

BACKGROUND

- Antimicrobial drug resistance is a key priority for the World Health Organisation (WHO).
- Antimicrobial drug resistance is associated to antimicrobial drug use.
- WHO supports a monitoring and statistical analysis program about antimicrobial drug consumption and recommends the use of the Anatomic Therapeutic Chemical classification and the Defined Daily Doses (DDD) unit to monitor antimicrobial drug use. Days of therapy (DOT) can also be used and are a preferred metrics in paediatrics because it is based on the number of days of treatment for each drug used and not on drug dosage.
- In Canada, the Government has published guidelines to monitor and limit antimicrobial drug resistance including the implementation of antimicrobial stewardship programs.
- Antimicrobial stewardship program is a required organizational practice for Canadian hospitals.
- In our hospital, an antimicrobial stewardship program is in place and includes the monitoring of DDD and DOT.

OBJECTIVES

- The objective of this descriptive, retrospective cross-sectional study is to describe the antimicrobial drug use expressed as DDD and DOT from 2010-2011 to 2014-2015.

METHODS

Inclusion criteria

- All drug prescription dispensed by the pharmacy department between April 1st 2010 and March 31st 2015 in a 500-bed teaching mother-child hospital

Exclusion criteria

- Antimicrobials excluded in pediatrics
 - Anti-retrovirals
 - Topical antimicrobials
 - Nebulized antimicrobials
 - Antiparasites
- Ob-gyn inpatients and all outpatients also excluded

Data extraction

- Pharmacy information system (GesphaRx®)

Analysis

- Descriptive statistics have been performed
- DDD/1000 patient-days and DOT/1000 patient-days ratios were calculated
- Variations between fiscal year 2014-2015 and 2010-2011 were expressed as a ratio for all antimicrobials, for antibiotics, antivirals, antifungals and for each molecule
- A >= 20% variation between both targeted years was considered important

