ANALYSIS OF THE OPERATION OF DIALYSIS CENTRES DURING THE COVID-19 PANDEMIC

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Abstract
Monitoring and assessment of the implementation of the National Program of Prevention, Treatment, Advancement and Control of Renal Insufficiency and Dialysis Development in the Republic of Serbia by 2020 has been implemented by the Institute of Public Health of Serbia “Dr Milan Jovanović Batut”. As the mode of dialysis centres operation changed after the COVID-19 epidemic was proclaimed, whereby some centres started operating in the Covid-regime, while Covid-negative patients from these centres were rerouted to the closest dialysis centres with available capacities, the need for monitoring and assessing the conditions for the implementation of the chronic dialysis program was further emphasized. The purpose of this paper is to provide a retrospective analysis of the conditions for the implementation of a chronic dialysis program in healthcare institutions within, and outside of the Network Plan during the COVID-19 outbreak in the period from the beginning of the epidemic to 1 October 2021. For the purposes of this study, a special questionnaire was designed, which was filled in by dialysis centres. The questionnaire consisted of three parts pertaining to: a) implementation of infection prevention measures at the dialysis centre, b) availability of personal protection equipment and disinfectants at the dialysis centres during the COVID-19 pandemic and c) conditions for the provision of dialysis services to patients positive for, or suspected of, COVID-19 infection. In the observed period, as much as 39% of the dialysis centres were designated to receive patients from other healthcare institutions, which called for additional efforts in organising and pursuing transmission containment. Implementation of transmission prevention measures in the dialysis centres was maintained at a very high level (between 95.5 and 100%). Only 10–15% of dialysis centres reported occasional shortages of individual items from the personal protective equipment or disinfectant categories. Almost one in five dialysis centres received a higher number of patients during the outbreak than was the case in the pre-pandemic period. In that sense, it was difficult to maintain the necessary physical distance in an already limited space, and to organize work in shifts as human resources were restricted. In addition to the general documents pertaining to infectious disease transmission prevention and containment, a protocol needed to be elaborated to organize the operation of dialysis centres in an outbreak such as the one caused by the SARS-CoV-2 virus.

 Keywords: dialysis, COVID-19, infection containment measures, protective equipment, organisation of operation
Увод


Непосредно након проглашења епидемије, министар здравља је низом документа послао обавештење здравственим установама о промени режима рада ди-јализних центара, од којих су неки започели са радом у ковид режиму, док су се ковид негативни пацијенти из тих центара преусмеравали на најближе дијализне центре. У ситуацији у којој имунокомпромитовани болесници, код којих су чешће присутне придружене болести као што су хипертензија, кардиоваскуларне болести и ди-јабетес [5], три пута недељно користе услуге дијализе у здравственој установи, спречавање, рано откривање и сузбијање болничких инфекција постало је изазов у време трајања епидемије изазване вирусом SARS-CoV-2.


Проблем рада дијализних центара након проглашења COVID-19 епидемије додатно је наглашена потреба за праћењем и проценом режима рада дијализних центара. Истакнуто је чинећи размену функције бубрега у трајању дужем од 90 дана [4].

Introduction

COVID-19 disease, which first appeared as the cause of severe respiratory infection in the Wuhan province in China in late 2019, was registered in the Republic of Serbia in March 2020. Only a day after the first confirmed case of COVID-19 infection from local transmission was registered in the Republic of Serbia, World Health Organisation (WHO) declared the COVID-19 pandemic caused by SARS-CoV-2 virus. Already on 15 March 2020, the president of the Republic of Serbia, chairman of the National Parliament and Prime Minister adopted the Decision on the proclamation of a state of emergency (“Official Gazette of the RS” no. 29/2020) [1], and on 19 March the Minister of Health issued the Order on the proclamation of a coronavirus epidemic in Serbia (“Official Gazette of the RS”, no. 37/2020) [2]. State of emergency was lifted on 6 May 2020 by the Decision on the termination of the state of emergency (“Official Gazette RS” no. 65/2020) [3].

Immediately after the declaration of the epidemic, the Minister of Health notified healthcare institutions, in a series of letters, on the changes in the regime of operation for the dialysis centres, of which some were to begin operating in COVID regime, while COVID-negative patients from these centres were to be referred to the nearest dialysis centres with capacities available to take over the provision of the chronic dialysis program in the new circumstances. The chronic dialysis program encompasses the treatment of patients with renal insufficiency with different renal function substitution methods for longer than 90 days [4].

