

Antimicrobial Usage (AMU) Surveillance in Hong Kong - Wholesale Supply Data (2019)

May 2021



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Background



Background

- The Hong Kong Strategy and Action Plan on Antimicrobial Resistance 2017-2022 was launched in July 2017
- Activity 3.1.2 suggests collecting antibiotic supply data from different sectors as proxy to reflect the overall usage and trend of antimicrobial usage
- Past summaries published in CHP website in 2018 (Year 2014-16), 2019 (Year 2014-17) and 2020 (Year 2014-18)
- This presentation briefly accounts the surveillance findings for year 2016-2019
- Since the Action Plan was published in July 2017, the situation of 2016 has been chosen as baseline for comparison



Methodology



Scope of Data

- Antimicrobials wholesale supply data from licensed drug wholesalers (ever supplied antimicrobials under monitoring) in year 2019 to the following sectors were included:
 - Department of Health (DH)
 - Hospital Authority (HA)
 - Private hospitals
 - Private doctors (mutually exclusive with Private Hospitals)
 - Dentists
 - Veterinary surgeons
 - Community pharmacies
 - Farmers (who had the Antibiotics Permits issued by the Director of Agriculture, Fisheries and Conservation Department)



Definitions

- Surveillance period is defined by calendar year
- Anatomical Therapeutic Chemical (ATC) classification
 - This system is developed by the World Health Organisation (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
 - DDD constants are updated by WHO annually[#]
 - As the year 2019 version of ATC/DDD was adopted in this report, the DDD figures of previous years have been re-calculated which would be different from the figures presented in the past reports
 - For example, DDD constant for oral use of amoxicillin was changed from 1000mg in 2018 to 1500mg in 2019

[#] https://www.whocc.no/atc_ddd_alterations__cumulative/ddd_alterations/



Antimicrobials monitored

- Antimicrobials fall under the following WHO ATC classification (2019) were collected from licensed drug wholesalers:
 - J01 – Antibacterials for systemic use
 - P01AB – Nitroimidazole derivatives, agents against amoebiasis and other protozoal diseases
 - A07AA – Antibiotics, intestinal antiinfectives
- Antimicrobials which can be administered by the following routes were included as recommended by WHO
 - Oral
 - Parenteral
 - Rectal
 - Inhalation
- Preparations for topical use were excluded



WHO AWaRe Categorisation

- WHO introduced the AWaRe categorisation in 2017 for antibiotic stewardship at local, national and global levels with the aim of reducing antimicrobial resistance
- The three categories are:
 - Access
 - Indicates the antimicrobials of choice for common infections as first- or second-choice empiric treatment options
 - Watch
 - Includes most of the “highest-priority critically important antimicrobials” for human medicine and veterinary use. These antimicrobials are recommended only for specific, limited indications
 - Reserve
 - Should only be used as a last resort when all other antimicrobials have failed
- Antimicrobials not listed under WHO AWaRe were grouped as “Others”
- WHO encourages countries or regions to work towards to have 60% or more of the overall AMU under Access and reduce the usage of antimicrobials under Watch and Reserve



Antimicrobial resistance is a global crisis



WHO's AWaRe tool can help countries tackle it by prioritizing how antibiotics should be used.



ACCESS

should be
always available

Access category antibiotics should be the preferred choice for common and serious infections.



WATCH

must be
used sparingly

Watch and Reserve category antibiotics are either at higher risk of resistance or too precious to use all the time.



RESERVE

only as
a last resort



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Broad-spectrum Antimicrobials (Big Guns)

The following broad-spectrum antimicrobials are important on treating resistant infections and being monitored in AMU surveillance with HA Dispensing Data. They are examined separately in this surveillance:

- 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:
 - Overall quantity of antimicrobials supplied to various sectors: **DDD***
 - Supply quantity after considering the annual mid-year population of Hong Kong: **DDD per 1,000 inhabitants per day (DID)**
- The following measurements were calculated:
 - Overall wholesale supply quantity
 - Antimicrobials wholesale supply by different grouping
 - Distribution by WHO AWaRe categorisation
 - Distribution by Sector
 - ATC Pharmacological Subgroup
 - 10 most supplied antimicrobials
 - Wholesale supply quantity of selected broad-spectrum antimicrobials

*The ATC/DDD Index (2019) published by the WHO Collaborating Centre for Drug Statistics Methodology were adopted

Statistical Method

- Year 2016 was chosen as the baseline for comparison as the Hong Kong Strategy and Action Plan on Antimicrobial Resistance 2017-2022 was issued in mid-2017 and such decision was endorsed by the High Level Steering Committee (HLSC)
- Following ECDC, compound annual growth rate (CAGR) was adopted to illustrate average annual rate of change when comparing antimicrobials supplied in 2019 with that in 2016.

$$CAGR = (SU_{2019}/SU_{2016})^{(1/3)} - 1$$

- In this equation, SU_{2019} is the total amount of antimicrobials supplied in year 2019, SU_{2016} is the total amount of antimicrobials supplied for year 2016

