

IRMA KORINTELI¹, HELEN PHAGA VA², KARAMAN PAGAVA¹

HOW HAS THE COVID-19 PANDEMIC AFFECTED ANTIBIOTIC PRESCRIBING IN HOSPITALIZED PATIENTS?

¹Tbilisi State Medical University, Child and Adolescent Medicine Department; ²Tbilisi State Medical University, Department of Epidemiology and BiostatisticsDoi: <https://doi.org/10.52340/jecm.2022.07.46>ირმა კორინთელი¹, ელენე ფაღავა², ყარამან ფაღავა¹

როგორ იმოქმედა COVID-19-ის პანდემიამ ჰოსპიტალიზირებულ პაციენტებში ანტიბიოტიკების გამოყენებაზე?

¹თსსუ ბავშვთა და მოზარდთა მედიცინის დეპარტამენტი, ²თსსუ ეპიდემიოლოგიისა და ბიოსტატისტიკის დეპარტამენტი

რეზიუმე

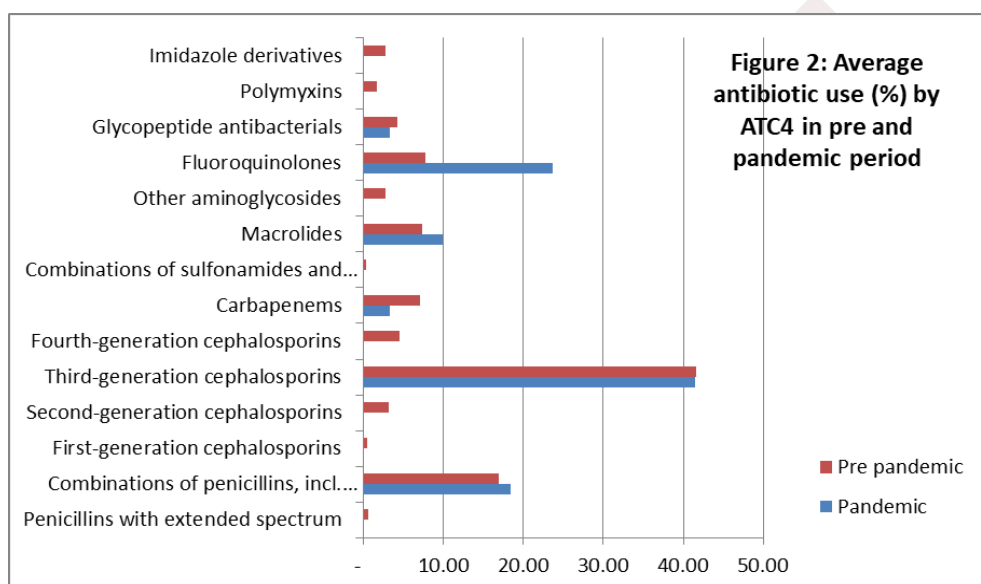
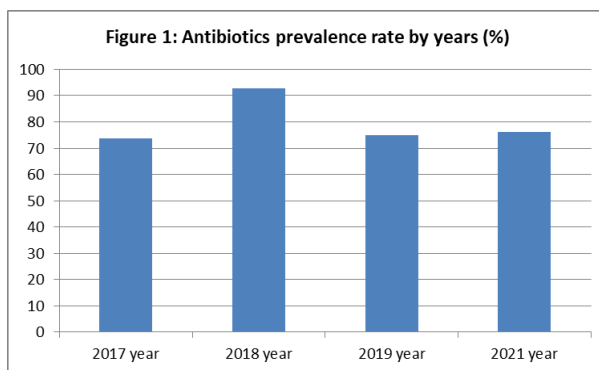
ბოლო 2 წელია, მსოფლიო ცხოვრობს COVID-19 პანდემიის პირობებში. შემთხვევების დიდმა რაოდენობამ, ჯანდაცვის სისტემების გადატვირთვამ და დაჩქარებული წესით შექმნილმა გაიდლაინებმა შესაძლებელია გამოიწვიოს ანტიბიოტიკების არამიზნობრივი გამოყენება. ჩვენ შევისწავლეთ ანტიბიოტიკების გამოყენება COVID-19-ით ინფიცირებულ პაციენტებში საქართველოს ჰოსპიტლებში. კვლევის შედეგად დადგინდა, რომ ანტიბიოტიკების გამოყენება პანდემიის დროს მნიშვნელოვნად არ შეიცვალა. უმეტესად გამოიყენება ფართო სპექტრის ცეფალოსპორინები, მაკროლიდების, ფტორქინოლონის ჯგუფის ანტიბიოტიკები. პოსტ პანდემიურ პერიოდში შესაძლებელია ვივარაუდოთ რომ გაიზრდება რეზისტენტობა ფართო სპექტრის ანტიბიოტიკების მიმართ.

