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Empirical Paper

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Impact of policy regulations on the functioning of hospitals in Poland during the COVID-19 pandemic: a qualitative analysis

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Abstract: During the state of epidemic in Poland in 2020, all facilities providing medical services were subject to constant reorganization. Legal changes, which were introduced at a very rapid pace, did not allow the standardization of the work of the health service. Therefore, the assessment of the practical effects of the introduced legal measures is challenging due to the lack of fixed benchmarks. Accordingly, the research method used in the article is a survey conducted among employees of the Voivodeship Specialist Hospital in December 2020, in which 165 employees from different wards participated. For this purpose, the article presents the detailed description of policy regulations related to healthcare management introduced in Poland in 2020. Combining legal research and qualitative data allowed general conclusions to be drawn with regard to the quality assessment of the implemented policy measures from the perspective of healthcare professionals.

Keywords: COVID-19 pandemic, hospitals, legal regulations, management processes
JEL Classification: K39, I11, I12, I15, I18

1 Introduction

Medical logistics is an area that is indispensable to society as a whole [He and Liu, 2015]. Its correct functioning, to a large extent, depends on management decisions, but this does not mean that the system is autonomous [Rossetti et al., 2012] The main objectives of medical logistics are to provide treatment services at the highest possible level, minimize waiting times for services, and reduce treatment costs [Turris et al., 2017; Zhai and Li, 2017]. It is not difficult to see that in Poland [Malesza and Kaczmarek, 2021], the system is overloaded; additionally, it has been observed that the efficiency of the services provided in 2020 was significantly undermined [Debowska et al., 2020].

The problem of the spread of Coronavirus disease 2019 (COVID-19) that emerged in 2019 has produced adverse consequences globally [Garbey et al., 2020; Muldoon et al., 2021]. The rapidity with which the

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pandemic spread was unstoppable and all decisions taken had a huge impact on further developments [Sartini et al., 2021]. The overriding objective for all countries became to extinguish the outbreak and diagnose it as soon as possible, while at the same time improving the functioning of many economic or social sectors. However, the exigent situation imposed by the rapid rate of spread of COVID-19 infection has forced steps to be taken to limit the freedom of society; and these measures have significantly affected the activities of many areas, including the medical sector [including access to information – see Kulińska, 2020].

During the peak period of the pandemic, among the key factors in hospital management was human resources. The so-called first wave was primarily an occasion for mobilization of staff by directors, whereas the greatest shortages were felt during the second wave, as some of the staff were delegated to temporary hospitals and many staff members got infected. A distinguishing feature of the third wave of the pandemic in Poland was the implementation of a series of regulations on benefits and the minimum wage for medical staff during the state of epidemic, which resulted in financial pressure on those who were affected by these measures, but nevertheless constituted necessary interventionism [Ledwoń, 2020; Chluska, 2021].

The article analyzes the impact of the COVID-19 pandemic on the functioning of the Polish hospital scenario in 2020 in the context of the following research questions: Did the decisions made by policy-makers during the COVID-19 pandemic affect the functioning of hospitals in 2020? How did these decisions and legal regulations affect the quality and quantity of medical services? Did the policy-directions taken prove to be effective in terms of safety enhancement? How did the medical staff evaluate the implemented solutions? Other authors have also undertaken similar studies of strategy in hospitals and assessed the impact of COVID-19 on the functioning of individual hospitals [Gostin, 2006; Demirhan et al., 2020]. At present, due to the relative scarcity of data and the recent situation with COVID-19, there are no uniform procedures in place for hospitals worldwide to respond to changes dictated by the pandemic. In view of the differences among individuals as well as entire health systems internationally, it is difficult to develop uniform procedures. However, continued research will in future be able to improve the current state of knowledge and create solutions for times when problems such as COVID-19 exist.

