial dispensed increased to a similar volume before COVID-19



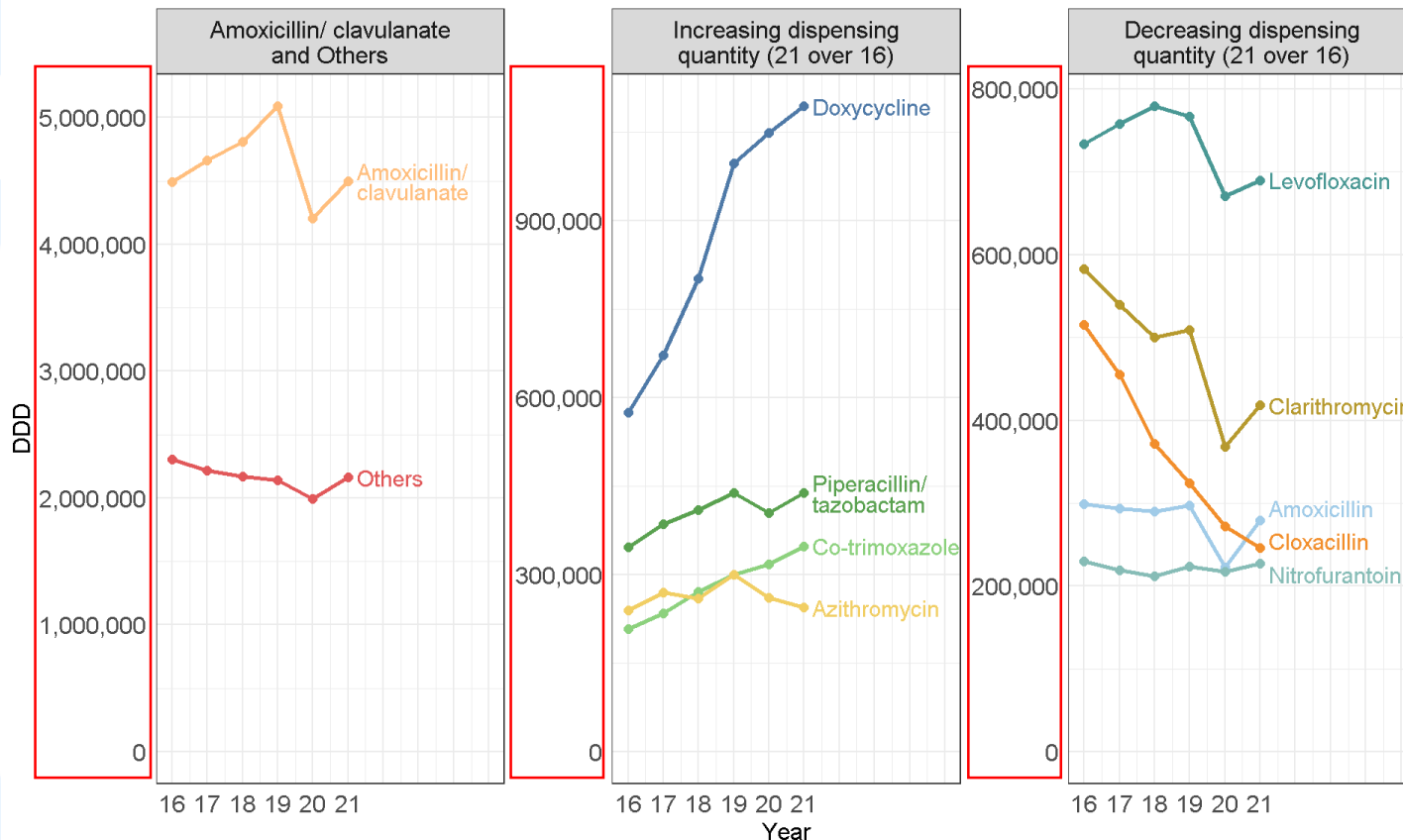
Five Most Dispensed Antimicrobial Groups in Public Hospitals and Clinics in 2021



- Beta-lactam antimicrobials continued to be the most dispensed antimicrobials in 2021
- Compared with 2020, the four most dispensed antimicrobial groups showed a rebound in dispensing volume
- Tetracyclines dispensing volume continued to increase since 2019



Ten Most Dispensed Antimicrobials in Public Hospitals and Clinics in 2021



- Amoxicillin/ clavulanate (Augmentin) continued to be the most dispensed antimicrobials in 2021
- Compared with 2020, most of the ten most dispensed antimicrobials showed a rebound in dispensing volume
- Doxycycline and co-trimoxazole dispensing volume continues to increase since 2016, which doxycycline has surpassed levofloxacin and has become the third most dispensed antimicrobials since 2018
- Dispensing of cloxacillin continues to drop since 2016