RESULTS

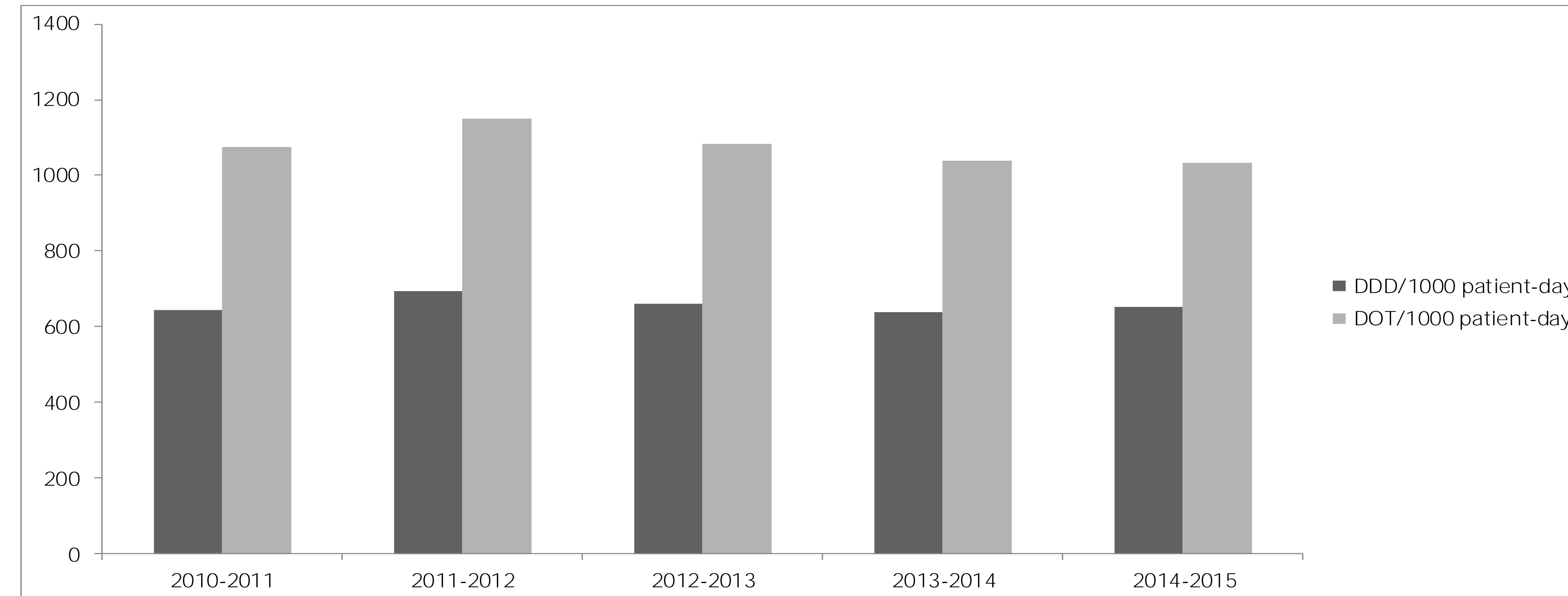


Figure 1—DDD/1000 patient-days and DOT/1000 patient-days ratios per year from 2010-2011 to 2014-2015

