

Real-time computer-generated alerts to select interventions and optimize an antimicrobial stewardship program

P. DOLCE¹, L. BERGERON², E. LABRECQUE², A. BOIVIN³, and H. BERNATCHEZ¹.

¹Department of Medical Microbiology and Infectious Diseases, CSSS Rimouski-Neigette (CSSSRN),

²Department of Pharmacy, CSSSRN, ³Department of Biology, Université du Québec à Rimouski.



ABSTRACT

Objectives: Implementation of antimicrobial stewardship program (ASP) is a challenge, with limited physician and pharmacist time. A multi-disciplinary approach (clinical pharmacists, medical microbiologists, infectious diseases, information technology) was undertaken to integrate information technology in our ASP, with alerts to tract potential interventions.

Methods: CSSSRN is a tertiary regional hospital with 230 acute-care beds. A software “Antibiokos” was implemented in November 2014 to enable our ASP team to tract interventions, using real-time data from interfaces with pharmacy, microbiology laboratory and admission-discharge-transfer. Electronic algorithms included core elements of ASP such as: time-sensitive stop orders (3 days for IV, 7 days for oral), overlapping spectra, switch from intravenous to oral, drug optimization according to culture results, formulary restriction and pharmacokinetics (PK). Real-time metrics (DDD, DOT, Costs) were provided.

Outcomes: During the first 4 months, a total of 7348 DDD were observed among inpatients, and 1004 electronic alerts were generated in 686 patients. The alerts were time-sensitive stop orders 55%, restriction 12%, PK 10%, optimization according to culture 6%, switch IV to oral 6%, overlapping spectra 6%, other 4%. A total of 184 interventions were done in 135 patients, mainly on Quinolones 23%, Pip-Tazo 21%, Cephalosporins 17%, Carbapenems 9%, Macrolides 5%, Antifungals 4%, Antivirals 3%. Suggestions were: no change 65%, replacement 23% and stop 12%. High acceptance rate of suggestions (95%) was observed. In comparison to the previous year, DDD were reduced by 14% and costs by 34%. The software provided significant time-reduction with estimates : >95% to get the metrics (DDD or DOT), and >50% to target and perform ASP interventions.

Conclusions: Realtime alerts provided a powerful tool to our ASP, with significant reduction of antimicrobial consumption and cost reduction