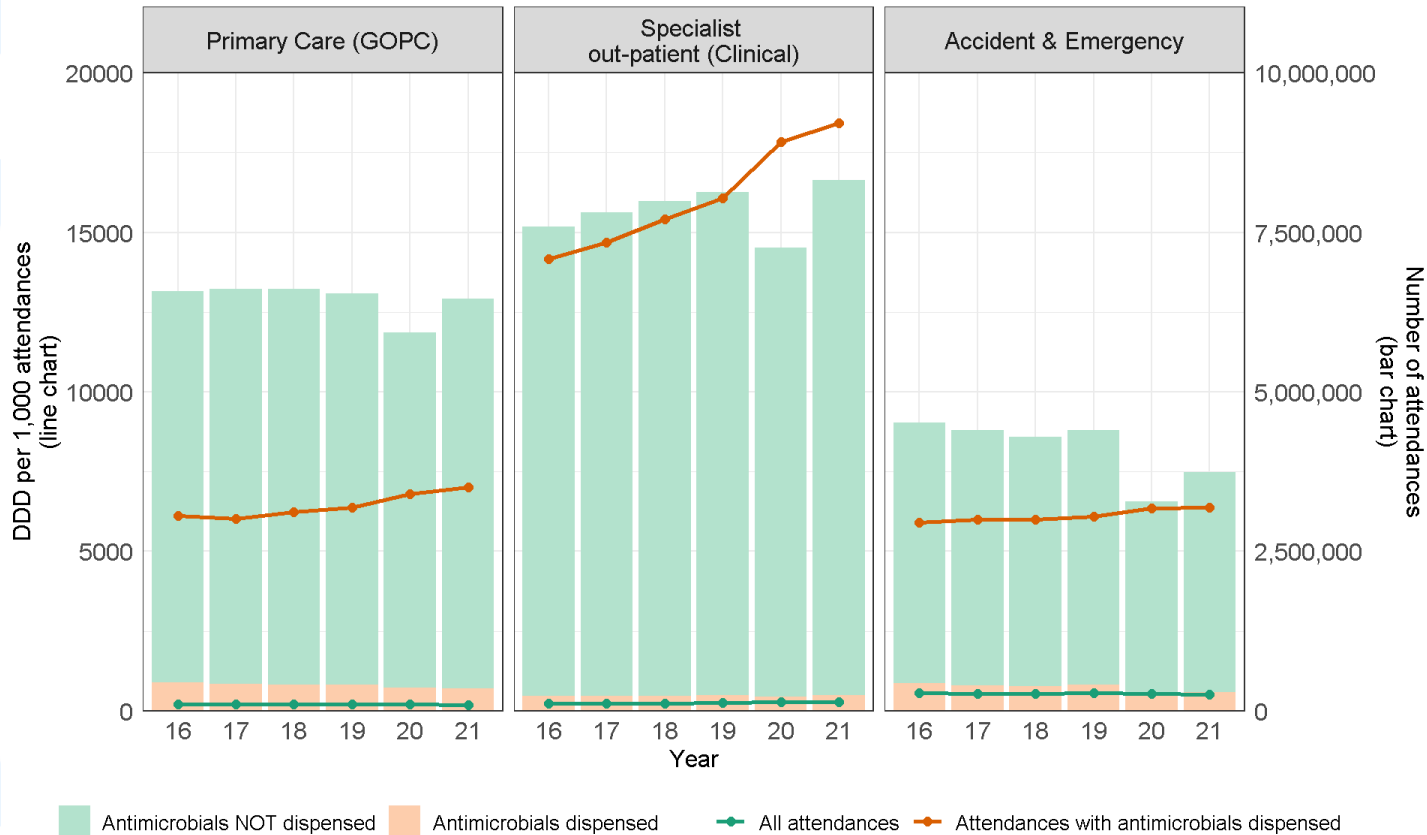


Results

2. Antimicrobials dispensed in HA non-inpatient service by service

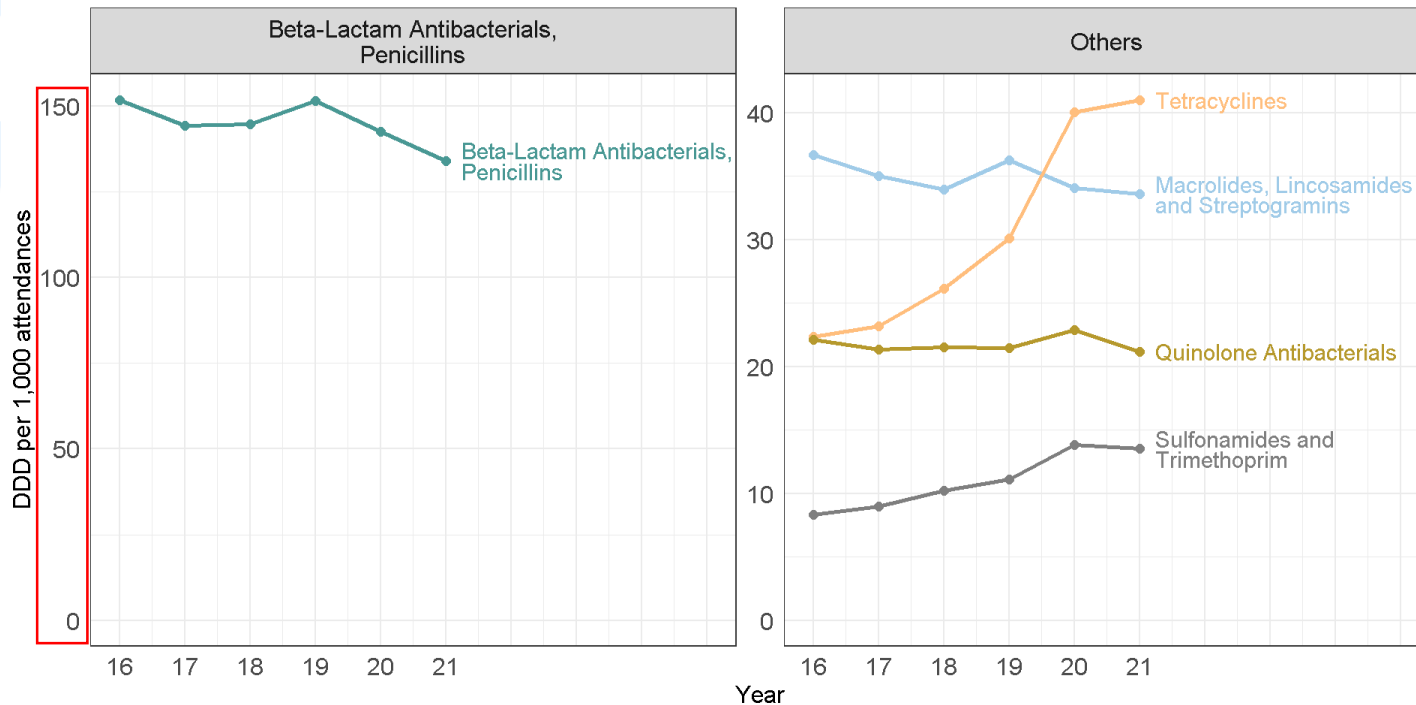


Total Antimicrobials Dispensed in HA Non-inpatient Service by Service



- Number of attendance rebounded in 2021 for all non-inpatient services
- Total antimicrobials dispensed (in DDD per 1,000 attendances) for Specialist out-patient (Clinical) continued to rise in 2021, despite attendance rebounded