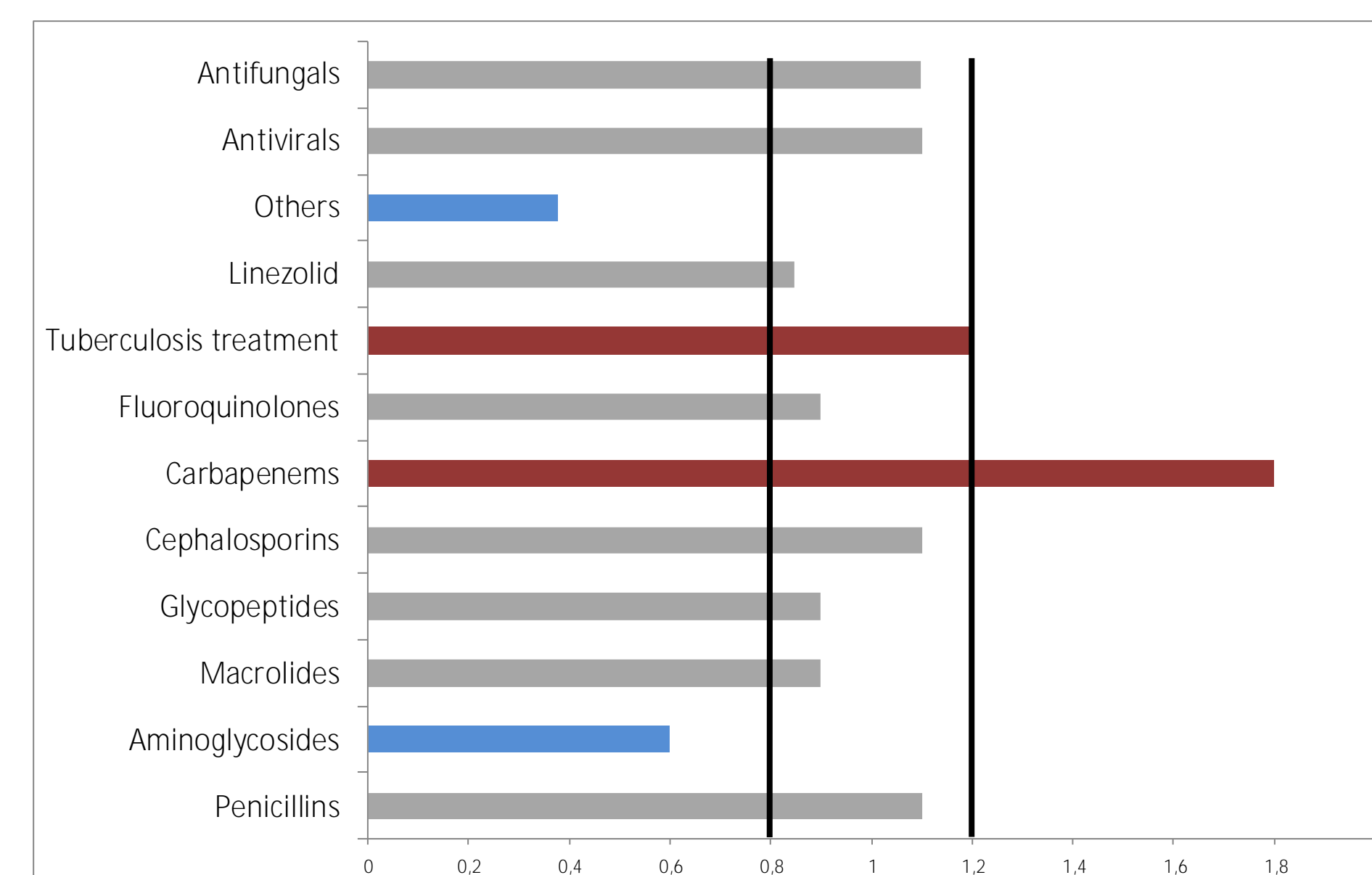


Figure 2—Variation ratios between DDD/1000 patient-days ratios in 2014-2015 and 2010-2011

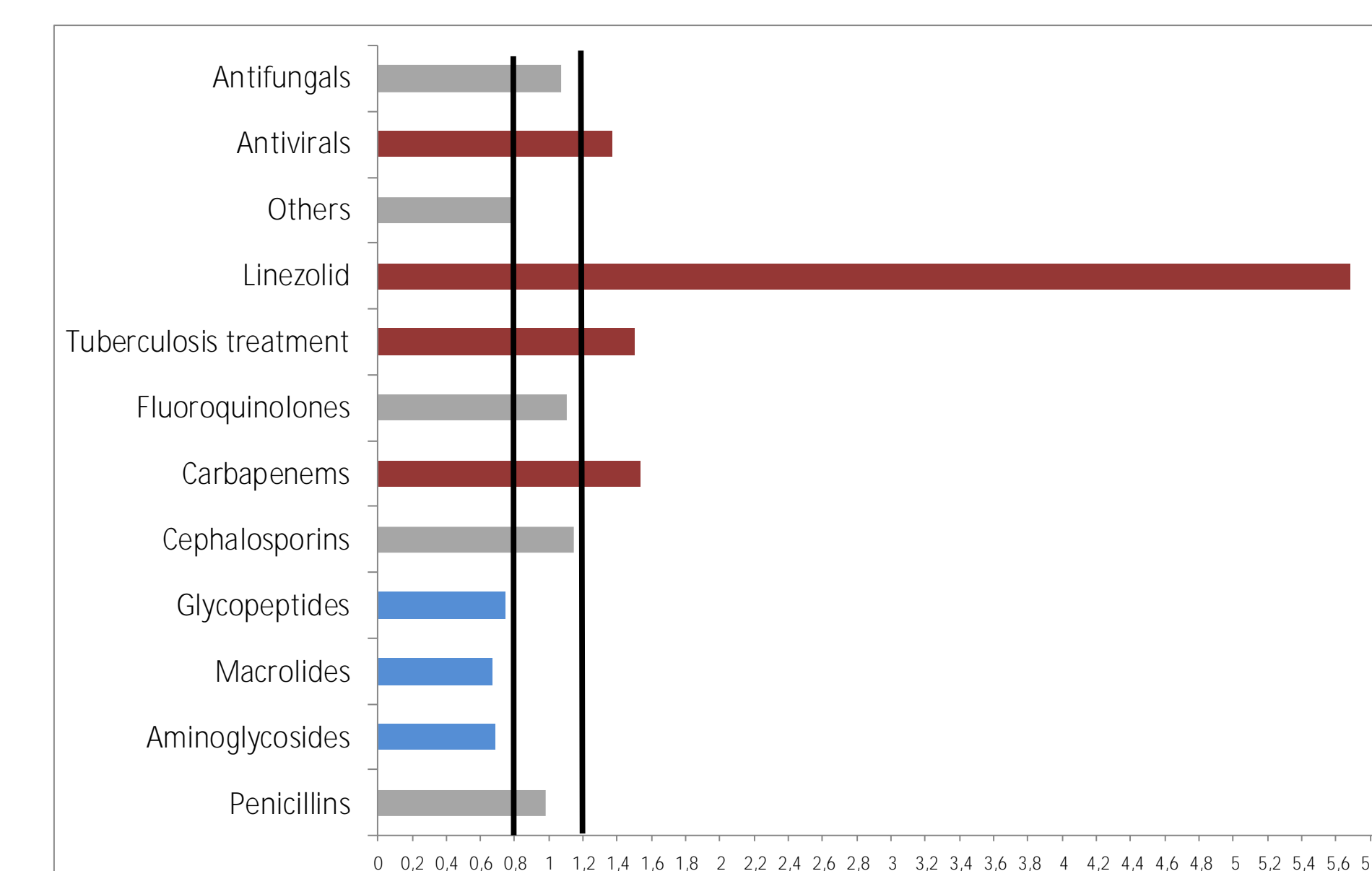


Figure 3—Variation ratios between DOT/1000 patient-days ratios in 2014-2015 and 2010-2011