For this purpose, the article presents a detailed description of policy regulations related to healthcare management introduced in Poland in 2020. The next step of research was to compare the standards and procedures imposed at the governmental level during the pandemic with their actual impact on quality of provision of medical services. For this purpose a bottom-up approach and empirical qualitative research were used. Specifically, the data on the condition of health care services in Polish hospitals were collected through surveys conducted among health care providers. The data obtained and their analysis allowed general conclusions to be drawn on the quality of health care services in Polish hospitals after implementation of the measures brought out by the government during the pandemic, together with an assessment of the effectiveness of the implemented policy measures, from the perspective of healthcare professionals. Investigating the mental state of staff is also an important factor, as this paper in effect also demonstrates by focusing on surveys of staff employed in the various facilities. Many authors have also sought to determine the impact of the COVID-19 pandemic on the health of both patients and staff [Iversen et al., 2020; Lu et al., 2020; Urooj et al., 2020; Ardebili et al., 2021; Karakose and Malkoc, 2021].

2 Characteristics of the research subject

In the Silesian Voivodeship, there are nine hospitals at the voivodeship level and 26 poviat hospitals [Hospital Information System, 2021], and these provide medical services for the vast majority of the inhabitants of the Silesian Voivodeship. One of the main hospitals in the Silesian Voivodeship is the Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój (WSS2), where the research for this publication was carried out. The hospital has existed since 1976; however, it was only in 1998 that it was designated as an Independent Public Medical Care Facility. Currently, it conducts its activities in 19 specialist wards,

and discharges its primary functions out of a 10-storey building, additionally encompassing a separate building where the nursing and therapeutic unit and the nursing and care unit are located. In this facility, there is also a night and holiday healthcare clinic, as well as a general practitioner – a family doctor. All this is managed by a five-person board headed by the Chief Executive Officer, who employs approximately 1,200 staff in various areas and forms of employment, including approximately 190 doctors and 440 nursing and midwifery staff. Some departments, such as the cleaning service and laboratory diagnostics, have been outsourced to external companies in the form of outsourcing of medical services, but in accordance with the general rules in place, external services are fully supervised by appointed persons from WSS2.

Staff in the following areas were surveyed: Pediatric Ward, Anesthesiology and Intensive Care Ward, Nephrology and Internal Medicine Ward, Pediatric Intensive Care Ward, Rehabilitation Ward, Gastrologic and Internal Medicine Ward, Cardiology and Internal Medicine Ward, Urology and Urological Oncology Ward, Department of Otolaryngology, Department of Ophthalmology, Obstetrics and Gynecology Ward, Neonatology Ward, General Surgery Ward, Neurosurgery Ward, Neurology Ward, Trauma and Orthopedic Surgery Ward, Emergency Ward, and Specialist Clinics including PCP, Administration, and Hospital Management.

The Voivodeship Specialist Hospital, as the name suggests, provides its services in many specializations, employing professional medical and nursing staff. Financial subsidies are earmarked for the continuous modernization of the building as well as the medical equipment, which is an essential element of providing medical services at the highest possible level.

During 2020, the selected research entity provided its services in a limited form due to the prevailing situation, but did not transform into a single-named “Covid” hospital.

3 Development of the COVID-19 pandemic in the context of the hospital functioning

The determination of the impact of the pandemic on the functioning of the hospital during 2020 shall begin with a breakdown of the Regulations of the Minister of Health and the Council of Ministers; documents, decisions, orders, and regulations of the Silesian Voivode, which directly refer to the Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój; and such procedures as introduced by the hospital itself to counteract COVID-19. Due to the rapidly changing situation, the presented list is not exhaustive but focuses on aspects that are of primary importance from the perspective of assessment of the functioning of hospitals in 2020 (Table 1).

The effectiveness of medical activities depends to a large extent on the number of medical and nursing staff providing medical services [Kargar et al., 2020]. The degree of effectiveness of the measures introduced to combat the COVID-19 pandemic was reflected in the number of patients admitted on a scheduled or emergency basis and their length of stay in hospital wards [Yu et al., 2020]. The calendar in Table 2 presents such statistics for 2020, stratified based on specific months and alongside a comparison with data for a similar time-period during 2019. This information directly shows how the amount of health services performed in the various departments of WSS2 has changed. Similar regulations related to countering the spread of the COVID-19 virus can be found in other states that were legally able to limit the spread [Xiang et al., 2020].