INTRODUCTION

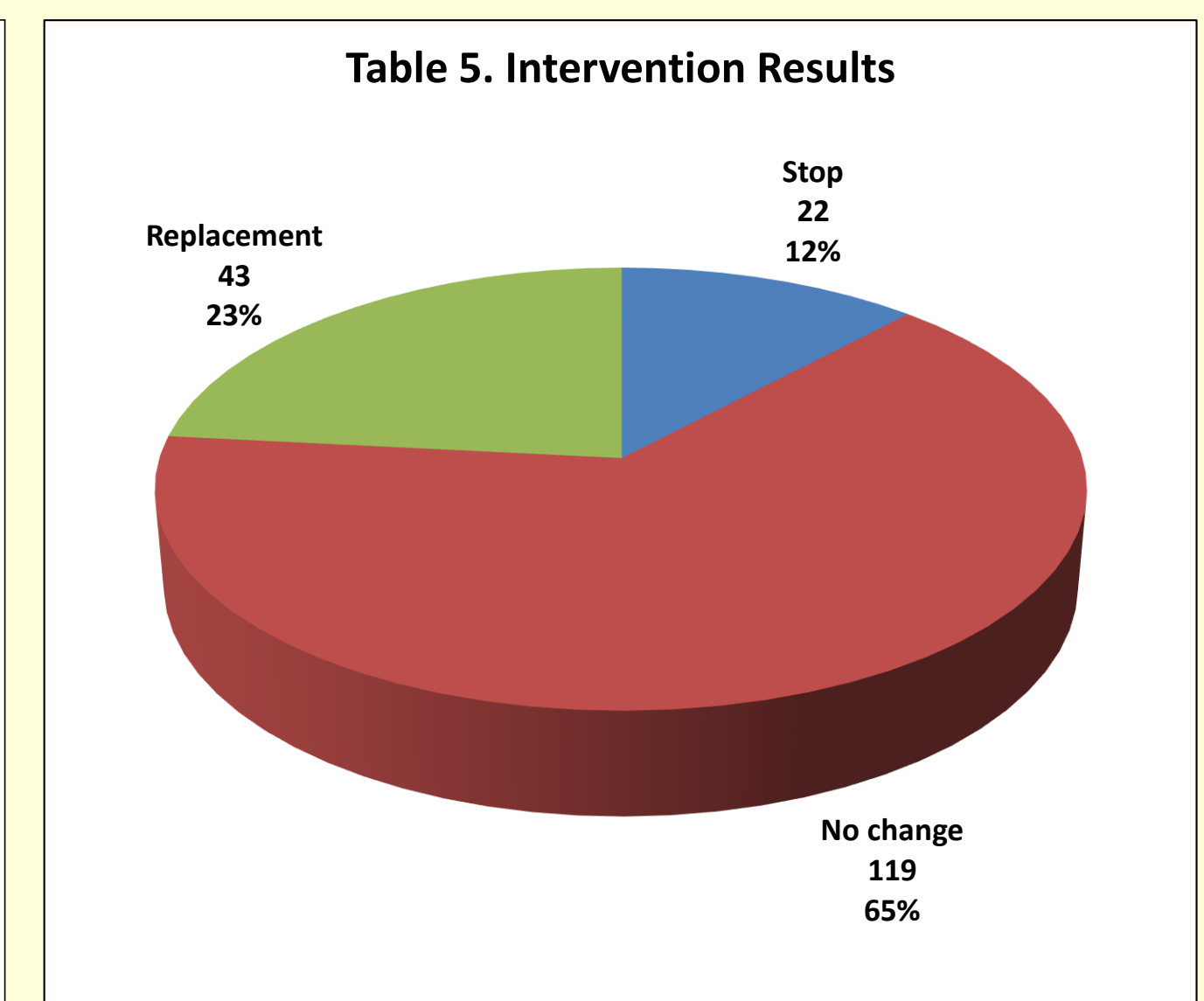
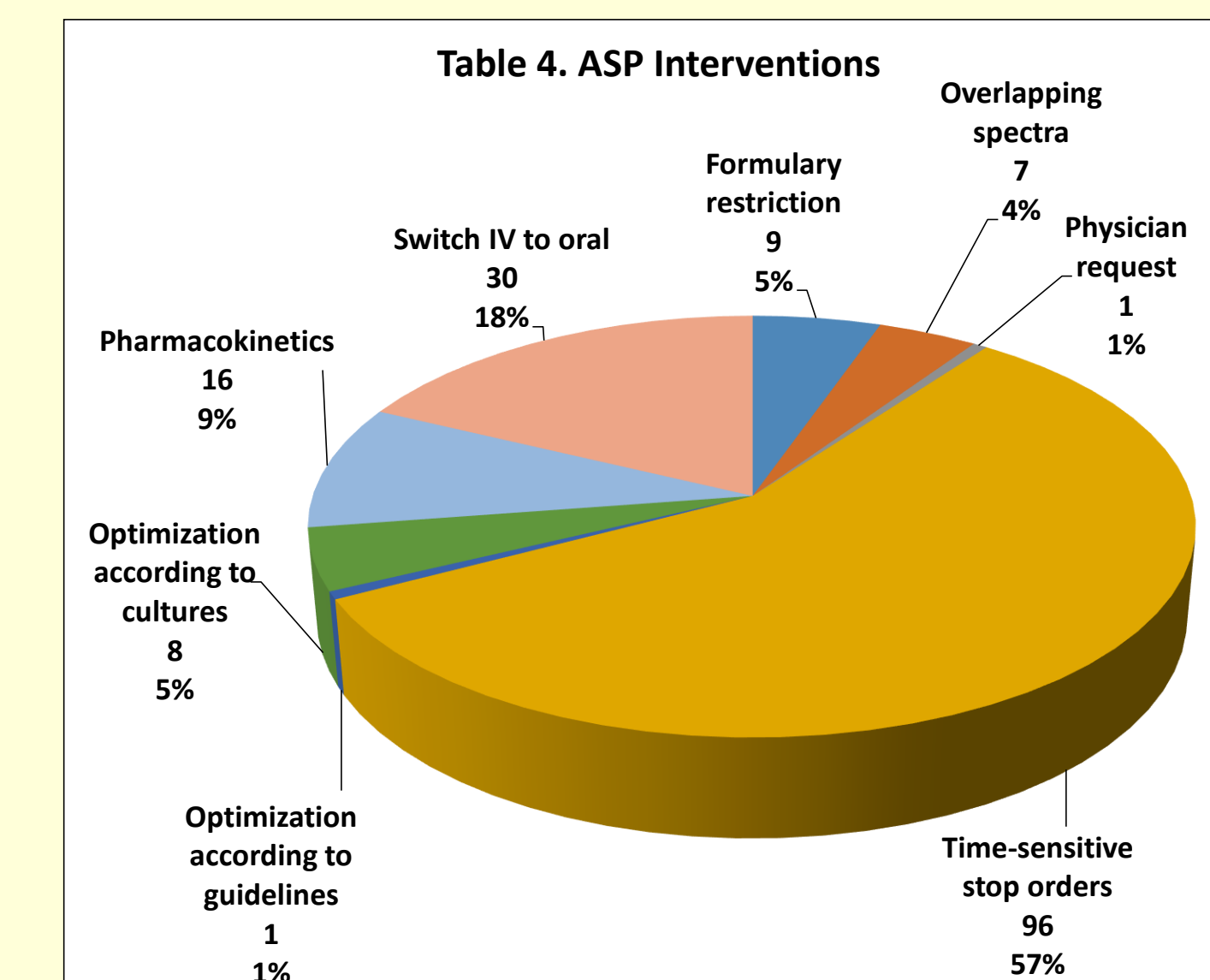
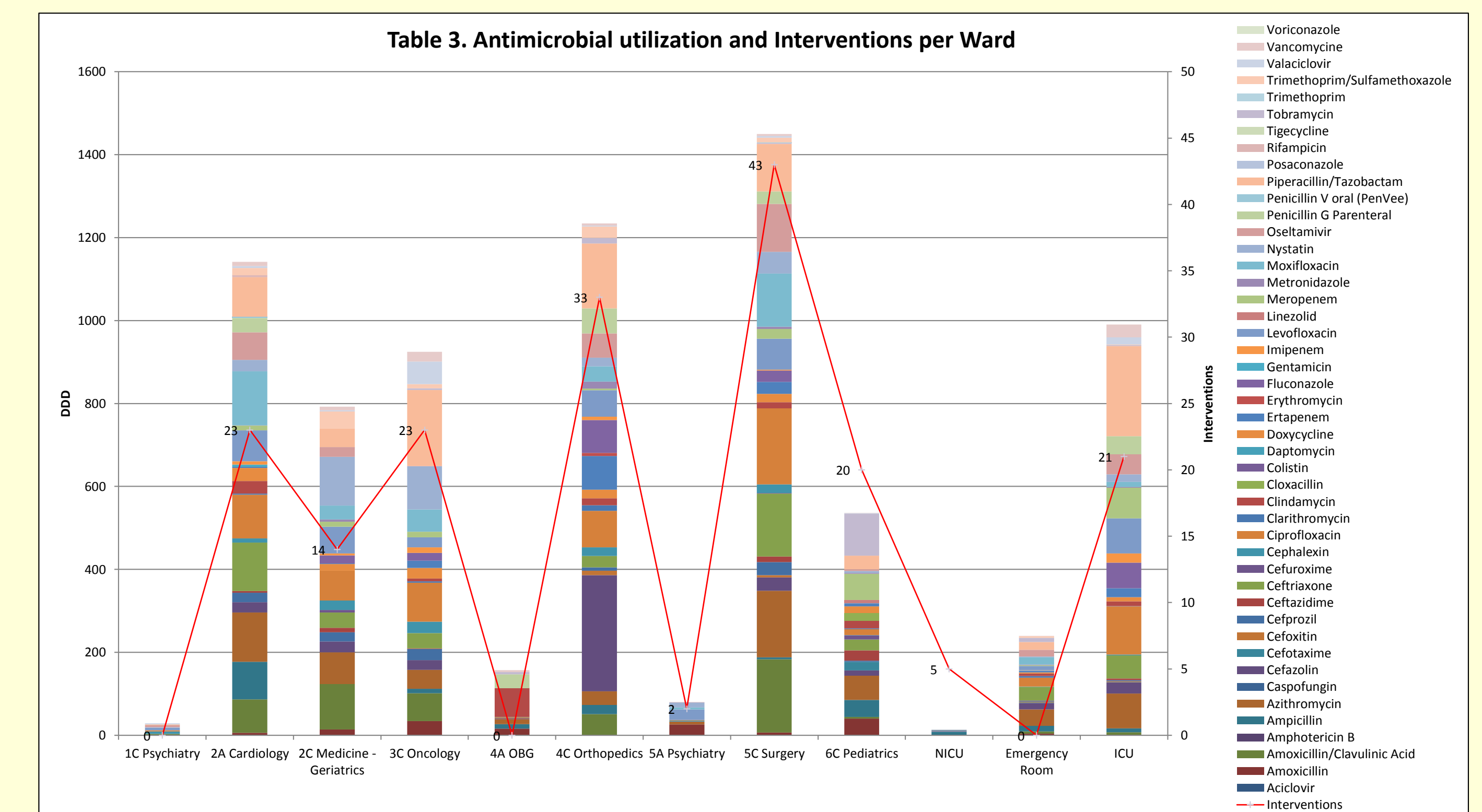
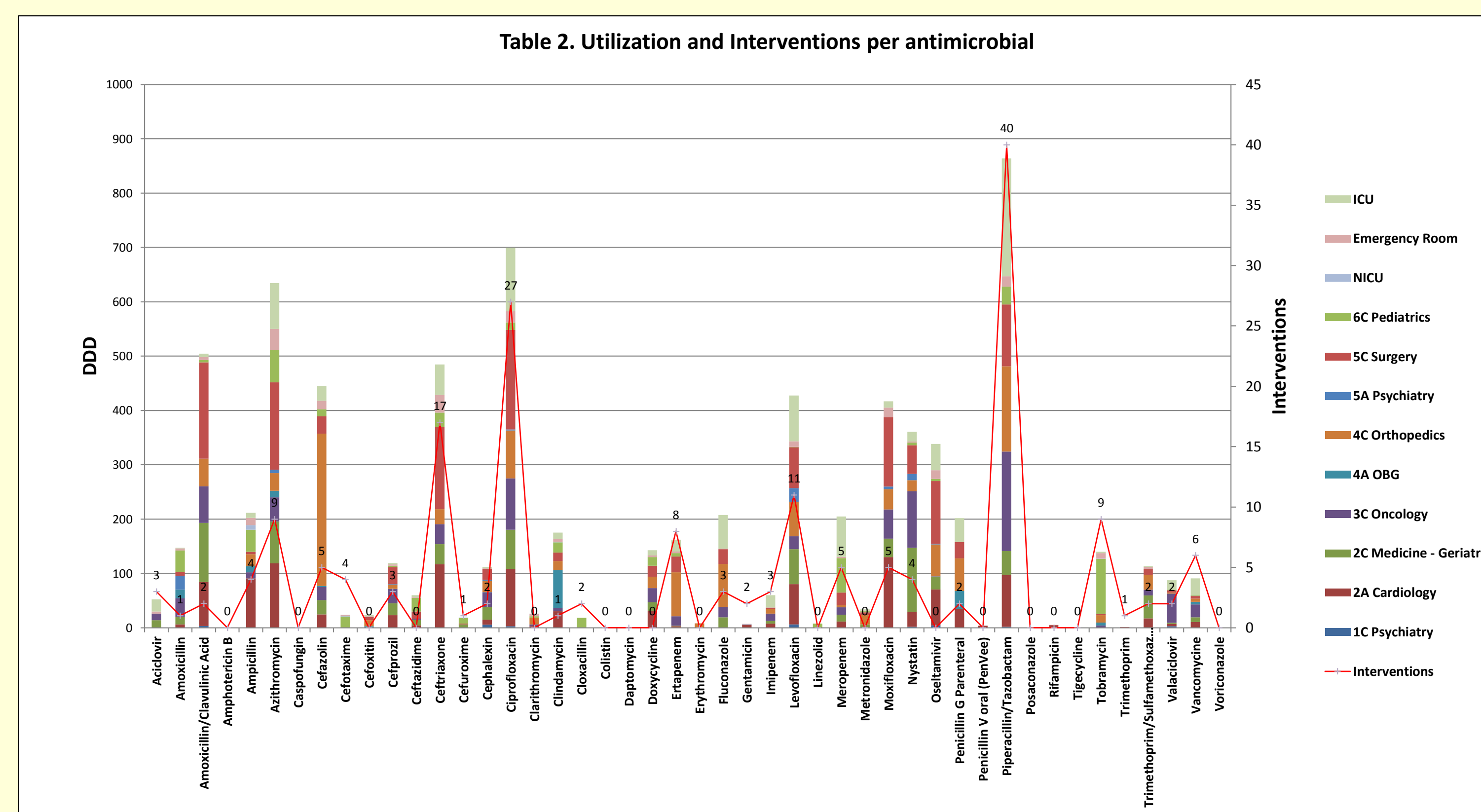
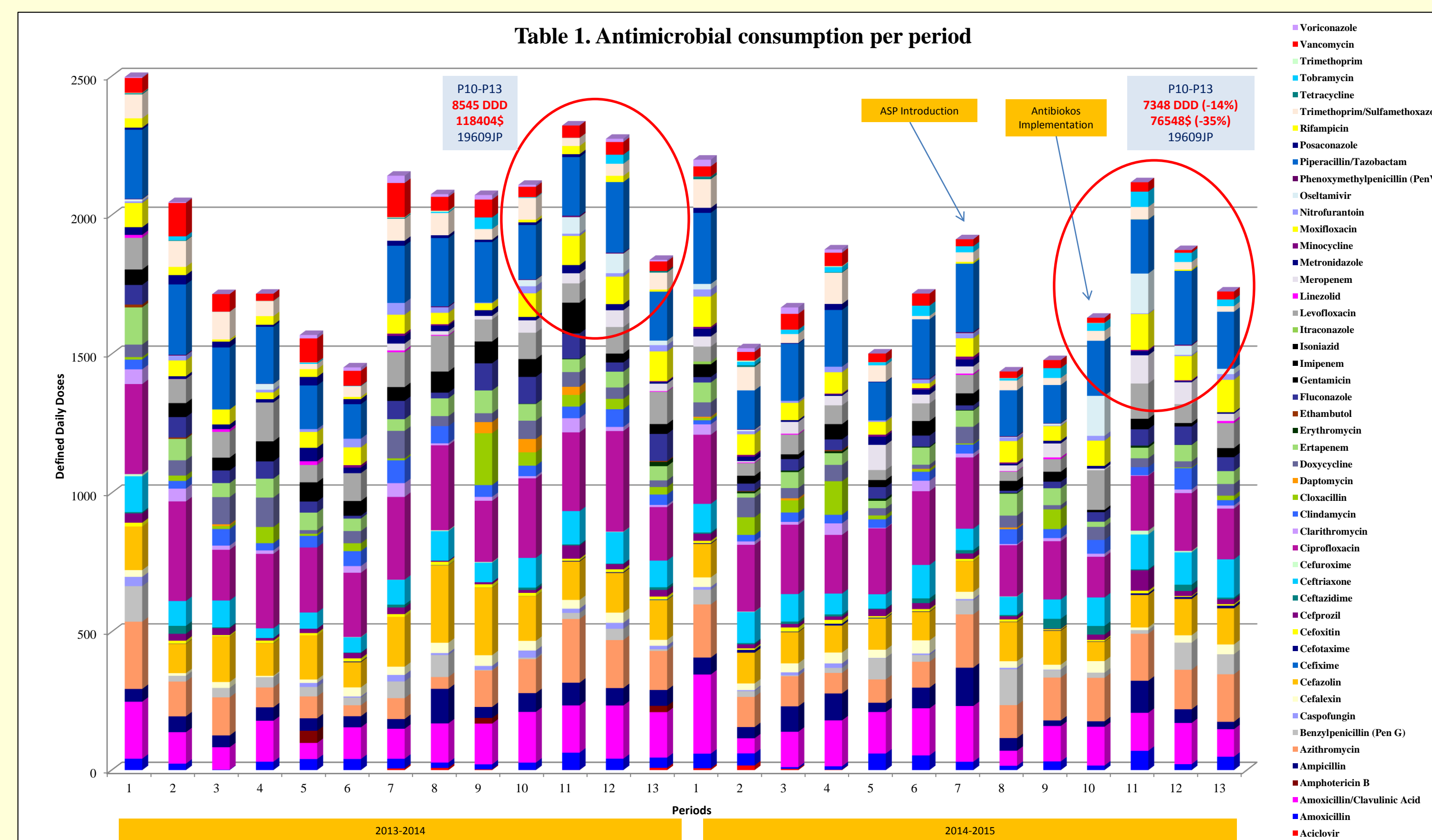
- An ASP program was implemented in our facility with a pharmacist 12 hours/week and Infectious Disease specialist 3 hours/week in September 2014.
- However, measurements of metrics was cumbersome, and it was difficult to record interventions.
- Information technology with artificial intelligence has the potential to provide useful realtime assistance to ASP teams.
- A pilot study was undertaken with the introduction of Antibiokos software (with realtime data from interfaces with Admission-Discharge-Transfer, Microbiology Lab and Pharmacy systems) in November 2014.
- Algorithms were designed to tract interventions opportunities.
- This retrospective study presents the results of the Pilot Study.