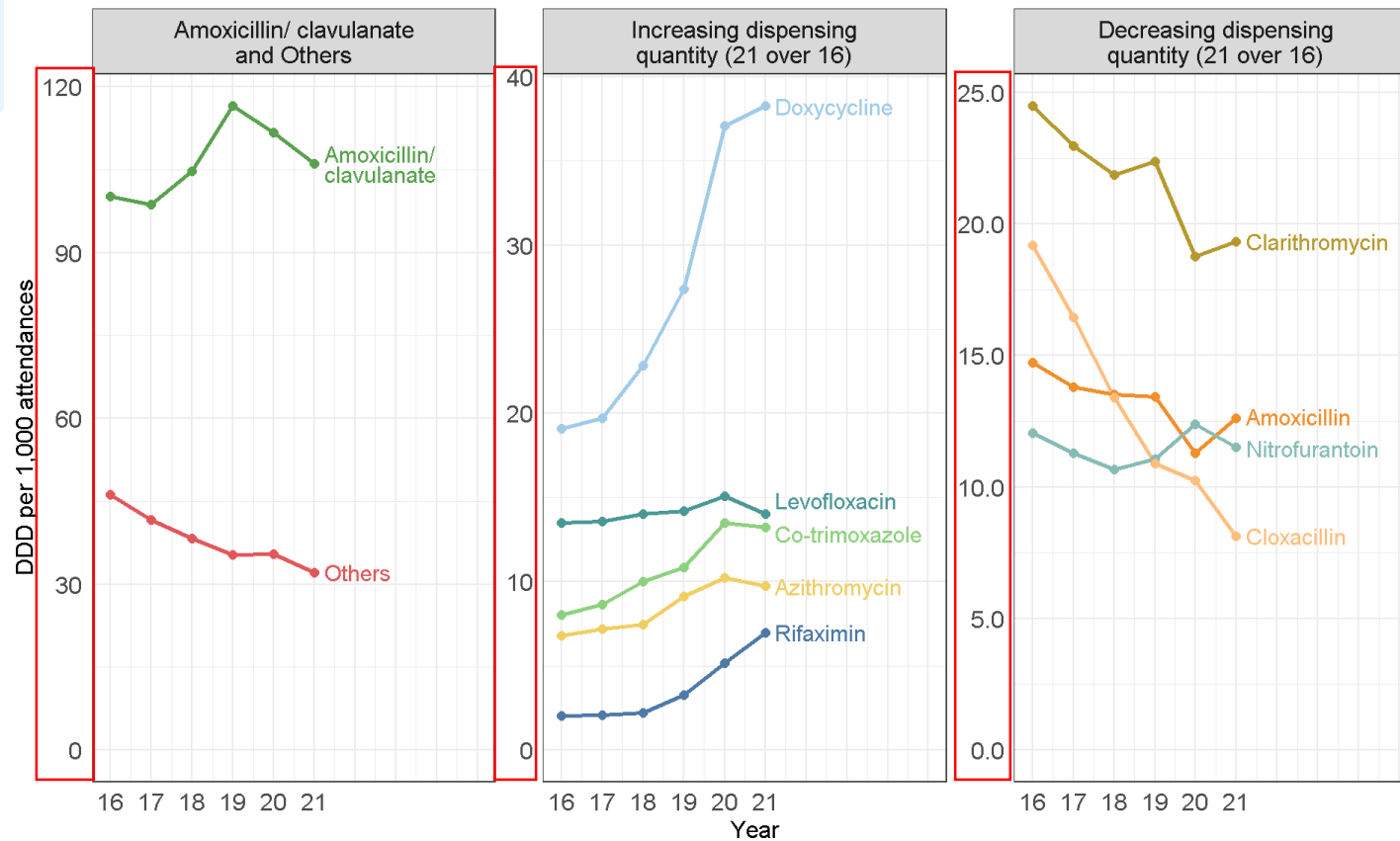
Five Most Dispensed Antimicrobial Groups in Non-inpatient Service in 2021



- Tetracyclines showed increased dispensing since 2016, while the other four most dispensed antimicrobial groups showed decrease when compared with 2020 data