The effectiveness of the implementation of decisions taken in the fight against SARS-CoV-2 was directly related to the development of the epidemic in Poland [Czarnowska et al., 2021], and the rapid spread of infected individuals had a negative impact on the quality of basic health services provided by medical facilities. The statistics included in the timeline of events presented in Table 1 illustrate the impact of the pandemic on the day-to-day workings of the hospital environment in the Silesian Voivodeship, and additionally offer a simultaneous indication of the areas of health care that were greatly affected by the COVID-19 pandemic.

Table 1. Timeline of JSS No. 2 procedures and activities in the context of national regulations [Own study]

Month	Recommendations and Ordinances of the Minister of Health and the Council of Ministers of Poland and Decisions of the Silesian Viovode	Procedures and actions of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój
I.	– recommendation to facilities with infectious wards to follow procedures in case of COVID-19 emergency – list of infectious hospitals: – Designation of rooms/ isolation in hospitals that have infectious wards	– No action taken
II.	– recommendation for persons returning from northern Italy to observe their health condition and in case of deterioration to be isolated or to contact the nearest infectious diseases unit – in general hospitals, to create a separate entrance for patients with symptoms of infectious disease and to follow the classification algorithm – need for staff in contact with persons suspected to have SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) infection to wear masks	– No action taken
III.	– **March 2** – Act of March 2, 2020 on special solutions for preventing, counteracting, and combating COVID-19, other communicable diseases, and emergencies caused by them – to lay down rules for remote working to minimize the risk of infection among staff – increase of the sickness benefit from 80% to 100% of the benefit assessment basis calculated on the basis of the provisions of the Act on cash benefits from social insurance in case of sickness and maternity – granting care allowances due to the necessity of taking care of a child in person in the situation of closing a day nursery, children's club, kindergarten, school, or other institution which the child attends – introduction of the possibility to provide health care services by means of teleportation, – the principles of disposal of contaminated medical waste generated in relation to COVID-19 were specified, – **March 3** – Call of the President of the Supreme Council of Nurses and Midwives on the sanitary-epidemic and medical procedures in connection with the risk of outbreak of the new coronavirus (SARS-CoV-2) on the territory of Poland addressed to medical professionals – nurses, midwives, health sector managers, and public authorities – a recommendation to nursing and midwifery staff to strictly observe sanitary-epidemiological standards and procedures implemented in places of assistance – an appeal to managers of medical establishments to provide safe workplaces for their staff, equip them with the necessary personal protective equipment, and conduct practical training on the prevention of SARS-CoV-2 infection	– **March 2** – Order No. 19/2020 of March 2 on the organization of WSS2 in connection with security measures against the SARS-CoV-2 epidemic and in the event of a patient presenting with suspected infection – a team responsible for organizational activities related to epidemic-proofing has been established – isolation areas have been identified – **March 5** – Procedure to be followed in case of suspected infection with SARS-CoV-2 – Emergency Room, POZ (Primary healthcare), NaHH (Night and holiday healthcare): – necessity to interview the patients about their state of health – patients with suspected infection are directed to the "Admission Room – Coronavirus" entrance – use of protective clothing provided by the hospital to the staff. Information from the Director concerning the organization of work in the reception room in order to separate the isolation area for patients with suspected infection with SARS-CoV-2 – to close all entrances to the hospital between 20:00 h and 5:00 h – to require the ward staff to ensure that visitors have left the hospital premises by 19:30 h at the latest – **March 10** – Order No. 22/2020 of March 10 on the introduction of organizational changes in WSS2 related to the epidemiological situation caused by SARS-CoV-2: – introduction of pre-qualification of patients based on the questionnaire in the format prescribed, which was administered to patients suspected of having SARS-CoV-2 infection through a barricade that was specifically created for this purpose (in a tent closely adjacent to the side entrance to the hospital)