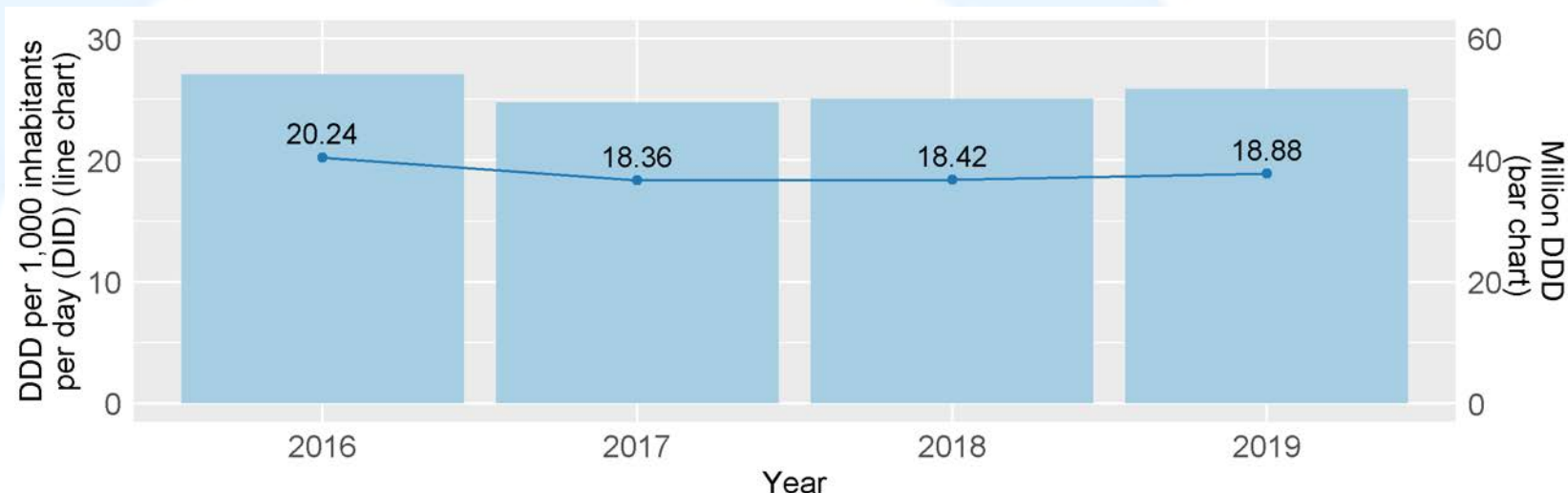


Results

1. Overall antimicrobials wholesale supply (2016-2019)



1. Overall antimicrobials wholesale supply (2016-2019)



	Year				Compound annual growth rate (16 to 19)
	2016	2017	2018	2019	
DDD in million	54.20	49.53	50.09	51.75	-1.5%
DID	20.24	18.36	18.42	18.88	-2.3%

* Non-human use antimicrobials supplied in Hong Kong were excluded.

- 2.3% decrease (CAGR for DID) in overall antimicrobials wholesale supply in Hong Kong was observed from 2016 and 2019
- Gradual increase in DID observed from 2017 to 2019