In a situation in which immunocompromised patients, a group of which comorbidities such as hypertension, cardiovascular disease and diabetes [5] are more prevalent, use dialysis services three times per week in a healthcare institution, the prevention, early detection and containment of hospital infections became a challenge at the time of the SARS-CoV-2 virus outbreak.

Monitoring and assessment of the implementation of the National Program of Prevention, Treatment, Advancement and Control of Renal Insufficiency and Dialysis Development in the Republic of Serbia by 2020 has been implemented and coordinated by the Institute of Public Health of Serbia „Dr Milan Jovanović Batut“[6], based on collection, processing and analysis of health, statistical and other data or indicators. As the operation regime of the dialysis centres changed after the proclamation of the COVID-19 outbreak, the need for monitoring and assessing the conditions for the provision of chronic dialysis services was further emphasized. The purpose of this paper is to provide a retrospective analysis of the conditions for the implemen-
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The Institute of Public Health of Serbia „Dr Milan Jovanović Batut” updates the number of patients on dialysis, as part of the chronic dialysis program, twice per year as a part of its regular reporting obligations to the National Health Insurance Fund. This activity gave rise to a regular e-mail communication between the Institute and dialysis centres. This structure was used to distribute questionnaires, at the same time as the second regular annual update of the dialysis patients database. The questionnaire was sent to the e-mails of all dialysis centres providing haemodialysis services under the chronic program.

The questionnaire was usually filled out by a physician, head of the dialysis centre or head nurse. The questionnaire collection period overlapped with the period for updating the database of patients on chronic haemodialysis, from 1 to 20 October 2021. Together with the questionnaires, each dialysis centre was also sent an Excel workbook with an instruction, so that the questions from the questionnaire would be automatically updated into the database. The filled-in questionnaires (as not all dialysis centres were able to fill them in Excel), or the filled in Excel workbook were sent by e-mail to the predetermined e-mail address at the Institute of Public Health of Serbia „Dr Milan Jovanović Batut”. All answers were then uploaded to a single database at the Institute of Public Health of Serbia „Dr Milan Jovanović Batut”.

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Резултати

Истраживању су се одазвали сви дијализни центри (стопа одговора 100%) распоређени по следећим типовима здравствених установа из Плана мреже: 13 домаћих здравља, 37 општих болница (самосталних или у саставу здравствених центара), три клиничко-болничка центра, четири клиничка центра, три специјалне болнице и Војномедицинска академија (за део капацитета који уговара са Републичким фондом за здравствено осигурање). Поред ових установа, истраживању су се одазвале и установе које су ван Плана мреже здравствених установа, а са којима Републички фонд за здравствено осигурање уговара капацитете за пружање услуга хемодијализе како би се задовољиле потребе пацијената за овом врстом здравствене заштите. Ради се о четири установе, од којих једна у Београду има две одвојене организационе јединице, те је из ових установа добијено укупно пет попуњених упитника. На овај начин посматрано, у истраживању смо имали укупно 67 јединица посматрања (картограм 1). Институт за здравствену заштиту деце и омладине Војводине није учествовао у истраживању, с обзиром да пружа услуге исključivo перитонеалне дијализе.

Картограм 1. Мрежа дијализних центара који пружају хронични програм хемодијализе у Републици Србији

Results

All dialysis centres responded to the study (response rate 100%), and were classified by the following types of healthcare institutions from the Network Plan: 13 primary healthcare facilities, 37 general hospitals (individual or parts of larger health centres), three clinical-hospital centres, four clinical centres, three special hospitals and the Military Medical Academy (for the share of its capacities it has allocated according to the Agreement with the National Health Insurance Fund). In addition to these institutions, institutions outside of the Healthcare Institutions Network Plan with which the National Health Insurance Fund had agreed on haemodialysis services provision to meet the needs of patients for this type of service, also responded to the survey. These are four institutions, of which one institution in Belgrade has two separate organisational units, which yielded a total of five completed questionnaires from these institutions. This means that there was a total of 67 observation units in our study (Figure 1). The Institute of Healthcare for Children and Youth of Vojvodina did not take part in the survey, since they provide exclusively the service of peritoneal dialysis.