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Table 1. Continued

Month	Recommendations and Ordinances of the Minister of Health and the Council of Ministers of Poland and Decisions of the Silesian Viovode	Procedures and actions of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój
	– **March 5** – Letter from the Health Department of the Silesian Voivodeship Office in Katowice of 5 March presenting the recommendations of Voivodeship Consultants in obstetrics and gynecology – List of entities providing obstetric-gynecological services for pregnant women diagnosed with or suspected to have COVID-19 infection – **March 8** – Order No. 32/2020/DSOZ of the President of the National Health Fund on the report and conditions for settlement of healthcare services related to the prevention, counteraction, and eradication of COVID – indication of financial rates for hospitalization of a patient suffering from COVID-19 – providing financial resources to providers of services in the fight against COVID-19 – **March 25** – Recommendations to single-named hospital and infectious disease unit workers to limit work activity in other sectors – **March 26** – Regulation of the Minister of Health of March 26, 2020 amending the Regulation on the training of nurses and midwives transfusing blood and its components – extending the validity of certificates by 6 months – **March 31** – Act of March 31, 2020 on amending certain acts in the health care system related to preventing, counteracting, and combating COVID-19 – introduction of the possibility for nurses and midwives, regardless of their education, to perform medical on-call duty in medical entities providing services 24 h a day – introduced shortening of the time of training after a break in exercising the profession – The possibility of qualifying donors for the donation of blood or blood components by nursing staff has been introduced. – Sick pay is increased from 80% to 100% for medical and nursing staff in compulsory quarantine. – the possibility for nursing staff to give tele-treatments	– three organizational zones were introduced: red for hospital employees; green for patients of the specialist clinic, primary care, laboratory, and physiotherapy laboratory; and blue for patients of hospital wards, dialysis station, NaHH, and Diagnostic Imaging Department – Patient labelling with color-coded identification bands is introduced. – **March 13** – Information from the Director about the introduction of a ban on the entry of clergy into hospital premises; an exception to the ban is made in life-threatening situations – **March 16** – Suspension of all admissions for hospitalization/treatment/tests planned until further notice – prohibition of laboratory staff (subcontractor) from entering hospital premises; codes have been introduced to separate medical and administrative areas – **March 17** – Rules on collection, characterization, and transport of biological material for laboratory testing for SARS-CoV-2 by real time PCR (The coronavirus PCR test is a genetic test to confirm SARS CoV-2 virus infection) – only a doctor of infectious diseases may order testing for COVID-19 – only a physician may perform SARS-CoV-2 testing – specific procedures are given for the preservation of the biological material collected Order No. 30/2020 of March17 on changing the work organization of WSS2 in connection with the epidemiological situation – work of specialist outpatient clinics was restricted – all planned admissions to hospital, treatments, and examinations were suspended (until further notice), except for oncology patients, drug programs, and KOS – infarction (cardiac care and rehabilitation programme) – performance of sterilization services for external entities suspended – relocation of primary care outpatient clinics to NaHH premises – a schedule was established for the availability of physicians on call for patients of specialist clinics and wards of the hospital – Information was provided to the hospital emergency room on referring patients with suspected or actual infection to specific treatment centers. – information to managers of organizational units (head of department) on absolute limitation of interdepartmental consultations, use of available means of communication (telephone, e-mail), absolute ban on transferring paper documentation between units