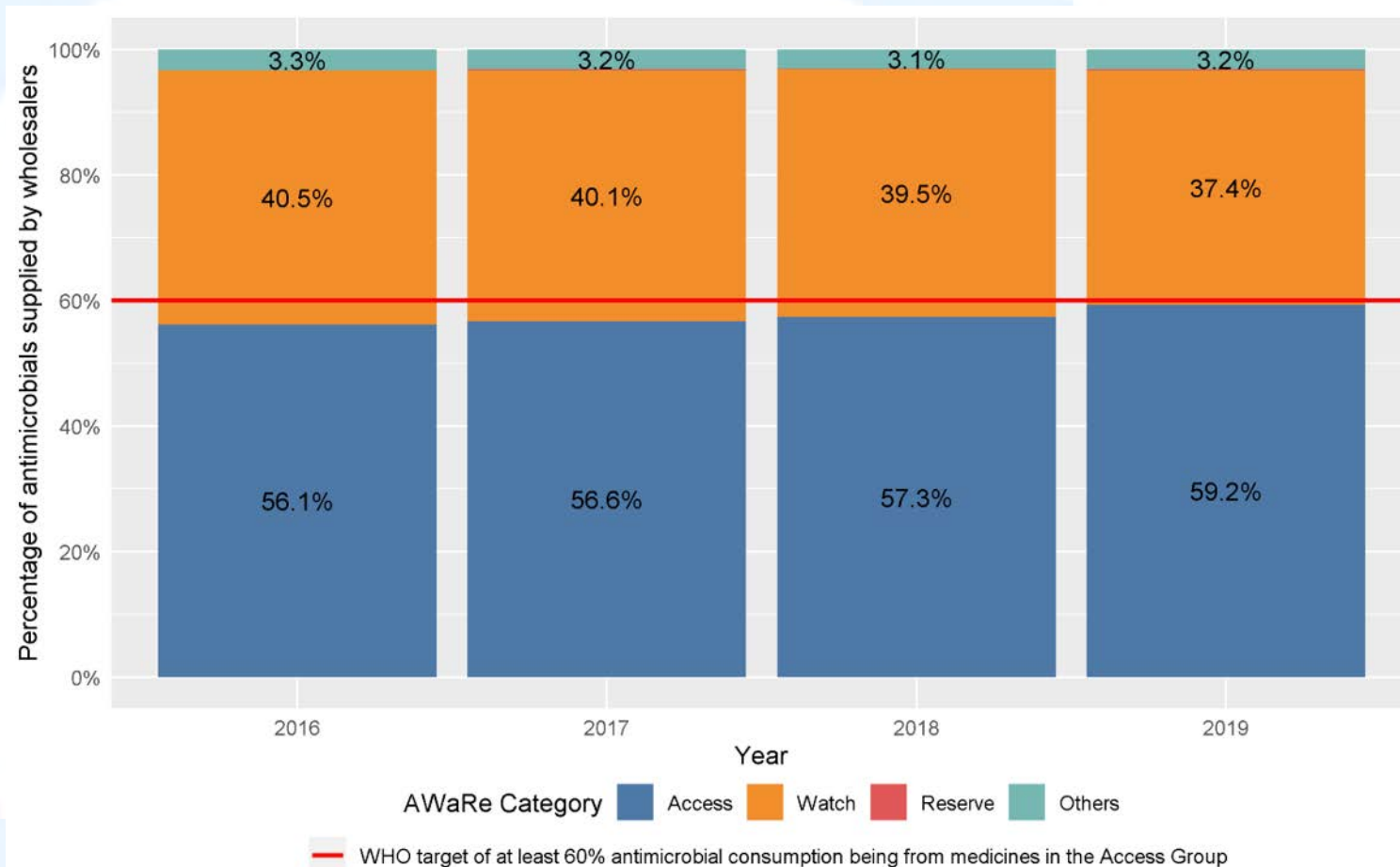
Results

2A. Antimicrobials wholesale supply (2016-2019)
- Distribution by WHO AWaRe categorisation



2A. Antimicrobials wholesale supply (2016-2019) 衛生防護中心 Centre for Health Protection

- Distribution by WHO AWaRe categorisation



- Antimicrobials under Access constituted 56.1% of all antimicrobials supplied in 2016 and increased to 59.2% in 2019
- The proportion of antimicrobials under Watch decreased from 40.5% in 2016 to 37.4% in 2019

2A. Antimicrobials wholesale supply (2016-2019) 衛生防護中心 Centre for Health Protection

- Distribution by WHO AWaRe categorisation

AWaRe Categorisation	DDD per 1,000 inhabitants per day (DID)*				Compound annual growth rate (16 to 19)
	Year 2016	Year 2017	Year 2018	Year 2019	
Access	11.36	10.39	10.55	11.19	-0.5%
Watch	8.19	7.36	7.28	7.06	-4.8%
Reserve	0.02	0.02	0.02	0.02	17.8%#
Others	0.67	0.59	0.57	0.61	-3.3%

* Non-human use antimicrobials supplied in Hong Kong were excluded.

- The supply of antimicrobials under Access and Watch showed decrease of 0.5% and 4.8% in CAGR from 2016 to 2019 respectively
- For Reserve antimicrobials, the number of antimicrobials supplied in Hong Kong increased from 5 in 2016 to 10 in 2019. Therefore, the CAGR figure# must be interpreted with caution