Table 1— DDD/1000 patient-days and DOT/1000 patient-days ratios by care units

	2010-2011		2011-2012		2012-2013		2013-2014		2014-2015	
	DDD/1000 patient-days	DOT/1000 patient-days	DDD/1000 patient-days	DOT/1000 patient-days	DDD/1000 patient-days	DOT/1000 patient-days	DDD/1000 patient-days	DOT/1000 patient-days	DDD/1000 patient-days	DOT/1000 patient-days
Infectious diseases unit	1308	1638	1335	1681	1274	1687	1344	1684	1345	1771
Others	30	52	29	49	23	44	33	51	29	44
Surgery units	813	981	815	972	896	1024	880	988	884	1000
Néonatology unit	38	537	39	606	33	474	32	434	36	532
Hemato-oncology unit	1804	2747	1860	2955	1701	2890	1729	2795	1728	2619
Pediatric unit	589	834	733	973	735	967	522	711	672	867
Intensive care unit	776	1518	830	1545	861	1502	987	1653	893	1508
Total	642	1068	693	1150	660	1084	637	1023	652	1033

- Wide variations were observed among care units in the same hospital.
- Hemato-oncology unit, infectious disease unit and intensive care unit were the three departments which had the highest DDD/1000 patient days and DOT/1000 patient-days ratios.

DISCUSSION/ CONCLUSION

- Antimicrobials drug consumption remained globally stable during the study period between 2010-2011 and 2014-2015 with a variation of 1.5% for DDDs and 3.8% for DOTs; this is not surprising considering our antimicrobial stewardship program, numerous drug utilization rules, decentralized pharmacists in most patient care areas and the relative stability of our patients severity profiles.

- In terms of DDDs and antimicrobial drug use,
 - Only carbapenems (1.8x) and tuberculosis drug combinations (1.2x) increased by a 1.2 factor or more; this is associated with practice changes in pediatric intensive care unit and also drug shortages of some antibiotics.
 - Only aminoglycosides (0.7x) decreased by a 0.8 factor or less; this is associated with a drug shortage of aminoglycosides (e.g. tobramycin and gentamicin).

- In terms of DDDs and patient care units,
 - None of patient care units were exposed to an increase by a 1.2 factor or more or a decrease by a 0.8 factor or less.

- In terms of DOTs and antimicrobial drug use,
 - Carbapenems (1.5x), tuberculosis drug combinations (1.4x), linezolid (5.7x) and antivirals (1.4x) increased by a 1.2 factor or more; linezolid has been introduced in neonatal intensive care units to replace vancomycin considering emerging resistances and antivirals were more systematically used in prophylaxis and treatment of viral infections in hemato-oncology and bone marrow transplant unit.
 - Glycopeptides (0.7x), macrolides (0.8x) and aminoglycosides (0.7x) decreased by a 0.8 factor or less; these antibiotic classes were less used considering again drug shortages and practice changes as well.

- In terms of DOTs and patient care units,
 - None of patient care units were exposed to an increase by a 1.2 factor or more or more or a decrease by a 0.8 factor or less.

- While DOTs are preferred to DDDs in pediatrics, we have been collecting both in Quebec considering a governmental directive that requires both metrics every year; we do believe DOTs are a better metrics to identify trends and problems.
- Some authors suggest an aggregated metrics (e.g. number of days of therapy on antimicrobials no matter the number of agents used) could be preferred to DOT; others question the use of the metrics when not > considering the outpatient course; these suggestions require further exploration by our research team.
- There are limited data published about DDDs and DOTs in pediatric; we hope the publication of these results will contribute to benchmarking between hospitals and sharing of practice experiences to limit the use of these drugs.
- This study has limitations; some antimicrobial agents/route and ob-gyn patients were excluded. The metrics used remained an indicator and should not be used alone to explain variations and guide practice changes.