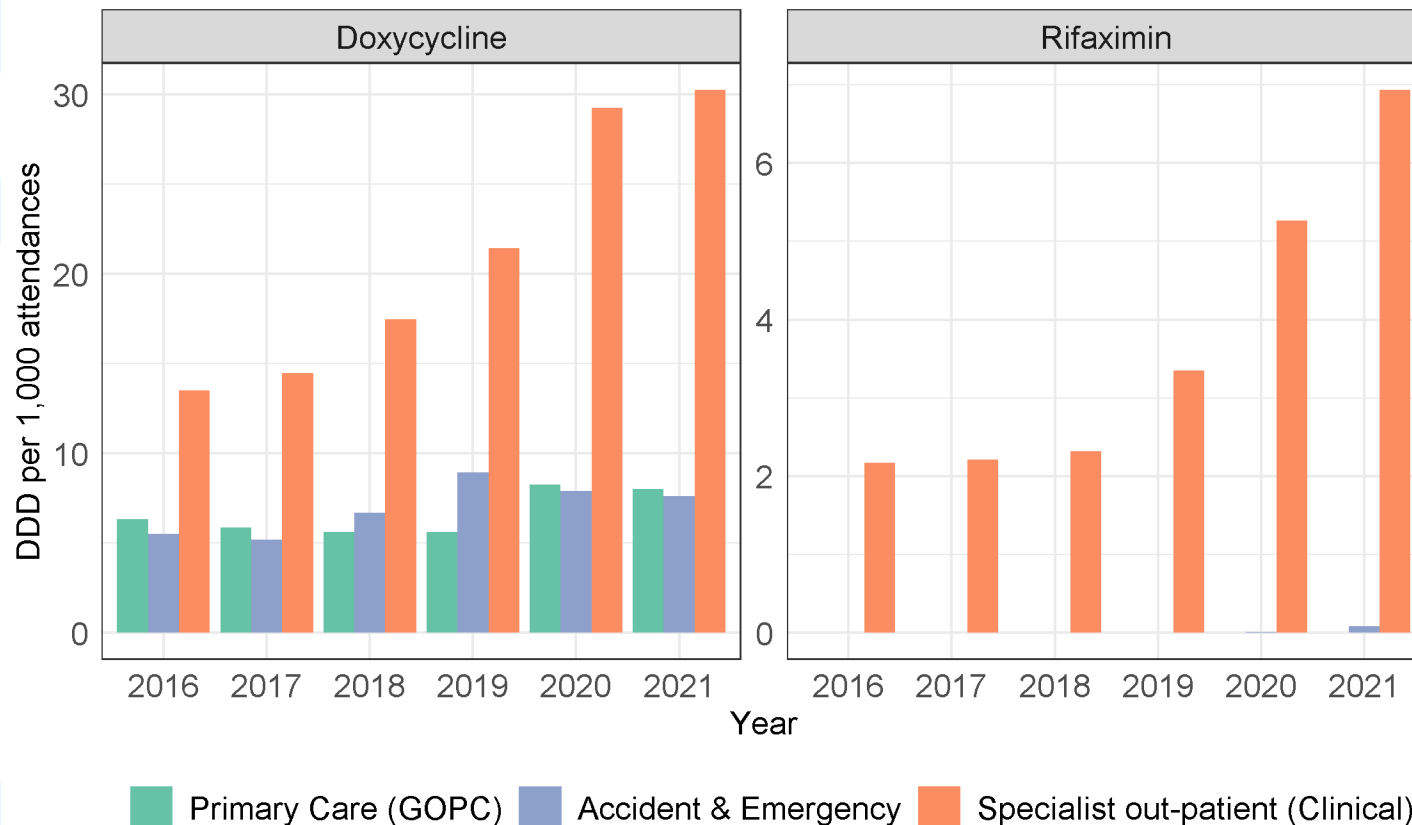


Ten Most Dispensed Antimicrobials in Non-inpatient Service in 2021



- Amoxicillin/ clavulanate (Augmentin) continued to be the most dispensed antimicrobials in non-inpatient service in 2021
- Doxycycline and rifaximin dispensing volume continued to increase since 2016, which doxycycline is the second most dispensed antimicrobials in non-inpatient service
- Compared with 2020, clarithromycin and amoxicillin showed a rebound in dispensing volume
- Dispensing of cloxacillin continued to drop since 2016

Examination on SOPC with increased antimicrobial dispensed



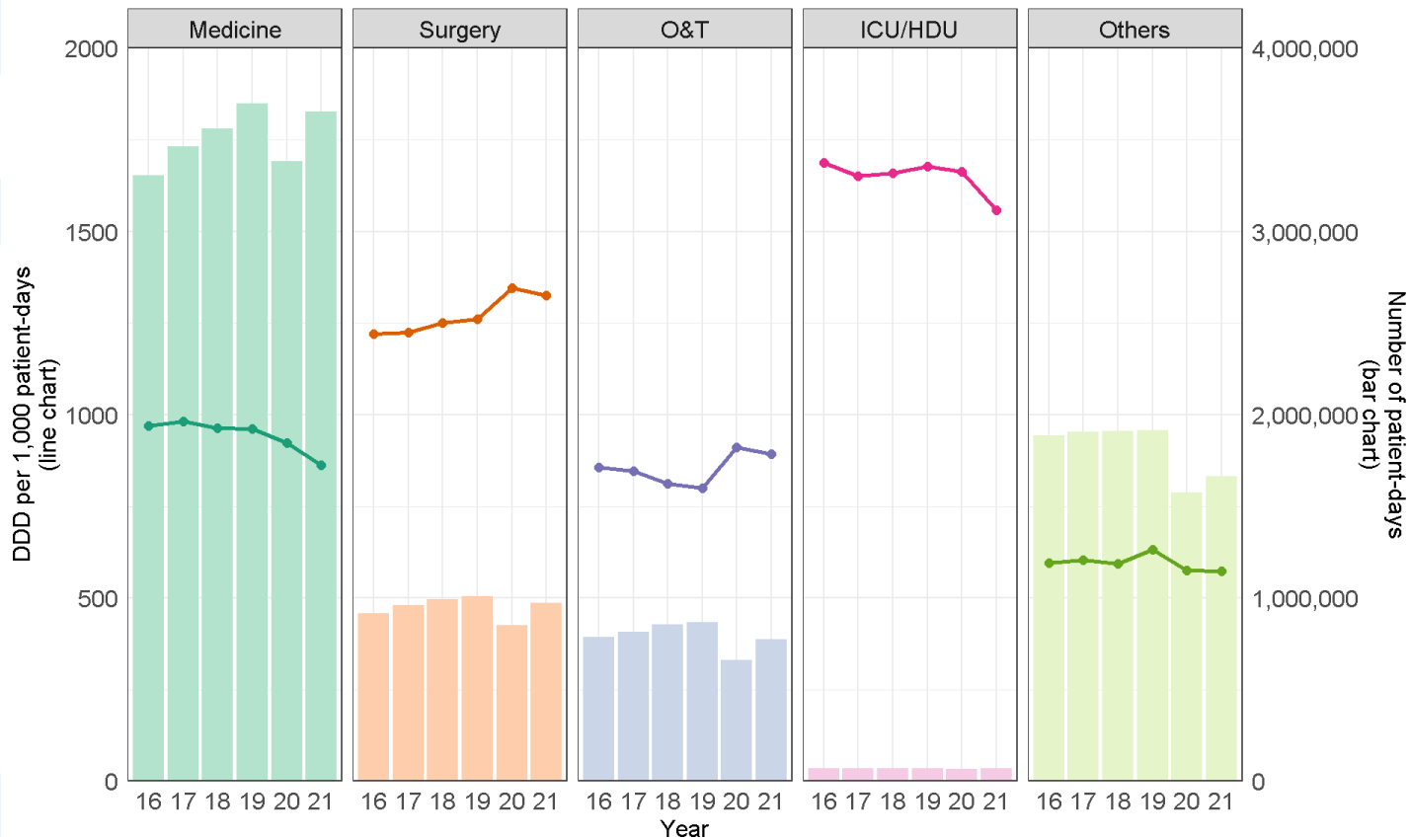
- Further examination of antimicrobials dispensed in out-patient settings revealed that more rifaximin (A07AA11), doxycycline (J01AA02), were dispensed from 2016 to 2021
- For doxycycline (20 to 21), dispensing volume dropped for A&E (7.89 to 7.60) and GOPC (8.26 to 8.01), but raised in SOPC (29.24 to 30.26)