PATIENTS AND METHODS

- CSSSRN is a 230-beds acute-care regional hospital.
- Antibiokos (Nosotech) algorithms were designed and alerts included these core elements
 - time-sensitive stop orders (3 days for IV, 7 days for oral)
 - overlapping spectra
 - switch from intravenous to oral
 - drug optimization according to culture results
 - formulary restriction
 - pharmacokinetics (PK)
- Alerts could be turned off automatically if the antimicrobial changed. Also, one drug could trigger more than one alert.
- Interventions were recorded by the ASP team 2 to 4 times weekly.
- All inpatients with oral or parenteral antimicrobials, from December 12, 2015 (P10) to March 31, 2015 (P13) were eligible for ASP intervention targeted with Antibiokos.
- Comparison of antimicrobials utilization with previous year was performed, including metrics (DDD, DOT, costs).

RESULTS

- A total of 1004 alerts were generated by the software, in 686 patients.
- In comparison to previous year, Antimicrobials consumption (DDD) decreased by 14%, and costs by 34% (Table 1)
- A total of 184 interventions were performed in 135 patients (Tables 2, 3).
- Most interventions targeted Quinolones 23%, Pip-Tazo 21%, Cephalosporins 17%, Carbapenems 9%, Macrolides 5%, Antifungals 4%, Antivirals 3%.
- ASP interventions are shown in Table 4. One third of interventions resulted in replacement or discontinuation of therapy (Table 5)
- The software provided significant time-reduction with estimates : >95% to get the metrics (DDD or DOT), and >50% to target and perform ASP interventions.



DISCUSSION AND CONCLUSIONS

- Information technology greatly improved the efficiency of our ASP team, with friendly-user software.
- Realtime alerts provided a powerful tool to our ASP, with significant reduction of human resources, antimicrobial consumption and cost reduction.