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Table 1. Continued

Month	Recommendations and Ordinances of the Minister of Health and the Council of Ministers of Poland and Decisions of the Silesian Viovode	Procedures and actions of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój
		– **March 18** – Isolation procedure for patients infected with SARS-CoV-2 and use of personal protective equipment by staff – segregation of so-called "isolation" rooms and marking of these rooms – segregation of staff, on each shift, dealing with patients suspected of or infected with COVID-19 staying in isolation rooms – visits to the patient are prohibited – meals to be served in disposable containers – the need for staff leaving the isolation room to maintain complete hygiene – there is a precise sequence for putting on and removing personal protective equipment, which is disposable
IV.	– **April 3** – Ordinance of the Minister of Health of April 3, amending the Ordinance on the handling of remains and human remains – **April 15** – Ordinance of the Minister of Health of April 15, 2020 amending the Ordinance on general terms and conditions of contracts for the provision of healthcare services – sets out detailed rules for the settlement of services contracted with the NFZ (National Health Fund) in the event of discontinuation of services under the concluded agreements for the treatment of patients infected with SARS-CoV-2 – **April 16** – Law of April 16, 2020 on specific support instruments in connection with the spread of the virus – Specified working hours, daily rest in health care services for the duration of the epidemic – **April 17** – Guidelines of the team of epidemiological nursing consultants for measures to prevent the spread of SARS-CoV-2 infections in the hospital environment – define the conditions for isolation of patients with suspected or actual infection, the rules for maintaining cleanliness during isolation, handling the patient's linen, medical waste, and food, – determination of rules for handling dead bodies of infected persons – **April 19** – Regulation of the Council of Ministers of April 19, 2020 on the establishment of certain restrictions, orders, and prohibitions in connection with the occurrence of an epidemic – **April 21** – Ordinance of the President of the National Health Fund of April 21, 2020 amending the Ordinance on the principles of reporting and conditions of settlement of healthcare services related to the prevention, counteraction, and eradication of COVID-19 – the possibility of concluding contracts for performing diagnostic RT-PCR tests for SARS-CoV-2 and their settlement was introduced	– **April 2** – Order No. 36/2020 of April 2 on organizational changes to minimize the risk of SARS-CoV-2 infection – change in the organization of work in the administration area concerning, inter alia, matters related to the circulation of paper documentation, e.g., issue of pay slips, transmission of statistical cards to the Medical Statistics Department, issue of personnel certificates – closed-door office operation and reduction in personal contacts – **April 3** – Decision of the Director on the detailed method of transmitting intra-hospital correspondence – **April 6** – Director's recommendation to separate single rooms in each ward for initial isolation of patients with justified suspicion of infection (number of rooms depends on needs) – **April 7** – Agreement between the Hospital Director and Trade Unions – the settlement period was extended from April 1, 2020 to December 31, 2020 – an equivalent working time system was introduced, which allowed the daily working time to be extended to 12 h – shift work in administration was introduced – Information from the Director specifying the rules for delivering packages for hospitalized patients – **April 14** – Procedure in ZOL (Care and Treatment Facility), ZPO (Health care team), and NaHH, POZ – in the case of suspected patient infection with SARS-CoV-2 – Designation of three entrances to the building (second hospital location): – Entry No. 1: main entrance to ZOL, ZPO, NaHH– pediatric patients – Entrance No. 2: main entrance to POZ, NaHH– adult patients – Entrance No. 3: entrance to the staff bathroom after contact – rules of handing over packages for patients in ZOL and ZPO are defined – determines the procedure in the event of a patient presenting to the POZ and NON-POZ