Figure 1. Network of dialysis centres providing chronic dialysis services in the Republic of Serbia
Само два дијализна центра, и то два клинично-болничка центра, скоро све време на које се истраживање однosiло, од почетка епидемије до 1. октобра 2021. године, била су одређена да примају искушчиво ковид позитивне пацијенте на хроничном програму хемодијализе.

Око 39% дијализних центара је било одређено да током пандемије прими пацијенте из других дијализних центара. Скоро једна петина дијализних центара (18,8%) је пријавила да је у новонасталим условима пружала услуге већем броју пацијената на хроничном програму дијализе него пре епидемије.

Примена мера превенције ширења инфекције током COVID-19 епидемије у дијализним центrima

У табели 1 приказана је учењапост примене мера превенције ширења инфекције у дијализним центrimа. У свим дијализним центrimа запослени су спроводили хигијену руку пре и после процедуре хемодијализе, користећи опрему и средства у одговарајућим просторијама и носили рукавице за једнократну употребу, особље које започиње и прекида процедуру хемодијализе носило је заштитне маске и постељина се мењала за сваког пацијента.

Такође се у свим дијализним центrimа спроводила деzinфекција, одржавање и преглед машина за хемодијализу према упутству за употребу. Нешто ређе пацијентима је проверавана температура и симптоми како би се потврдило да не постоји сумња на инфекцију пред улaska у просторију за дијализу, као и посматрање пацијената са сумњом на инфекцију пре улaska у просторију за дијализу, односно предузимање мера за спречавање ширења инфекције. У истом проценту дијализних центrimа особље са симптомима инфекције, попут гроzнице и дијареје, било је прегледано од стране лекара, како би се утврдило да ли могу да раде пре него што уђу у дијализни центар. И на крају, у преко 95% дијализних центrimа медицински инструменти за хемодијализу су се стерилизисали или су били за једнократну употребу. Комисија за заштиту од болничких инфекција, која по Закону о здравственој заштити постоји у свакој здравственој установи, регуларно се састајала са запосленима из различитих области, а предмети које пацијенти и особље често додирују (на пример, кваке) пребрисавани су или су дезинфиковани неколико пута дневно.

Иako ниједним стручно-методолошким упутством или правилником није било прописано, у више од половине дијализних центrimа запослени који започињу и

Only two dialysis centres, both clinical-hospital centres, were designated to receive exclusively covid-positive patients on chronic haemodialysis throughout the entire study period, from the beginning of the outbreak to 1 October 2021.

About 39% of dialysis centres were designated to receive patients from other dialysis centres during the pandemic. Almost one fifth of dialysis centres (18%) reported providing services to a larger number of patients on long-term haemodialysis in the new circumstances than in the pre-pandemic period.

Implementation of transmission prevention measures during the COVID-19 outbreak at dialysis centres

Table 1 shows the frequency of the implementation of transmission prevention measures in the dialysis centres. In all dialysis centres, the staff performed hand hygiene procedures prior to and following the haemodialysis procedures, using the appropriate equipment and agents in the appropriate facilities, and wore disposable gloves. Staff members initiating and terminating the haemodialysis procedures wore protective masks, and bed linens were changed for each patient.

In addition, disinfection, maintenance and inspection of haemodialysis machines were performed in line with the manufacturer’s instructions in all dialysis centres. Body temperature and symptoms checks, to verify that there was no suspicion of infection prior to entry into the dialysis room, as well as observation of patients with suspected infections prior to entry into the dialysis room and implementation of transmission prevention measures were somewhat less frequent. The same percentage of dialysis centres reported that staff showing signs of infection, such as fever and diarrhoea, were examined by physicians to check if they were fit to work prior to entering the dialysis centre. Finally, over 95% of dialysis centres sterilized medical instruments for haemodialysis, or used single-use sets. Commission for the prevention of nosocomial infections, which exists in each health institution in line with the Law on Healthcare, met regularly with staff members working in different fields, and items that were frequently touched by patients and staff (e.g., doorknobs) were wiped or disinfected several times per day.

Although it was not prescribed in the expert methodological instruction or in the rulebook, more than one half of dialysis centres reported that their employees starting and terminating the haemodialysis procedures wore single-use, impermeable or plastic aprons or coats (56%), or safety goggles and face shields (67.2%).
завршавају процедуру хемодијализе носили су једно-
кратне, непропусне или пластичне кецеље или манти-
ле (56%), односно заштитне наочаре или штитнике за
лице (67,2%).