Results

3. Antimicrobials dispensed in HA inpatient service by specialty



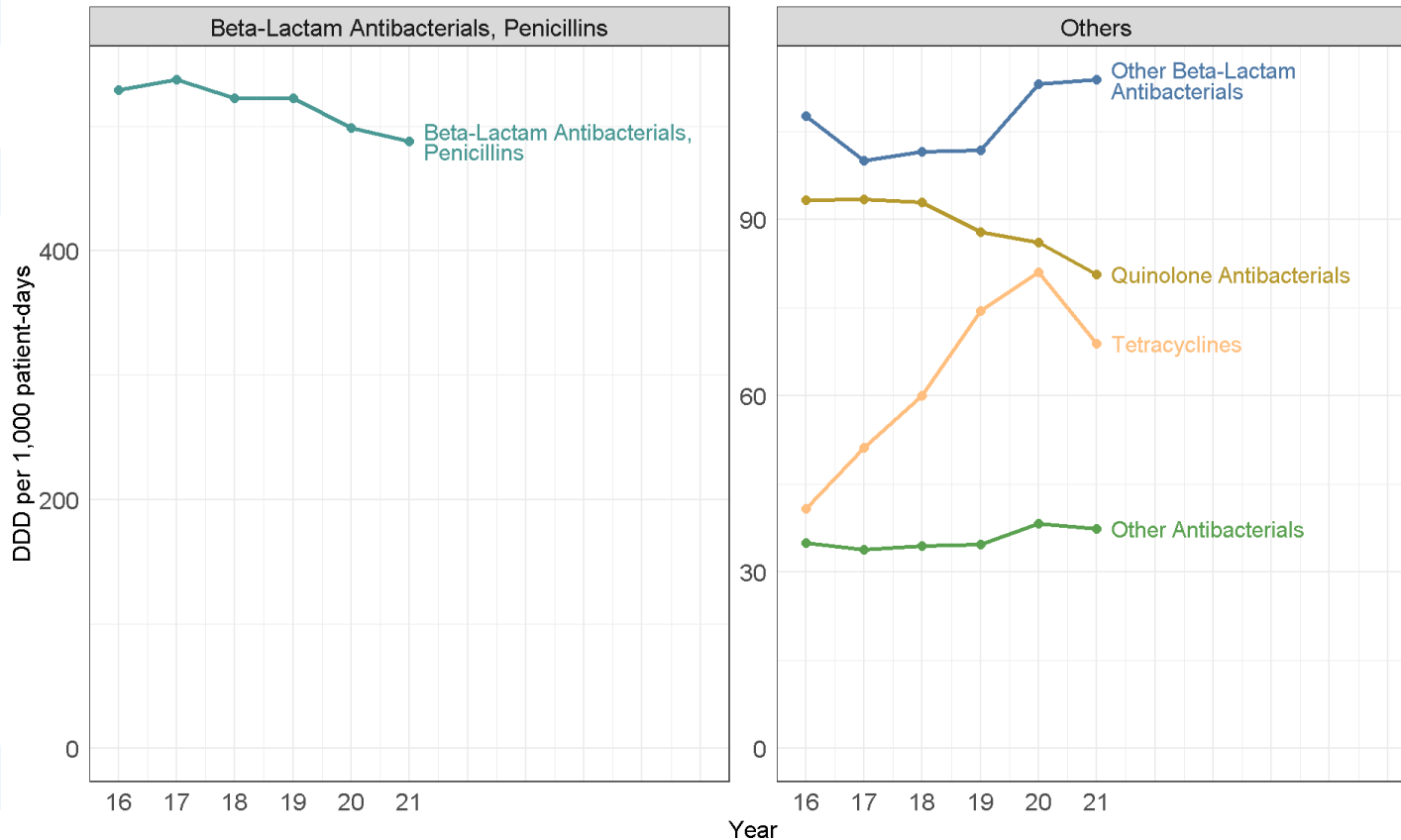
Total Antimicrobials Dispensed in HA Inpatient Service by Specialty



- Number of patient-days rallied by various degrees in different specialties
- Meanwhile, antimicrobial dispensed in DDD per 1,000 patient-days decreased in all specialties by different degrees



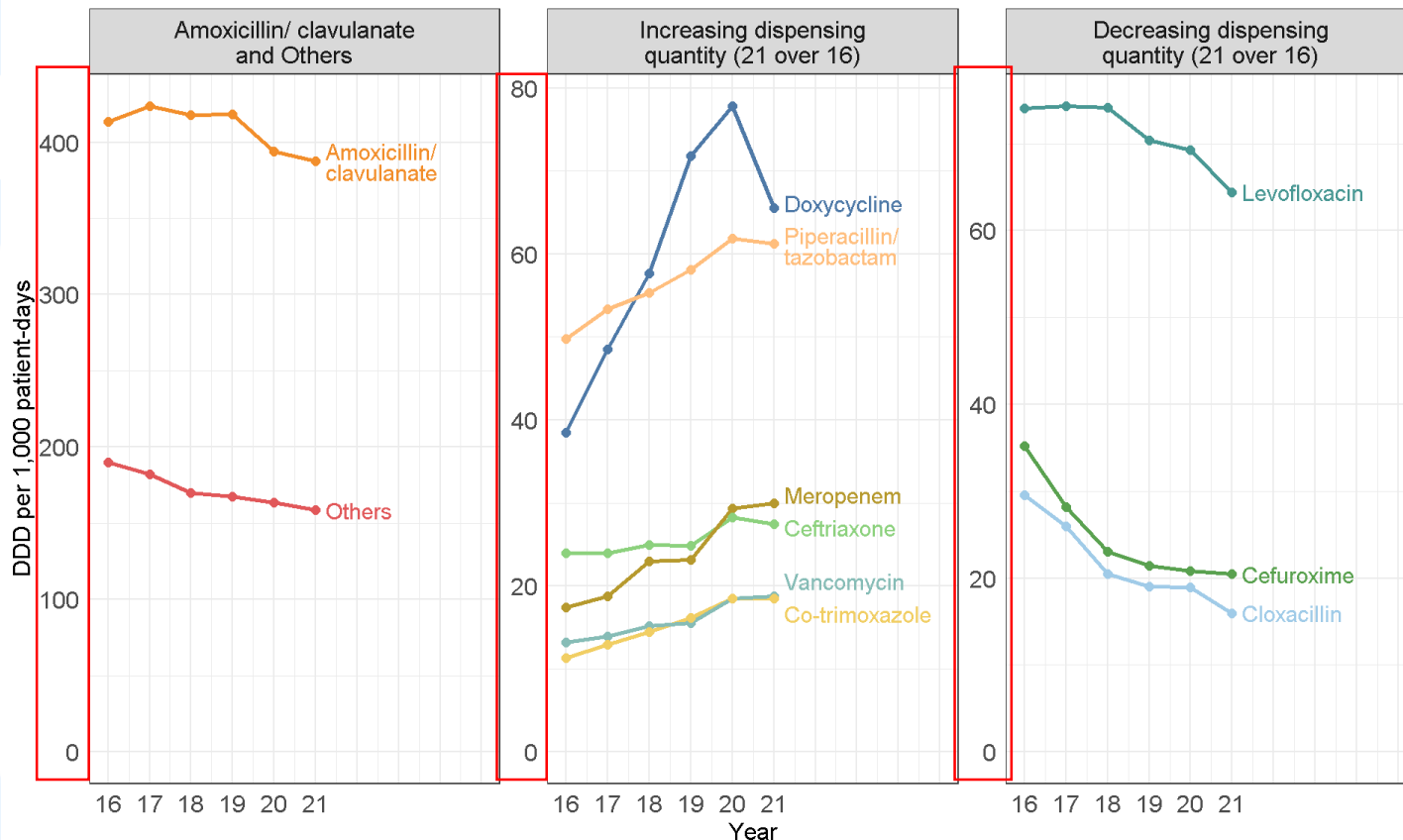
Five Most Dispensed Antimicrobial Groups in Inpatient Service in 2021