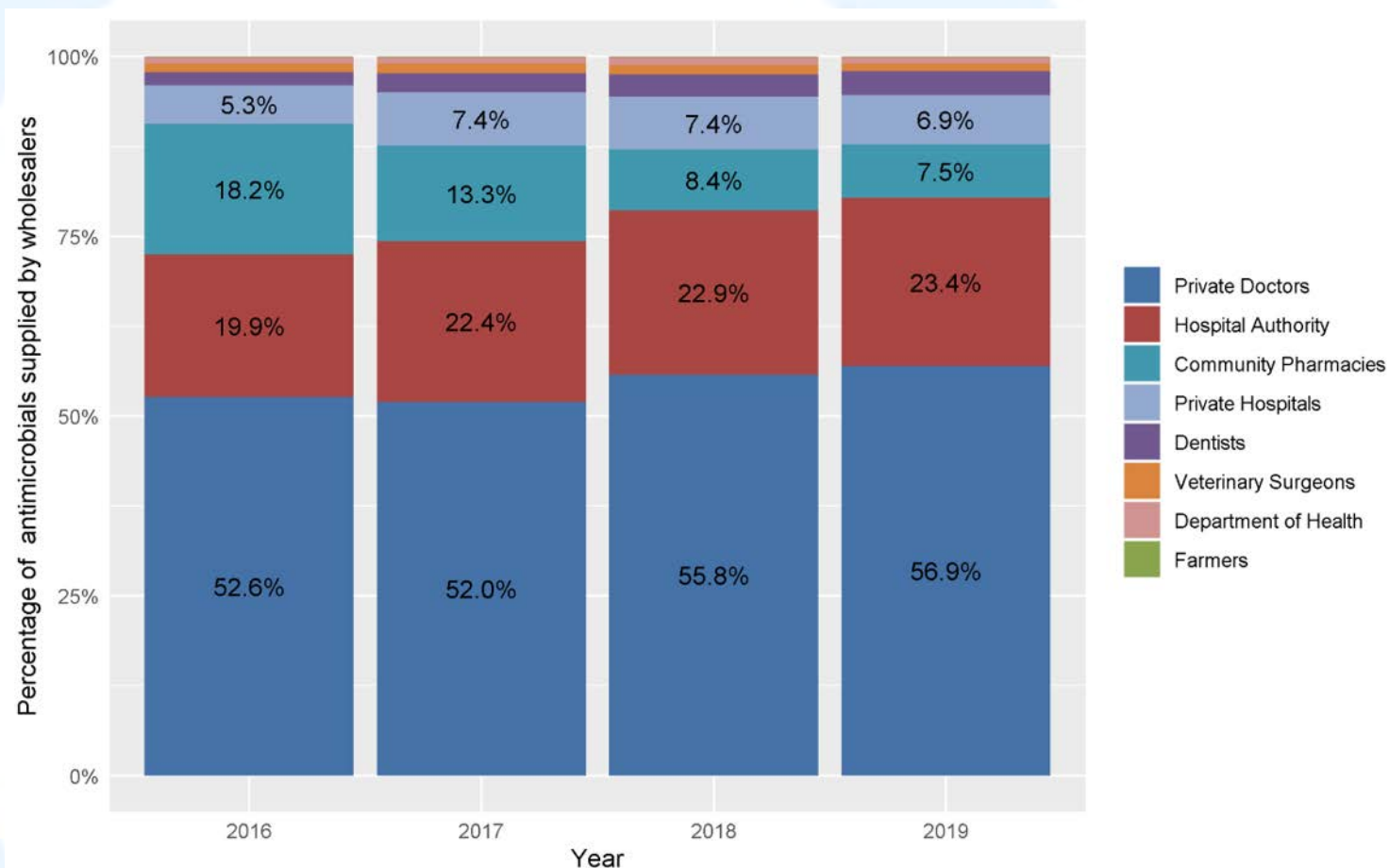
Results

2B. Antimicrobials wholesale supply (2016-2019)
- Distribution by Sector



2B. Antimicrobials wholesale supply (2016-2019) 衛生防護中心 Centre for Health Protection

- Distribution by Sector



- In 2019, 56.9% of antimicrobials supplied in Hong Kong went to private doctors, followed by Hospital Authority (23.4%) and community pharmacies (7.5%)
- Percentage of antimicrobials supplied to community pharmacies decreased gradually from 18.2% in 2016 to 7.5% in 2019



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2B. Antimicrobials wholesale supply (2016-2019) 衛生防護中心 Centre for Health Protection

- Distribution by Sector

	DDD per 1,000 inhabitant days (DID)				Compound annual growth rate (16 to 19)
	Year 2016	Year 2017	Year 2018	Year 2019	
Human-use sectors					
Private Doctors	10.78	9.67	10.41	10.87	0.3%
Hospital Authority	4.07	4.17	4.27	4.47	3.2%
Community Pharmacies	3.73	2.47	1.57	1.43	-27.4%
Private Hospitals	1.09	1.38	1.38	1.31	6.3%
Dentists	0.37	0.50	0.58	0.63	19.1%
Department of Health	0.19	0.17	0.21	0.18	-3.1%

- Among antimicrobials supplied for human use, supply to dentists showed the sharpest increase of 19.1% in CAGR from 2016 to 2019 though the absolute amount was small
- Proportion of antimicrobials supplied to community pharmacies showed the sharpest decrease of 27.4% in CAGR