Табела 1. Примена мера превенције ширења инфекци-
је у дијализним центима

<table>
<thead>
<tr>
<th>Мере превенције ширења инфекције</th>
<th>Учесталост у %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Медицински инструменти за хемодијализу се стерилишу или су за једнократну употребу за сваког пацијентана. Medical instruments for haemodialysis are sterilized, or are single use, for each patient.</td>
<td>Увек / Always – 95,5</td>
</tr>
<tr>
<td>Запослени спроводе хигијену руку пре и после процедура хемодијализе, користећи опрему и средствстава у одговарајућим просторијама. Employees perform hand hygiene procedures prior to and following dialysis procedures, using the appropriate equipment and formulations in the appropriate facilities.</td>
<td>Увек / Always – 100</td>
</tr>
<tr>
<td>Дезинфекција, одржавање и преглед машина за хемодијализу спроводи се према Упутству за употребу. Disinfection, maintenance and inspection of haemodialysis machines is performed in line with the Instructions for Use.</td>
<td>Увек / Always – 100</td>
</tr>
<tr>
<td>У здравственој установи постоји Комисија за заштиту од болничких инфекција и састаје се регулярно са запосленима из различитих области. Healthcare institution has a Commission for the prevention of nosocomial infections which meets regularly with staff from different fields.</td>
<td>Увек / Always – 95,5</td>
</tr>
<tr>
<td>Особље са симптомима инфекције, попут грознице и дијареје, прегледа лекар како би утврдио да ли могу да раде пре него што уђу у дијализни центар. Staff showing signs of infection, such as fever and diarrhoea, are examined by physicians to check if they are fit to work prior to entering the dialysis centre.</td>
<td>Увек / Always – 97</td>
</tr>
<tr>
<td>Запослени пажљиво одржавају хигијену руку пре и после процедура и носе рукавице за једнократну употребу. Staff perform hand hygiene procedures carefully, prior to and following medical procedures, and wear single-use gloves.</td>
<td>Увек / Always – 100</td>
</tr>
<tr>
<td>Особље које започиње и прекида процедуру хемодијализе носи заштитне маске. Staff initiating and terminating haemodialysis wears face masks.</td>
<td>Увек / Always – 100</td>
</tr>
<tr>
<td>Запослени који започињу и завршавају процедуру хемодијализе носе једнократне, непропусне или пластичне кецеље или мантиле. Staff initiating and terminating haemodialysis wears single-use, impermeable or plastic aprons or coats.</td>
<td>Скоро увек / Almost always – 21,2 Никад / Never – 22,7</td>
</tr>
<tr>
<td>Особље које започиње и прекида процедуру хемодијализе носи заштитне наочаре или штитнике за лице. Staff initiating and terminating haemodialysis wears goggles or face shields.</td>
<td>Скоро увек / Almost always – 67,2 Никад / Never – 25,4</td>
</tr>
<tr>
<td>Пацијентима се проверава температура и симптоми како би се потврдило да не постоји сумња на инфекцију пре уласка у просторију за дијализу. Patients are checked for fever and symptoms to verify that there is no suspicion of infection prior to entering the dialysis room.</td>
<td>Увек / Always – 97</td>
</tr>
<tr>
<td>Пацијенти са сумњом на инфекцију се посматрају пре уласка у просторију за дијализу, и према њима се предузимају мере за спречавање ширења инфекције. Patients suspected of being infected are observed prior to entering the dialysis room, and are subjected to infection transmission prevention measures.</td>
<td>Увек / Always – 97</td>
</tr>
<tr>
<td>Постељина се мења за сваког пацијентана. Bed linens are changed for each patient.</td>
<td>Увек / Always – 100</td>
</tr>
<tr>
<td>Предмети које пацијенти и особље често додирују (на пример, кваке) бришу се или дезинфикују неколико пута дневно. Items that are frequently touched by patients and staff (e.g., doorknobs) are wiped or disinfected several times per day.</td>
<td>Увек / Always – 95,5</td>
</tr>
</tbody>
</table>

АНАЛИЗА ОРГАНИЗАЦИЈЕ РАДА ДИЈАЛИЗНИХ ЦЕНТАРА ТОКОМ ЕПИДЕМИЈЕ COVID-19 ИНФЕКЦИЈЕ У СРБИЈИ
Драгана Атанасијевић

Снајдевеност дијализног центра током COVID-19 епидењи е заштитном опремом и дезинфекцијенси-
ма
На основу добијених резултата може се закључити да је опремљеност личном заштитном опремом у време епидењи у већини дијализних центара била задово-