- Four out of five most dispensed antimicrobial groups showed a decrease in dispensing volume from 2020 to 2021
- Meanwhile, other beta-lactam antimicrobials increased dispensed volume by <1%
- Tetracyclines dispensing volume peaked in 2020 and showed the first annual reduction since 2016



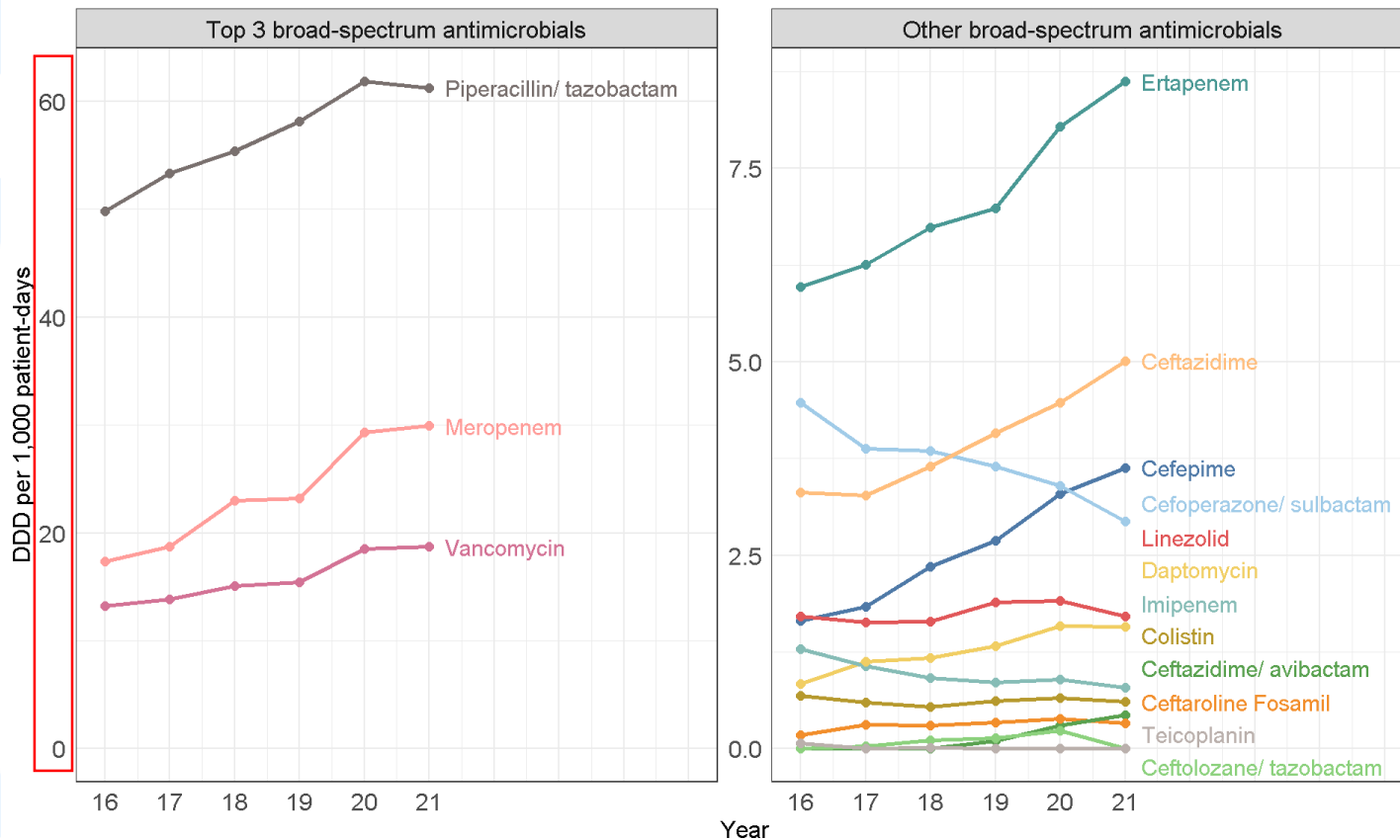
Ten Most Dispensed Antimicrobials in Inpatient Service in 2021



- Amoxicillin/ clavulanate (Augmentin) continued to be the most dispensed antimicrobials in inpatient service in 2021
- Doxycycline dispensing volume showed the first annual reduction since 2016