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Table 1. Continued

Month	Recommendations and Ordinances of the Minister of Health and the Council of Ministers of Poland and Decisions of the Silesian Viovode	Procedures and actions of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój
	– **April 24** – Communication from the Minister for Health – referral for work to combat epidemics – presentation of remuneration to persons assigned to work to combat epidemics – **April 25** – Polish diagnostic-therapeutic and organizational recommendations for the care of persons infected or exposed to SARS-CoV-2 infection: – defined the principles of pharmacotherapy, oxygen therapy, and management of patients in the ICU (intensive-care unit) – recommendations for the protection of medical personnel against infection are included – **April 28** – Ordinance of the Minister of Health of April 28, 2020 on standards for restrictions on the provision of healthcare services to patients other than those suspected of or infected with SARS-CoV-2 by medical professionals having direct contact with patients with suspected or actual infection – changes have been introduced for medical professionals working with patients suspected of or infected with SARS-CoV-2, restricting their work with healthy patients – **April 30** – Communication from the National Health Fund on additional measures for persons providing services in entities in connection with the COVID-19 outbreak	– **April 15** – Order No. 39/2020 of April 15 on the isolation area for internal medicine patients suspected of SARS-CoV-2 infection requiring hospitalization – conversion of the Rehabilitation Ward into an isolation area – The principles of organization of work of the medical and nursing staff in the newly established isolatorium were determined. – recommendation of the director concerning the introduction of new principles of collecting material for testing for SARS-CoV-2 – the need to take a swab for all patients to be hospitalized in the wards of the hospital – a special room was prepared for swabbing patients for planned hospitalization – **April 16** – Director's decision on the introduction of new rules for patients reporting for examinations in the Diagnostic Imaging Department – **April 23** – Director's order to change the place and hours of delivery of parcels for patients – **April 27** – Management and organization of work in the operating theatre in the case of a patient suspected of or diagnosed with SARS-CoV-2 infection – separate operating rooms for gynecological-obstetric patients suspected of or infected with SARS-CoV-2 in order to perform emergency Cesarean sections or natural deliveries – defined rules for the work of the surgical, anesthetic, neonatology, and cleaning teams – the procedure for the management of suspected SARS-CoV-2 infection in a trauma patient – indicates the principles for management of trauma patients infected with SARS-CoV-2 in the emergency room, operating theatre, and Diagnostic Imaging Department, and indicates the contact details of medical entities that have infectious wards treating trauma patients within their structure Procedure to be followed in the case of suspected patient infection with SARS-CoV-2 – Pediatric Ward – defined management in the pediatric emergency room of a patient asymptomatic for SARS-CoV-2 but in contact with a person in whom SARS-CoV-2 infection has been confirmed and a patient with symptoms for infection – preparation of an isolation room for a child suspected of SARS-CoV-2 infection – Order 43/2020 of April 30 on the amendment of Order No. 22/2020 of March 10 on the introduction of organizational changes related to the epidemiological situation caused by SARS-CoV-2 – pre-qualification of persons presenting themselves at specialized clinics has been introduced

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Table 1. Continued

Month	Recommendations and Ordinances of the Minister of Health and the Council of Ministers of Poland and Decisions of the Silesian Viovode	Procedures and actions of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój
		– **April 30** – Order 44/2020 of April 30 on the resumption of physiotherapy workshops for outpatient physiotherapy and day center and specialist outpatient clinics – obliged the manager of the physiotherapy laboratory, the managing physician of the Rehabilitation Ward, and the manager of specialist outpatient clinics to draw up a schedule of patient admissions and to establish rules for the safe provision of services – the rules of initial qualification (sluice) of patients reporting to the physiotherapy area and specialist outpatient clinics are specified in detail
V.	– **May 2** – Regulation of the Council of Ministers on the establishment of certain restrictions, orders, and prohibitions in connection with an epidemic situation – **May 4** – Announcement of NFZ Headquarters regarding the provision of medical rehabilitation services – possibility of re-establishing activity in the scope of inpatient and outpatient rehabilitation – possibility of full-scale reinstatement of inpatient rehabilitation centers/units – **May 5** – Message from NFZ Central Office to healthcare providers regarding SZOI portal (Information Management System) – updated documentation on electronic verification and confirmation of medical device orders Opinion of a national consultant in family medicine on the conduct of balance studies in children during the COVID-19 pandemic – **May 6** – Recommendations for the organization of long-term care services during the COVID-19 pandemic – limiting visits to patients – reducing to a minimum the number of staff required to work with patients in the long-term care area (separation of nursing sub-units and units) – limitation of employment of medical personnel – use of ICT systems by doctors to consult patients in long-term care facilities – **May 8** – Resolution No. 321/2020/VII of the Regional Council of Nurses and Midwives in Katowice of May 8, 2020 – A special financial aid for the members of the District Chamber of Nurses and Midwives in Katowice granted in the event of infection with the virus	– **May 8** – Director's recommendation on the organization of work in the event of an influx of large numbers of patients suspected of or infected with SARS-CoV-2 – the need to report the current occupancy and severity status of patients, vacant ventilators, and staff status – the order of procedure was established: suspension of admissions in the Admissions Chamber and reorganization of wards in case of exhaustion of isolation places in wards (Otolaryngology) – **May 13** – Information from the Director on the launch of the electronic sending of payslips; creation of e-mail service boxes for each staff member, irrespective of the form of employment – **May 21** – Procedure for dealing with patients admitted to hospital on an elective basis given the risk of transmission of the SARS-CoV-2 epidemic – define scheduled admissions to all wards of the hospital, with detailed epidemiological history taking by telephone before scheduled admission – defined planned admissions to the ward not exceeding two patients per day, except for ZOL and ZPO – it was recommended to perform a swab prior to admission for COVID-19 – the rules of informing about admissions by the registration of the Admissions Chamber are specified – **May 25** – Director's information on requiring staff to self-measure their body temperature before entering hospital premises. Director's recommendation regarding reporting of isolation vacancies in wards – **May 27** – Director's recommendation defining rules for limited work in specialist clinics: one doctor = 10–12 patients; two doctors in Trauma and Orthopedic Clinic (previously 5)