Availability of protective equipment and disinfectants at the dialysis centres during the COVID-19 pandemic
Based on the results obtained, it can be concluded that the availability of personal protective equipment at the time of the pandemic was satisfactory in the majority of dialysis centres. Namely, 95.5% of dialysis centres reported
that there were no shortages of disposable gloves, 97% reported the same for alcohol-based hand disinfectants and 98.5% for sodium hypochlorite or other surface disinfectants. Occasional shortages of disposable face masks, goggles or face shields were reported by 10.5% of dialysis centres in the observed period, while 15% reported intermittent shortages of single-use aprons or coats.

Conditions for the provision of haemodialysis services during the COVID-19 epidemic at dialysis centres

Since the beginning of the outbreak, the expert recommendation has been to keep a physical distance of at least two meters between persons, especially indoors, as one of the transmission prevention measures. It was thus of special importance to get data on whether this was possible in the facilities available to the dialysis centres. The results show that a distance exceeding one meter between dialysis beds, where patients would spend several hours per day, could only be provided in 38.8% of the dialysis centres. In a small number of dialysis centres (4.5%), the distance was below 70 cm.

Of the measures implemented when haemodialysis was to be provided to a patient with suspected or confirmed COVID-19 infection (Table 2), the most common approach used was to segregate patients in shifts, i.e., to segregate staff working with each group of patients, followed by segregation by separate rooms. Several dialysis centres reported segregating suspected and positive dialysis patients into separate facilities, but this was difficult to ensure due to specific technical requirements regarding the presence of reverse osmosis devices.

Table 2. Measures for providing dialysis to patients with suspected/confirmed COVID-19 infections

<table>
<thead>
<tr>
<th>Мера / Measure</th>
<th>% дијализних центара који су спровели меру</th>
</tr>
</thead>
<tbody>
<tr>
<td>Раздвајање у посебне просторије</td>
<td>82</td>
</tr>
<tr>
<td>Преграђивање заједничког простора</td>
<td>41.8</td>
</tr>
<tr>
<td>Раздвајање по сменама</td>
<td>85.1</td>
</tr>
<tr>
<td>Одвајање особља које ради са суспектним/потврђеним случајевима COVID-19 инфекције</td>
<td>85.1</td>
</tr>
</tbody>
</table>
The analysis encompassed all dialysis centres with in and outside of the Network Plan during the COVID-19 outbreak, in the period from the beginning of the epidemic to 1 October 2021. The analysis encompassed all dialysis centres within and outside of the Network Plan, which were providing haemodialysis services to patients on long-term haemodialysis in the Republic of Serbia.

Considering that, in addition to the general prevention measures prescribed by the legislation (Law on the Protection of the Population from Infectious Diseases [8] and the Regulation on the prevention, early detection and containment of nosocomial infections [9]), the Regulation on the measures for prevention and containment of the infectious disease COVID-19 [10] was also adopted during the COVID-19 outbreak, we focused on assessing the impact of implementing the existing legislation on the operation and organisation of dialysis centres in the conditions of the COVID outbreak, bearing in mind that none of the aforementioned legislative acts pertains specifically to the organisation and particular needs of dialysis centres.

In the observed period, as many as 39% of the dialysis centres were designated to receive patients from other healthcare institutions, which called for additional efforts in organising and keeping up the fight against transmission. Almost one in five dialysis centres (18.8%) received a higher number of patients during the outbreak than was the case in the pre-pandemic period. In that sense, it was difficult to provide the prescribed physical distancing in a space that had been limited even in the pre-pandemic period.

Only two dialysis centres (both outside of the Network Plan) were unable to provide PCR or rapid antigen testing. More than one half of the dialysis centres (61.2%) registered horizontal transmission among staff, among staff and patients, or among patients. In 41.7% of dialysis centres it was impossible to implement at least one of the segregation measures, whether pertaining to patients or staff working with patients with suspected/confirmed COVID-19 infections.

**Discussion**

Institute of Public Health of Serbia „Dr Milan Jovanović Batut“, in line with its competencies, conducted the first national analysis of the conditions for the implementation of a chronic dialysis program in the centres within, and outside of the Network Plan during the COVID-19 outbreak, in the period from the beginning of the epidemic to 1 October 2021. The analysis encompassed all dialysis centres within and outside of the Network Plan, which were providing haemodialysis services to patients on long-term haemodialysis in the Republic of Serbia.