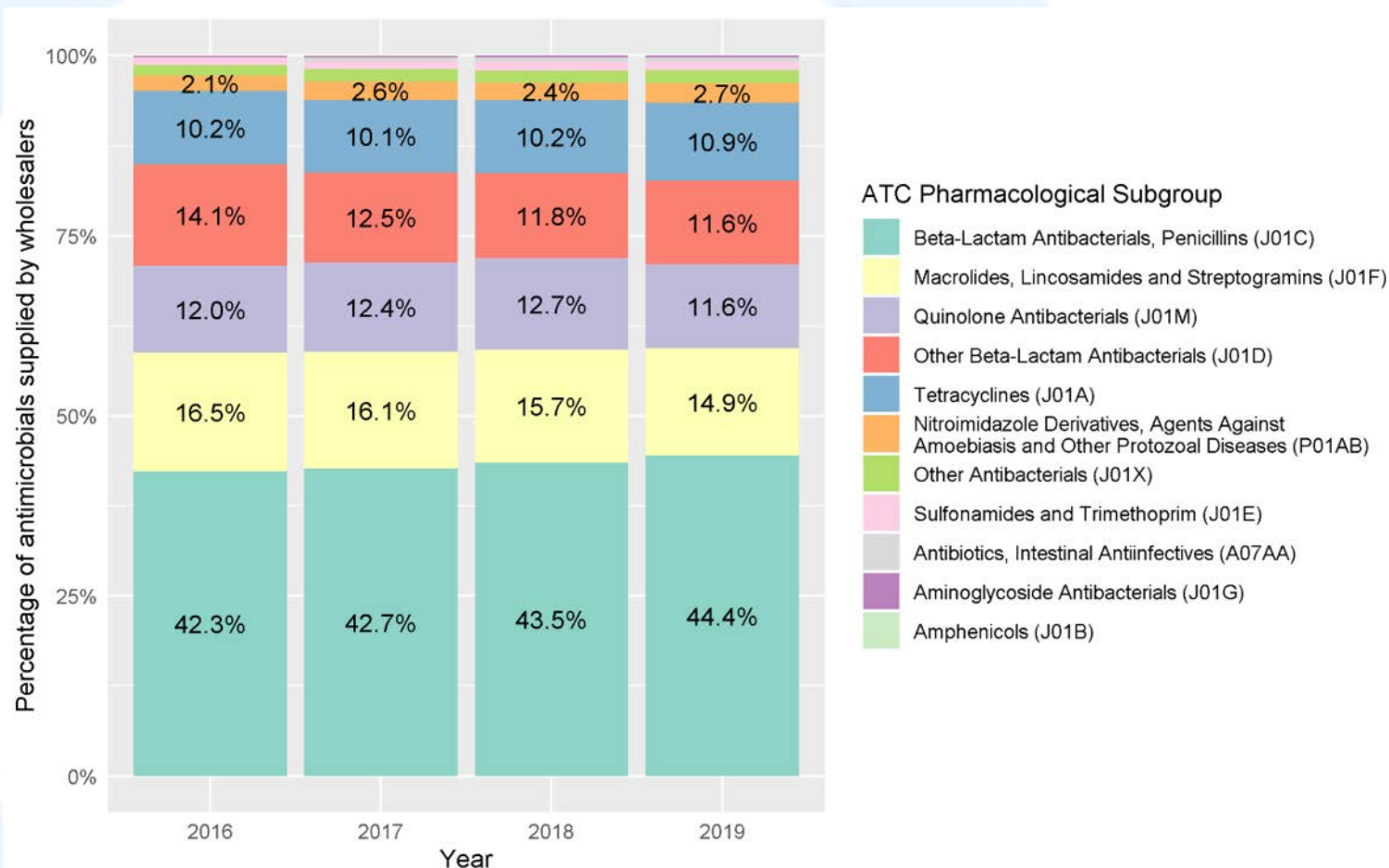
Results

2C. Antimicrobials wholesale supply in Hong Kong
(by ATC Pharmacological Subgroup)



2C. Antimicrobials wholesale supply (2016-2019) 衛生防護中心 Centre for Health Protection

- Distribution by ATC Pharmacological Subgroup



- In 2019, beta-lactam antibacterial, penicillins (J01C) was the most commonly supplied antimicrobial group (44.4%) by wholesale, followed by macrolides, lincosamides and streptogramins (J01F) (14.9%), quinolone antibacterials (J01M) (11.6%), other beta-lactam antibacterials (J01D) (11.6%), and tetracyclines (J01A) (10.9%)

2C. Antimicrobials wholesale supply (2016-2019) 衛生防護中心 Centre for Health Protection

- by ATC Pharmacological Subgroup

ATC Pharmacological Subgroup		DDD per 1,000 inhabitant days (DID)				Compound annual growth rate (16 to 19)
Code	Description	Year 2016	Year 2017	Year 2018	Year 2019	
J01C	Beta-Lactam Antibacterials, Penicillins	8.56	7.84	8.01	8.39	-0.6%
J01F	Macrolides, Lincosamides and Streptogramins	3.34	2.96	2.89	2.82	-5.5%
J01M	Quinolone Antibacterials	2.43	2.29	2.34	2.20	-3.3%
J01D	Other Beta-Lactam Antibacterials	2.85	2.30	2.17	2.19	-8.4%
J01A	Tetracyclines	2.07	1.85	1.87	2.05	-0.3%
P01AB	Nitroimidazole Derivatives, Agents Against Amoebiasis and Other Protozoal Diseases	0.43	0.47	0.44	0.51	5.8%
J01X	Other Antibacterials	0.29	0.32	0.32	0.34	5.0%
J01E	Sulfonamides and Trimethoprim	0.21	0.19	0.22	0.21	-0.5%
A07AA	Antibiotics, Intestinal Anti-infectives	-	0.10	0.12	0.12	N/A [#]
J01G	Aminoglycoside Antibacterials	0.05	0.05	0.05	0.05	-2.2%
J01B	Amphenicols	<0.005	<0.005	<0.005	<0.005	-70.0%
J01R	Combinations of Antimicrobials*	-	-	-	-	-
	Total	20.24	18.36	18.42	18.88	-2.3%

Note:

Antimicrobials supplied for non-human use in Hong Kong (e.g. veterinary surgeons and farmers) were not included

* There was no registered product under "Combinations of Antimicrobials" (J01R) in Hong Kong

The CAGR for antimicrobials under A07AA is not applicable as the 2016 figure was not complete

- Antimicrobials under P01AB (nitroimidazole derivatives) and J01X (other antibacterials) increased most (5.8% and 5.0% in CAGR respectively)
- Antimicrobials under J01B (amphenicols) and J01D (other beta-lactam antibacterials) decreased most (-70% and -8.4% in CAGR respectively)