Background: For the last 2 years, the world has been living in the COVID-19 pandemic. More than 623 million people have been infected since the beginning of the pandemic [1]. Unfortunately, during the pandemic there were cases of lethality and more than 6 million patients died [1]. The pandemic has led to an increased number of hospitalizations and overload of the medical system [2]. SARS-CoV-2 infection, like other viral infections, can be complicated with bacterial infections, which was one of the frequent causes of death. Guidelines for the treatment of COVID-19 patients were developed in a hurry given the emergency state of the pandemic. Therefore, a role of antibiotics in treatment was partly unclear [3]. High numbers of clinical cases, overburdened health care systems, and hastily created guidelines may lead to inappropriate use of antibiotics. In the future, this will become the reason for increase of antibacterial resistance in the world [4]. In the post-pandemic period, when the long-term consequences of infection with the coronavirus are still unclear, the rise of antibiotic resistance might complicate the health of the population [5].

Aim of our survey was to study antibiotic prescribing among the COVID-19 patients admitted to the hospitals in Georgia and to detect the main trends: 1) Total prevalence of antibiotic use in COVID-19 patients, 2) Identification of the most commonly used antibiotic groups, 3) Empirical and targeted treatment frequency, 4) Comparison of the mentioned data with similar pre-pandemic date.

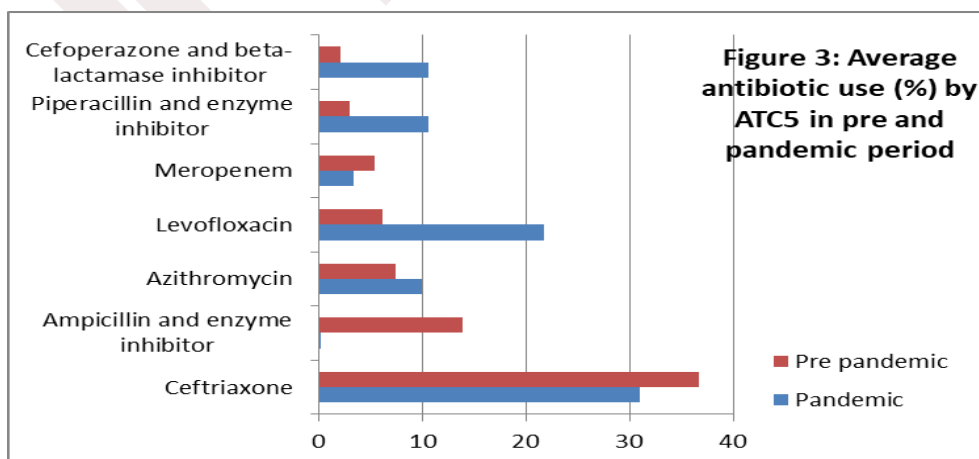
Methods and Materials: The Global Point Prevalence Survey was conducted in 19 Georgian hospitals in 2017-2021. The Survey included 782 inpatients receiving an antibiotic on the day of PPS within 82 wards. Data were analyzed according to the Global PPS methodology (www.global-pps.com). We compared 2017-2019 pre-pandemic data to 2020-2021 pandemic findings.

Results: Total average antibiotic prevalence rate in time of pandemic was 76.1%. In pre-pandemic data average antibiotic prevalence was 80.3%. The highest prevalence was observed in 2018 and it was 92.6%. The prevalence of antibiotics by year is shown in Figure 1.