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Only nine of 67 dialysis centres (13.4%) used the space provided for additional comments, as supplements to the answers in the questionnaire. The most frequent comment (30%) noted group transportation as the place where the patients were most commonly exposed to infection and where transmission was the most likely.

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постићи потребно физично дистанцирање у и онако ограниченом простору, са ограниченим бројем високо специфичног профила запослених, што је додатно представљало препредак за превенцију инфекција и примену мера контроле [11].

Међутим, чак и у таквим условима, примена мера превенције ширања инфекције у дијализним центрама се кретала на завидно високом нивоу (између 95,5% и 100%) у поређењу са резултатима добијеним сличним истраживањима. Примера ради у Јапану [7], ниједна од поменутих мера се није примењивала у свим дијализним центрама, па чак ни ношење маске приликом укључивања и изкључивања пацијената на и с апа рата за дијализу (98,2%) што је, према том истраживању, била једно и најчешће примењивана мера [7]. Такође, интересантно је да је у свега 34% дијализних центара мењана постељина иза сваког пацијената [7], чак и у ковид условима, иако је у тој земљи издат посебан Водич за спровођење мера за превенцију ши рења инфекције који је експлицитно наводио мере и међу њима и промену постељине, док је у Републици Србији тај проценат 100%. Али, оно што и сами аутори овог истраживања у Јапану напомињу, исти Водич наводи „да пракса замене постељина може проузроковати организме инфекцију која је експлицитно наводио мере и међу њима и промену постељине, док је у Републици Србији тај проценат 100%. Али, оно што и сами аутори овог истраживања у Јапану напомињу, исти Водич наводи „да пракса замене постељина може проузроковати организме инфекцију која је експлицитно наводио мере и међу њима и промену постељине, док је у Републици Србији тај проценат 100%. Али, оно што и сами аутори овог истраживања у Јапану напомињу, исти Водич наводи „да пракса замене постељина може проузроковати организме инфекцију која је експлицитно наводио мере и међу њима и промену постељине, док је у Републици Србији тај проценат 100%. Али, оно што и сами аутори овог истраживања у Јапану напомињу, исти Водич наводи „да пракса замене постељина може проузроковати организме инфекцију која је експлицитно наводио мере и међу њима и промену постељине, док је у Републици Србији тај проценат 100%. Али, оно што и сами аутори овог истраживања у Јапану напомињу, исти Водич наводи „да пракса замене постељина може проузроковати организме инфекцију која је експлицитно наводио мере и међу њима и промену постељине, док је у Републици Србији тај проценат 100%. Али, оно што и сами аутори овог истраживања у Јапану напомињу, исти Водич наводи „да пракса замене постељина може проузроковати организме инфекцију која је експлицитно наводио мере и међу њима и промену постељине, док је у Републици Србији тај проценат 100%. Али, оно што и сами аутори овог истраживања у Јапану напомињу, исти Водич наводи „да пракса замене постељина може проузроковати организме инфекцију која је експлицитно наводио мере и међу њима и промену постељине, док је у Републици Србији тај проценат 100%. Али, оно што и сами аутори овог истраживања у Јапану напомињу, исти Водич наводи „да пракса замене постељина може проузроковати организме инфекцију која је експлицитно наводио мере и међу њима и промену постељине, док је у Републици Србији тај проценат 100%. Али, оно што и сами аутори овог истраживања у Јапану напомињу, исти Водич наводи „да пракса замене постељина може проузроковати организме инфекцију која је експлицитно наводио мере и међу њима и промену постељине, док је у Републици Србији тај проценат 100%. Али, оно што и сами аутори овог истраживања у Јапану напомињу, исти Водич наводи „да пракса замене постељина може проузроковати организме инфекцију ко}

However, even in such conditions, implementation of the transmission prevention measures at dialysis centres was at quite a high level (between 95.5 and 100%), compared to the results obtained from similar studies. For example, in Japan [7], none of the aforementioned measures were implemented in all dialysis centres, not even wearing face masks when initiating and terminating the dialysis procedure (98.2%), which was, according to that study, the most frequently implemented measure [7]. It is also interesting that only 34% of dialysis centres changed bed linens for each patient [7], even in COVID circumstances, despite the fact that a special Guideline was issued in Japan for the implementation of infection transmission prevention measures, explicitly prescribing measures including the changing of bed linens; in the Republic of Serbia, this percentage was 100%. However, like the authors of the Japan study note themselves, the same Guideline also states that “the practice of changing linens can cause the dispersal of dust in the air, which could contaminate the surroundings or be inhaled by the patients” [7], which again points to the fact that recommendations need to be evidence-based, primarily, and then also clear and unambiguous in order for institutions to adhere to them consistently.