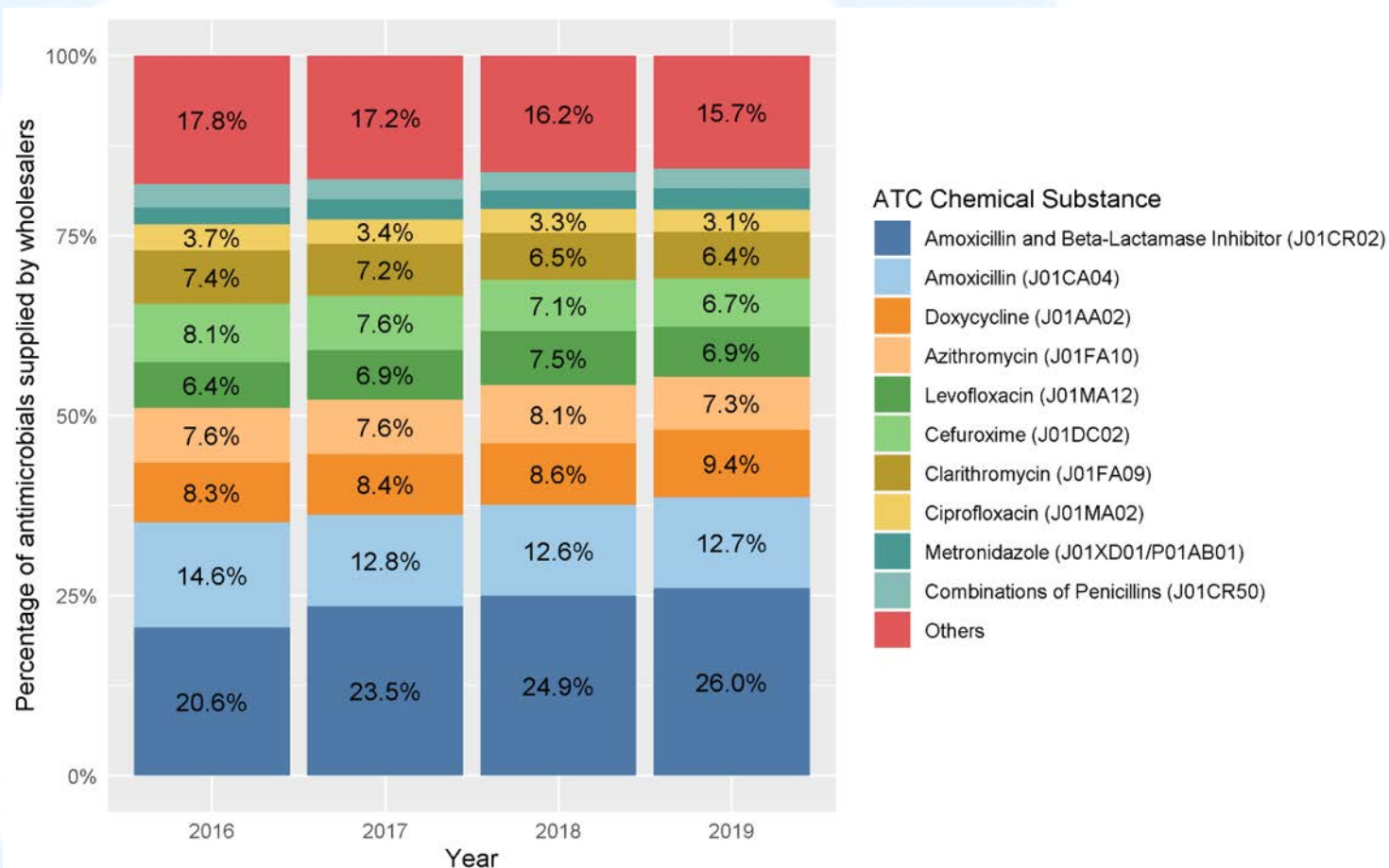
Results

2D. Antimicrobials wholesale supply in Hong Kong
(10 most commonly supplied antimicrobials)



2D. Antimicrobials wholesale supply (2016-2019) 衛生防護中心 Centre for Health Protection

- 10 most commonly supplied antimicrobials



- The 10 most commonly supplied antimicrobials contributed >80% of all antimicrobials supplied from 2016 to 2019
- In 2019, amoxicillin and beta-lactamase inhibitor (J01CR02) was the most commonly supplied antimicrobial (26.0%) by wholesale, followed by amoxicillin (J01CA04) (12.7%), and doxycycline (J01AA02) (9.4%)

2D. Antimicrobials wholesale supply (2016-2019) 衛生防護中心 Centre for Health Protection

- 10 most supplied antimicrobials

ATC Chemical Substance		DDD per 1,000 inhabitant days (DID)				Compound annual growth rate (16 to 19)
Code	Description	Year 2016	Year 2017	Year 2018	Year 2019	
J01CR02	Amoxicillin and Beta-Lactamase Inhibitor	4.16	4.31	4.59	4.91	5.6%
J01CA04	Amoxicillin	2.95	2.34	2.33	2.40	-6.7%
J01AA02	Doxycycline	1.69	1.54	1.58	1.77	1.7%
J01FA10	Azithromycin	1.54	1.39	1.48	1.38	-3.5%
J01MA12	Levofloxacin	1.29	1.26	1.39	1.31	0.5%
J01DC02	Cefuroxime	1.63	1.39	1.31	1.27	-8.0%
J01FA09	Clarithromycin	1.50	1.32	1.19	1.21	-6.9%
J01MA02	Ciprofloxacin	0.74	0.63	0.62	0.59	-7.2%
J01XD01/ P01AB01	Metronidazole*	0.47	0.51	0.48	0.55	5.1%
J01CR50	Combinations of Penicillins	0.66	0.50	0.47	0.52	-7.5%
	Others	3.61	3.15	2.98	2.97	-6.3%
	Total	20.24	18.36	18.42	18.88	-2.3%