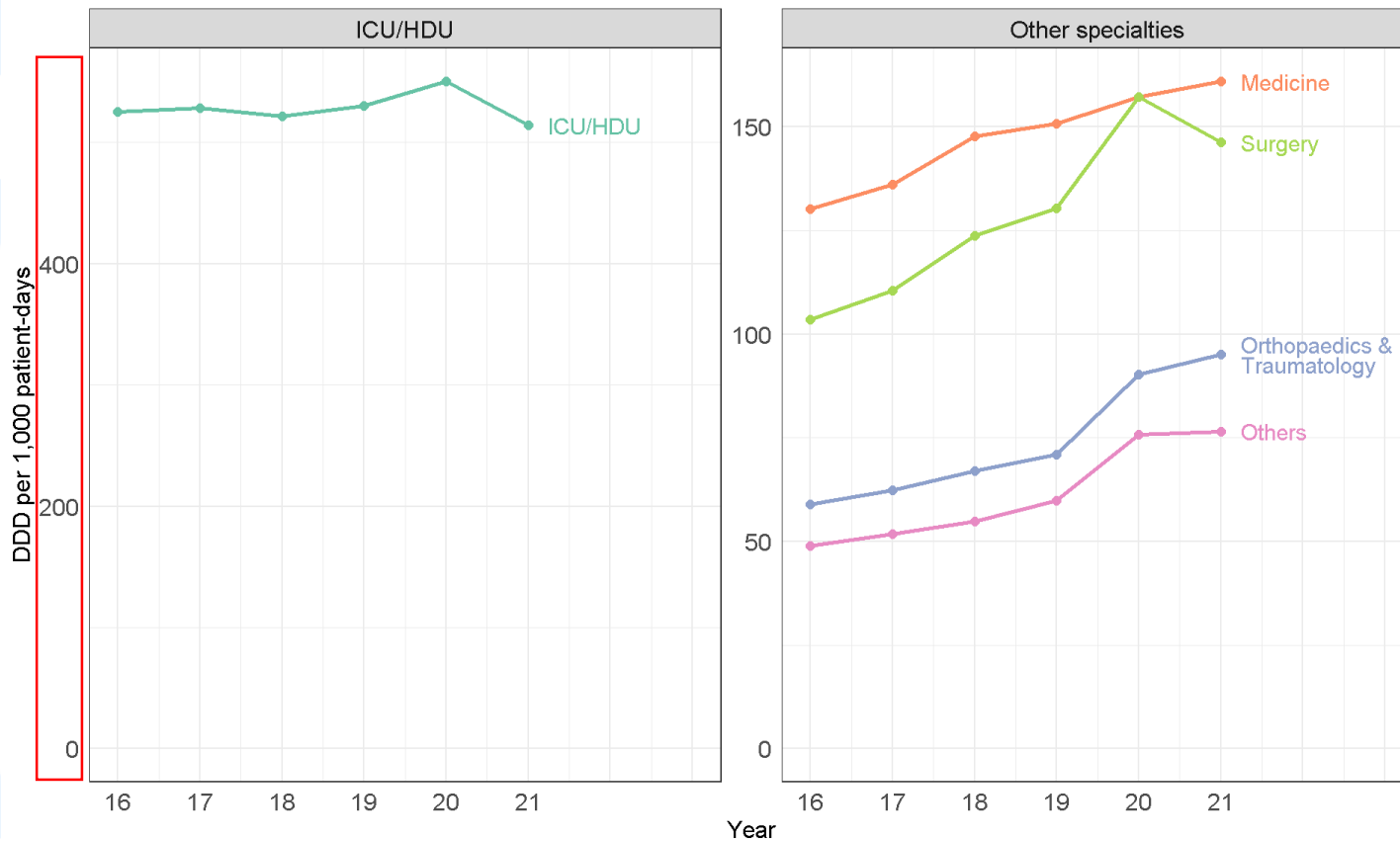
Broad-spectrum Antimicrobials Dispensed in Inpatient Service



- The three most dispensed broad-spectrum antimicrobials continue to be piperacillin/ tazobactam, meropenem and vancomycin
- It was firstly observed since 2016 that dispensing volume of these three antimicrobials plateaued, and piperacillin/ tazobactam showed a decrease for the first time
- Meanwhile, being the fourth most dispensed broad-spectrum antimicrobials, the increasing dispensing of ertapenem warrants monitoring



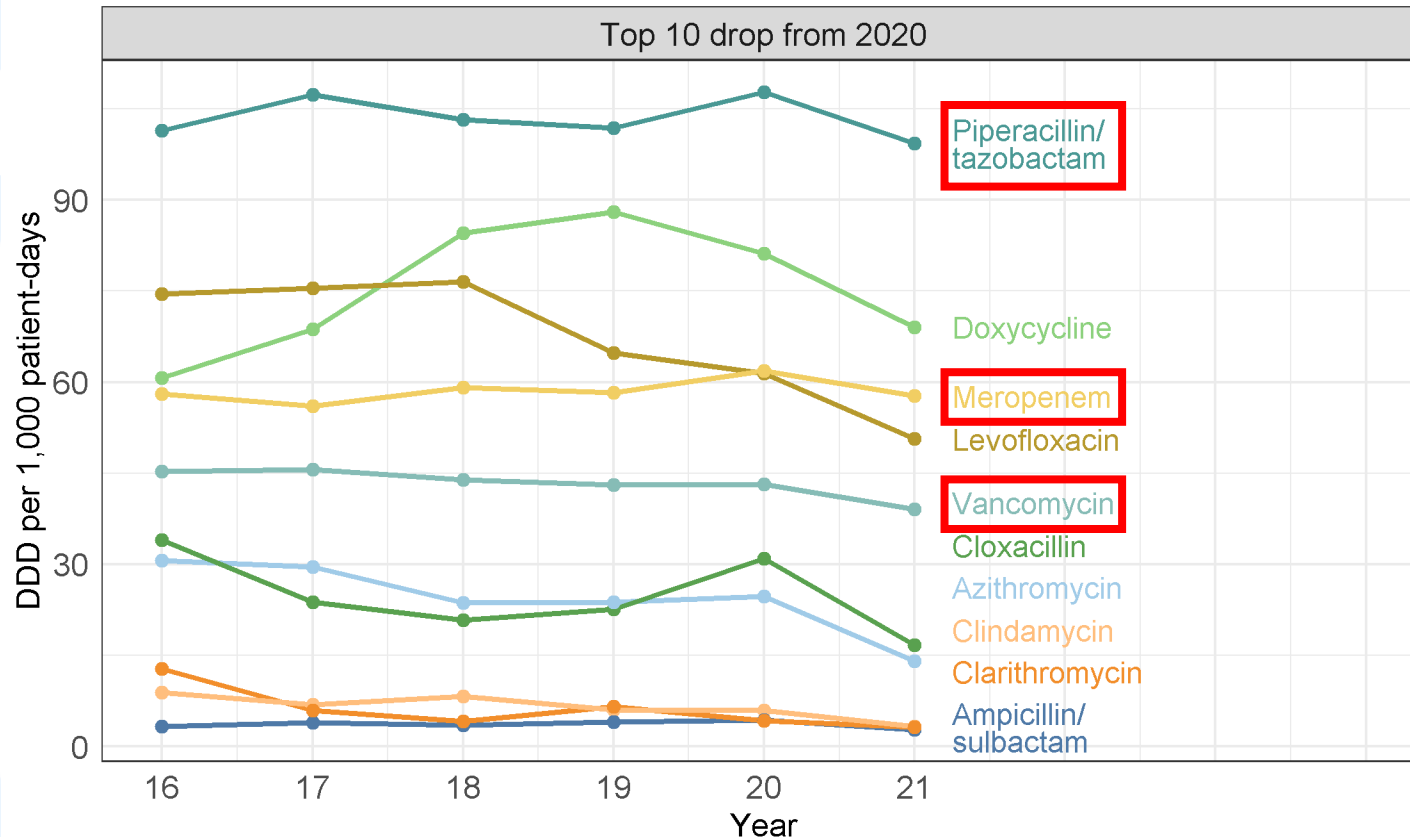
Broad-spectrum Antimicrobials Dispensed in Inpatient Service by Specialty



- ICU/ HDU continues to be the speciality with most broad-spectrum antimicrobials dispensed in 2021
- Antimicrobial dispensed in ICU/ HDU and surgery peaked in 2020 and showed a reduction in 2021
- Meanwhile, dispensing volume in medicine, O&T and other specialties continued to show an increase