In our circumstances, a similar thing can be observed for wearing disposable aprons/coats, or goggles/face shields. These are two measures that, since they had not been specifically prescribed in any document, were applied depending on the situation, i.e., depending on the individual assessment.

According to the data acquired, it could be said that staff at the dialysis centres had at their disposal adequate quantities of personal protective equipment and disinfectants, except for occasional shortages registered in only 10-15% of the dialysis centres.

What the results of similar studies show is that the implementation of individual protective measures is insufficient, but that only combined with active contact tracing [12], virological screening [13] and isolation measures [14], they can yield satisfactory results in preventing horizontal transmission. Our study showed similar results. If we add the fact that, despite the infection transmission prevention measures being applied in almost all dialysis centres and no shortages of personal protective equipment and disinfectants being reported, two thirds of the dialysis centres were unable to provide the necessary conditions to allow for the prescribed physical distancing measures between
the dialysis beds (distance equal to or less than 1 m), and the fact that two fifths of the dialysis centres were unable to implement at least one of the segregation measures, whether of patients or of staff working with patients with suspected or confirmed COVID-19 infection, it is no wonder that as many as two thirds of dialysis centres reported horizontal transmission.

It’s important to note here, as a limitation of our study, that an aspect that is very important for infection transmission was not taken into consideration (group transport, where some patients spend even several hours a day together).

In that sense, the comments from individual dialysis centres that emphasized the transport of dialysis patients to and from the dialysis centre as the place most likely to lead to transmission are very important.

**Conclusion**

In almost all dialysis centres within and outside of the Network Plan, which provided haemodialysis services to patients on long-term dialysis, infection transmission prevention measures have been applied since the beginning of the COVID-19 epidemic, in line with the current legislation.

Regardless of the newly arising circumstances, more than nine tenths of the dialysis centres in the aforementioned period reported no shortages of personal protective equipment, alcohol-based hand disinfectant or surface disinfectants.

What the dialysis centres were least able to influence, as their spatial capacities and staff were limited, were the conditions for the provision of dialysis and implementation of measures for the dialysis of patients with suspected/confirmed COVID-19 infections, i.e., providing appropriate isolation of such patients. There is a need for additional research on the possibilities of reorganizing capacities in emergency situations (highly infectious disease outbreak, redistribution of patients to other dialysis centres and reception of an additional number of patients), such as the COVID-19 outbreak. Additional research that would be based on the number of cases and deaths would identify a possible correlation of risk from infection and conditions for dialysis, including group transport to and from the dialysis centre.

Bearing in mind the specificities of dialysis provision, we believe that, in addition to the general documents pertaining to infectious disease transmission prevention and containment, a protocol needs to be elaborated to organize the operation of dialysis centres in an outbreak such as the one caused by the SARS-CoV-2 virus.
С обзиром на специфичности пружања услуга дијализе, мишљења смо да је, поред општих аката која се односе на спречавање ширења и сузбијање заразних болести, потребно сачинити и протокол за организацију рада дијализних центара у условима постојања епидемије попут ове изазоване вирусом SARS-CoV-2.

Захвалност
Институт за јавно здравље Србије „Др Милан Јовановић Батут“ веома цени напор свих учесника у истраживању који су, у изузетно тешким условима рада током почетка петог таласа епидемије, уложили напор да одговоре и доставе тражене податке.

Финансирање
За спровођење овог истраживања нису ангажована доцни средства, већ је исто спроведено кроз редовне активности Института за јавно здравље Србије „Др Милан Јовановић Батут“.

Acknowledgment
The Institute of Public Health of Serbia „Dr Milan Jovanović Batut“ highly appreciates the effort of all participants in our research who have, in very difficult working conditions of the fifth wave of the pandemic, put in the effort to respond to our questions and submit the requested data.

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Литература / References


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