Note:

Antimicrobials supplied to veterinarians, and non-human use antimicrobials (i.e. ATC code starts with Q) were not included

* Metronidazole was classified as J01XD01 for parenteral use and P01AB01 for oral/ rectal use

- Supply of amoxicillin and beta-lactamase inhibitor (J01CR02) and metronidazole (J01XD01/P01AB01) increased most (5.6% and 5.1% respectively in CAGR) while cefuroxime (J01DC02) and combination of penicillins (J01CR50) decreased most (-8.0% and -7.5% respectively in CAGR) from 2016 to 2019

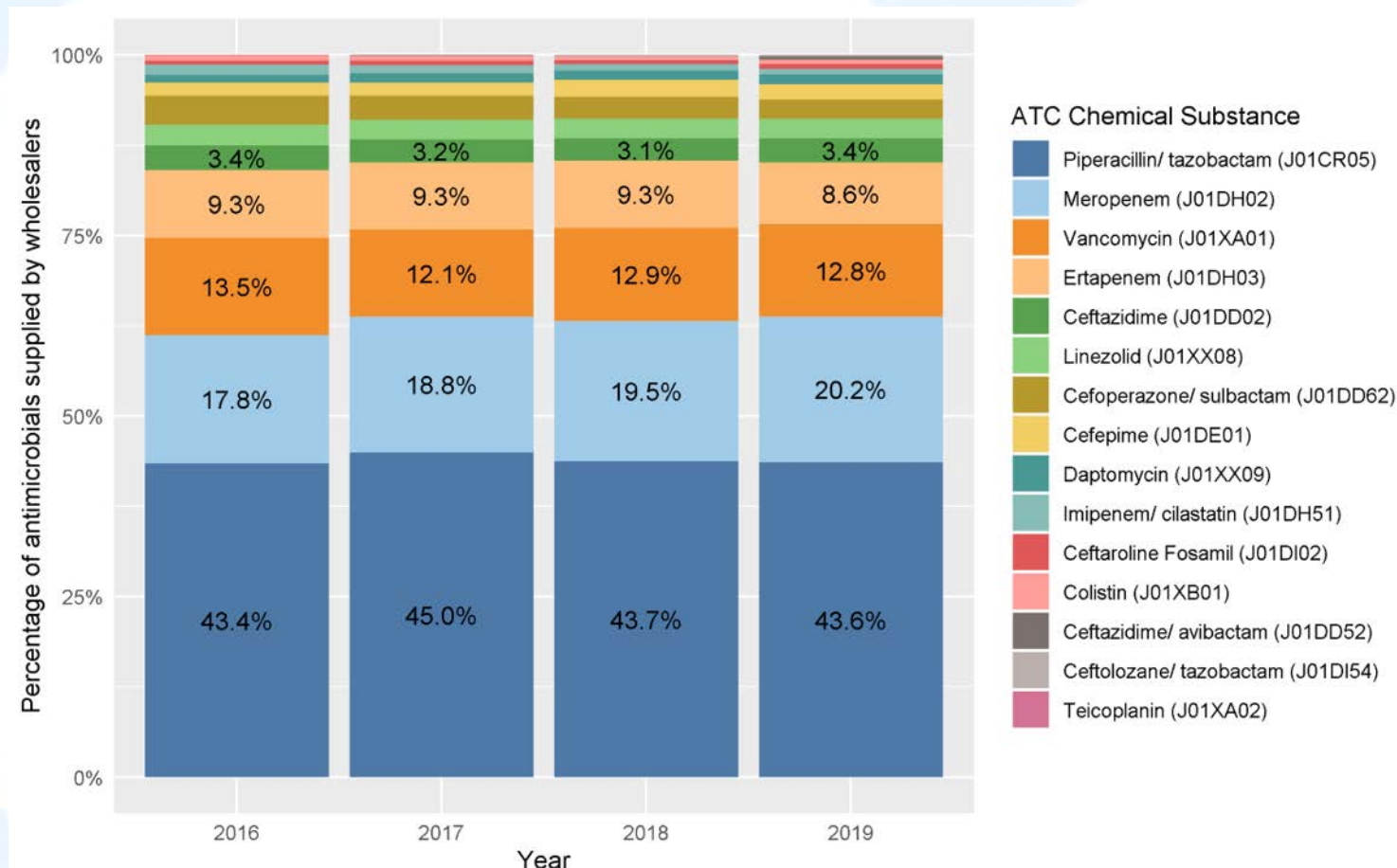


Results

3. Wholesale supply of selected broad-spectrum antimicrobials



3. Wholesale supply of selected broad-spectrum antimicrobials



- Majority of these broad spectrum antimicrobials were supplied to HA and private hospitals from 2016 to 2019 (about 99%)
- In 2019, piperacillin/tazobactam was the most commonly supplied (43.6%) broad-spectrum antimicrobial, followed by meropenem (20.2%) and vancomycin (12.8%)