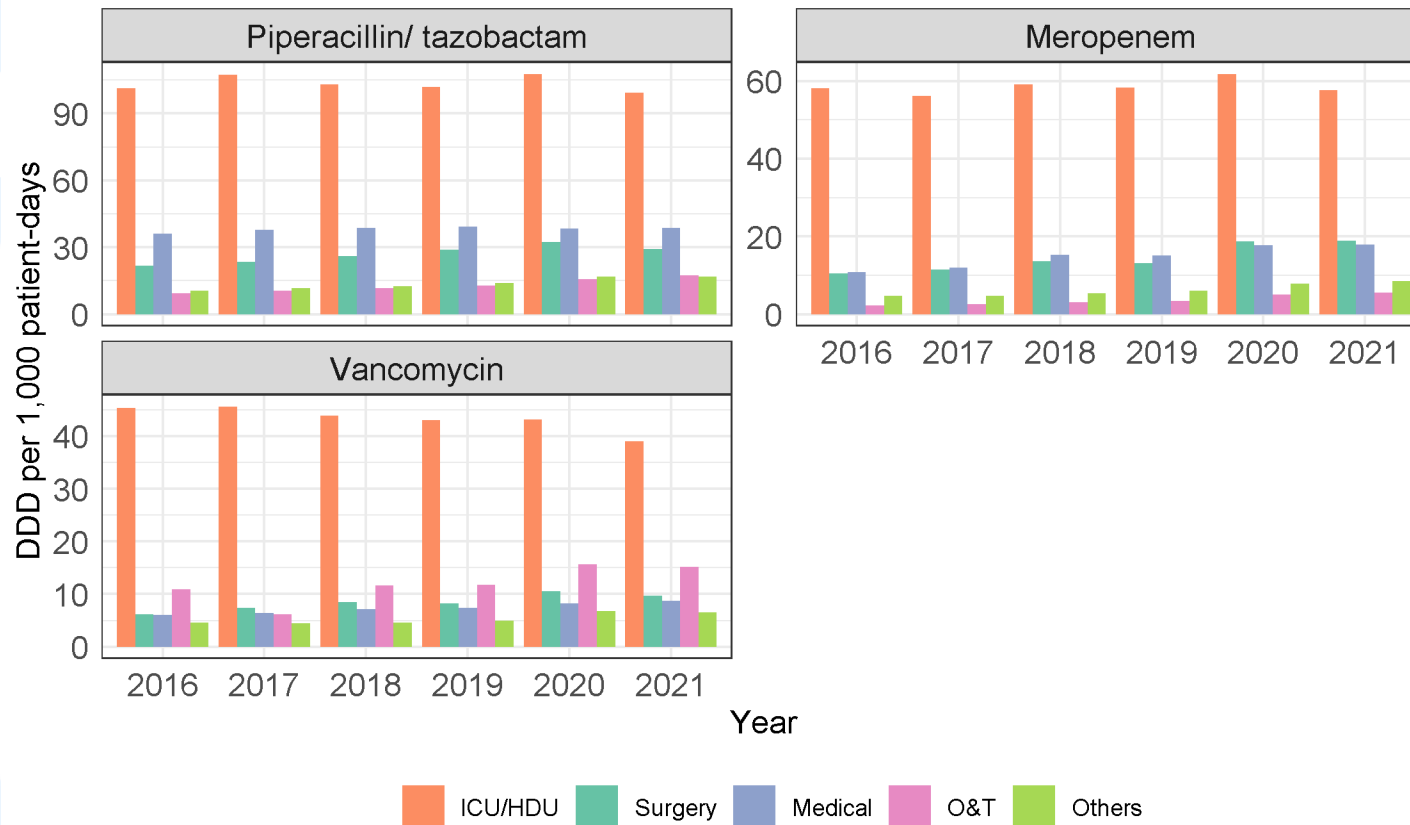
Top 10 drop in dispensing volume from 2020 in ICU/ HDU



- Broad-spectrum antimicrobials were observed among the ten most drop in dispensing volume compared to 2020:
 - Piperacillin/ tazobactam, meropenem, and vancomycin showed a reduction in 2021



Examination on ICU/HDU with decreased broad-spectrum antimicrobials dispensed



- Further examination of broad-spectrum antimicrobials dispensed in ICU/HDU revealed that less piperacillin/ tazobactam, meropenem, vancomycin were dispensed from 2020 to 2021
- Reduction in dispensing of these three antimicrobials was not seen in other specialities

Remarks on interpretation of results

- DDD is a technical unit of use that does not necessarily reflect the recommended or average prescribed dose
- There are no separate DDDs for children which makes the DDD estimates for paediatric formulations more difficult to interpret
- The amount of antimicrobials dispensed was used as a proxy for the amount consumed
- The surveillance results cannot be used to judge the appropriateness of usage in the absence of the relevant clinical information



Summary and Recommendation



Summary on AMU surveillance (2 years since the COVID-19 pandemic)

- For inpatient services, total antimicrobial dispensing volume remained lower than pre-COVID era (2016-2019) while for non-inpatient services, total antimicrobial dispensed increased to a similar volume before COVID-19 (slides 12)
- 👍 Being the inpatient specialty with most antimicrobials dispensed, **ICU/HDU** showed a major drop from 20 to 21, and reductions were also observed for **broad-spectrum antimicrobials** (piperacillin/ tazobactam, meropenem and vancomycin) (slide 25, 27)
- 👍 It was first observed since 2016 that dispensing volume of the three most dispensed broad-spectrum antimicrobials plateaued in 2021 (**piperacillin/ tazobactam, meropenem and vancomycin**), and piperacillin/ tazobactam showed a decrease for the first time in 2021 (slide 24)
- 👍 For **ertapenem**, the increasing dispensing volume since 2016 warrants monitoring (slide 24)
- 👍 For **doxycycline**, continuous rise in dispensing for SOPC since 2016, coupled with the firstly seen reduction in inpatient service in 2021, warrant further investigation (slides 18, 23)



Recommendation

- Continuous monitoring of antimicrobial usage in HA hospitals/ clinics to assess the effectiveness of the Antibiotic Stewardship Program
- Given the discrepant trend of doxycycline dispensed in inpatient and non-inpatient settings, further examination is warranted
- It is anticipated that HA service will continue to resume in 2022 and close monitoring of AMU for both inpatient and non-inpatient services is needed to assess for any impact of COVID-19 on AMU.