We used the ATC classifier to identify the most commonly used antibiotic groups. According to the ATC Level 4 (ATC4) codes third generation cephalosporins were used mainly in time of pandemic and average rate was 41.4%. In addition to cephalosporins, 23.6% of patients were treated with fluoroquinolones, 18.4% with combinations of penicillin, incl. beta-lactamase inhibitors, 9.8% with macrolides and 3.2% and 3.2% with carbapenems and glycopeptide compounds, respectively. Comparison of the average percentage of antibiotic use in the pre- and pandemic periods by ATC4 codes is shown in Figure 2.

By the ATC Level 5 (ATC5) Top 5 the most frequently used antibiotics in time of pandemic were ceftriaxone - 30.9%, levofloxacin - 21.7%, piperacillin and enzyme inhibitor - 18.4%, cefoperazone and beta-lactamase inhibitor - 10.5%, azithromycin - 15.1% (See Fig.3).



The treatment process was mostly empirical under pandemic conditions and averaged 97.6%. In the pre-pandemic period, antibiotic treatment was empirical in 85.2% and targeted in 14.9% of cases.

Conclusion: The prevalence of antibiotic use did not change significantly during the pandemic, mostly broad spectrum third-generation cephalosporins were used. Compared to the pre-pandemic period, second and first generation cephalosporins were hardly used. An increased use of fluoroquinolone and macrolides during the pandemic is noticeable. From combinations of penicillin, incl. beta-lactamase inhibitors class practically basically changed situation. Ampicillin enzyme inhibitor has been completely replaced by piperacillin and enzyme inhibitor. One of the reasons for the increased use of the broad-spectrum antibiotics can be considered mainly empirical antibiotic therapy. Based on the results of our research, we can assume that in the post-pandemic period the resistance against the broad-spectrum antibiotics is expected to increase.

References:

1. World meter, COVID 19 pandemic statistic. <https://www.worldometers.info/coronavirus/>.
2. D Blumenthal, EJ Fowler, M Abrams, Covid-19 - Implications for the Health Care System, *N Engl J Med* 2020; 383:1483-1488
3. Michele Bartoletti, Ozlem Azap, Aleksandra Barac, ESCMID COVID-19 living guidelines: drug treatment and clinical management, *Clinical Microbiology and Infection*, Volume 28, Issue 2:222-238
4. Monnet Dominique L, Harbarth Stephan. Will coronavirus disease (COVID-19) have an impact on antimicrobial resistance? *Euro Surveill.* 2020;25(45): pii=2001886. <https://doi.org/10.2807/1560-7917.ES.2020.25.45.2001886>
5. Sara Tomczyk, Angelina Taylor, Allison Brown, Impact of the COVID-19 pandemic on the surveillance, prevention and control of antimicrobial resistance: a global survey, *Journal of Antimicrobial Chemotherapy*, Volume 76, Issue 11:3045–3058

IRMA KORINTELI¹, HELEN PHAGA VA², KARAMAN PAGAVA¹

HOW HAS THE COVID-19 PANDEMIC AFFECTED ANTIBIOTIC PRESCRIBING IN HOSPITALIZED PATIENTS?

¹Tbilisi State Medical University, Child and Adolescent Medicine Department; ²Tbilisi State Medical University, Department of Epidemiology and Biostatistics

SUMMARY

For the last 2 years, the world has been living in the COVID-19 pandemic. High numbers of clinical cases, overburdened health care systems, and hastily created guidelines may lead to inappropriate use of antibiotics. Aim of our survey was to study antibiotic prescribing among the COVID-19 patients admitted to the hospitals in Georgia and to detect the main trends. The prevalence of antibiotic use did not change significantly during the pandemic. mostly broad spectrum third-generation cephalosporins were used. Compared to the pre-pandemic period, second and first generation cephalosporins were hardly used. An increased use of fluoroquinolone and macrolides during the pandemic is noticeable. One of the reasons for the increased use of the broad-spectrum antibiotics can be considered mainly empirical antibiotic therapy. Based on the results of our research, we can assume that in the post-pandemic period the resistance against the broad-spectrum antibiotics is expected to increase.

Keywords: covid-19, antibiotic, hospitalized patient