3. Wholesale supply of selected broad-spectrum antimicrobials

ATC Chemical Substance		DDD per 1,000 inhabitant days (DID)				Compound annual growth rate (16 to 19)
Code	Description	Year 2016	Year 2017	Year 2018	Year 2019	
Beta-Lactam Antibacterials, Penicillins						
J01CR05	Piperacillin/ tazobactam	0.114	0.128	0.138	0.149	9.2%
Other Beta-Lactam Antibacterials						
J01DH02	Meropenem	0.047	0.053	0.062	0.069	13.8%
J01DH03	Ertapenem	0.025	0.027	0.029	0.029	5.9%
J01DD02	Ceftazidime	0.009	0.009	0.010	0.012	8.7%
J01DD62	Cefoperazone/ sulbactam	0.011	0.009	0.010	0.009	-4.9%
J01DE01	Cefepime	0.005	0.005	0.007	0.007	14.7%
J01DH51	Imipenem/ Cilastatin	0.004	0.003	0.003	0.003	-12.1%
J01DI02	Ceftaroline Fosamil	0.001	0.002	0.002	0.002	24.4%
J01DD52	Ceftazidime/ avibactam	-	§	-	0.001	N/A*
J01DI54	Ceftolozane/ tazobactam	-	§	0.001	0.001	N/A*
Other Antibacterials						
J01XA01	Vancomycin	0.036	0.034	0.041	0.044	6.9%
J01XX08	Linezolid	0.008	0.008	0.009	0.009	6.2%
J01XX09	Daptomycin	0.003	0.004	0.004	0.005	19.0%
J01XB01	Colistin	0.002	0.002	0.002	0.002	-1.2%
J01XA02	Teicoplanin	§	-	§	-	-
Total Broad Spectrum Antibiotics						
	Total	0.263	0.284	0.315	0.341	9.0%

Note:

Antimicrobials supplied for non-human use in Hong Kong (e.g. veterinary surgeons and farmers) were not included

* The CAGR for the supply of antimicrobial is not applicable as it is a newly introduced antimicrobial which was not available in 2016

§ Less than 0.0005

- Total wholesale supply of selected broad-spectrum antimicrobials increased by 9.0% in CAGR from 2016 to 2019
- Piperacillin/ tazobactam, meropenem and vancomycin have been the 3 most commonly supplied selected broad-spectrum antimicrobials from 2016 to 2019. They accounted for about 76% of all selected broad-spectrum antimicrobials under monitoring in 2019
- The sharp increase in CAGR of daptomycin from 2016 to 2019 will be further investigated



Remarks on interpretation of results (1)

- 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
- Change in DDD* constants in 2019 by WHO resulted in re-calculating of the past data and hence the figures in this presentation would be different from the figures presented in the past

* WHO ATC 2019 version was adopted for DDD calculation



Remarks on interpretation of results (2)

- The surveillance of antimicrobials by wholesale supply in Hong Kong is a voluntary self-reporting by licensed drug wholesalers and could have reporting errors
- Wholesale supply data is used as a proxy for the amount of antimicrobials supplied to each sector, therefore the figures are not equivalent to dispensing figures
- Wholesale supply data could be affected by marketing strategies, e.g. discount offers
- Readers are cautioned not to use the Hong Kong figures to make direct comparison with that of other countries as the health care services provision system and the methodology in collecting the surveillance data may not be the same



Summary

- Overall wholesale supply of antimicrobials decreased from 20.24 DID in 2016 to 18.36 DID in 2017 but gradually increased to 18.88 DID in 2019 and the compound annual growth rate from 2016 and 2019 was -2.3%
- Hong Kong reached 59.2% of overall antimicrobial supplied under the Access group of WHO AWaRe categorisation in 2019, which is very close to the benchmark of 60% as recommended by WHO
- Majority of antimicrobials supplied in Hong Kong went to private doctors, the major primary healthcare service providers (56.9%), followed by Hospital Authority (23.4%) and community pharmacies (7.5%) for 2019
- Percentage of antimicrobials supplied to community pharmacies showed gradual reduction from 18.2% in 2016 to 7.5% in 2019
- Overall wholesale supply of broad-spectrum antimicrobials in Hong Kong showed an increase of 9.0% (compound annual growth rate) from 2016 to 2019



Recommendations

- Apart from sharing the surveillance results, we would continue to strengthen communication with stakeholders of respective sectors to solicit their support on enhancing the implementation of antibiotic stewardship programme
- As the majority of antimicrobials were supplied to private doctors (56.9%) and Hospital Authority (23.4%), strengthening the implementation of antibiotic stewardship programme in primary care and public hospitals are recommended
- Majority of the broad spectrum antimicrobials were supplied to Hospital Authority and private hospitals. The continuous rising trend of these broad spectrum antimicrobials warrants to further explore and enhance the antibiotic stewardship programme in hospitals



THE END

Thank you