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Table 1. Continued

Month	Recommendations and Ordinances of the Minister of Health and the Council of Ministers of Poland and Decisions of the Silesian Viovode	Procedures and actions of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój
	– **May 11** – Communication of the Minister of Health concerning the possibility to perform a swab for COVID-19 on the 12th day of quarantine, under the condition of self-transport, without contact with other persons – announcement from the National Health Fund Headquarters about increasing the number of available swab points for SARS-CoV-2 – communication of the Minister of Health on family childbirth – the need for a negative PCR test for COVID-19 for the person accompanying the childbirth – the need for an epidemiological interview of the pregnant woman and the attendant – the length of time the attendant has to stay at the birth is specified – **May 12** – Regulation of the Minister of Health amending the regulation on the organizational standard of care in isolation facilities – **May 29** – Regulation of the Council of Ministers of May 29, 2020 on the establishment of certain restrictions, orders, and prohibitions in connection with the occurrence of an epidemic – discontinuation of health services provided in mobile vehicles – discontinuation of rehabilitation services provided under contracts awarded by ZUS (Social Insurance Institution)	– **May 29** – Director's decision on the mandatory maintenance of the national COVID-19 patient register (with effect from June 1, 2020) – **WHOLE MAY** – Establishment of "swabbing" teams within the framework of the established cooperation with the Pniówek mine in order to perform swabs for the presence of SARS-CoV-2 among the mine employees
VI.	– **June 1** – Message from NFZ Headquarters: – The possibility of resuming the operation of spas from June 16 only for patients with a negative diagnostic test result for SARS-CoV-2 – **June 3** – Communication from the Minister of Health – Update on recommendations concerning COVID-19 outbreak for family/primary care midwives – **June 16** – Communication from the Minister of Health on the allocation of funds for the fight against the epidemic – Appropriation of funds from the program Knowledge Education Development for salary supplements for the staff of nursing homes, residential care units, and hospices, as well as for purchase of personal protective equipment and disinfectants, for the period of the COVID-19 pandemic Regulation of the President of the NFZ no. 87/2020/DSOZ amending the regulation on detailed conditions of agreements in the system of basic hospital healthcare services – **June 17** – Order of the President of the NFZ No. 86/2020/DEF on the change of the financial plan of the National Health Fund for 2020 – Increase of costs of healthcare services in voivodeship plans by PLN 302.679 million. Regulation of the Minister of Health amending the regulation on infectious diseases causing the obligation of hospitalization, home isolation, and the obligation of quarantine or epidemiological surveillance – specified the duration of quarantine until a negative COVID-19 test result is obtained	– **June 3** – Information from the Director regarding the suspension (until further notice) of elective admissions due to the lack of isolation places for patients – **June 17** – Director's recommendation to change the entrance to the NaHH – **June 30** – Director's message on changing the entrance for patients reporting to specialist clinics and physiotherapy laboratories, with a new route for dependent patients and those in wheelchairs – crossing of traffic routes between patients and administrative staff

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Table 1. Continued

Month	Recommendations and Ordinances of the Minister of Health and the Council of Ministers of Poland and Decisions of the Silesian Viovode	Procedures and actions of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój
	– **June 19** – Information of the National Health Fund of June 19, 2020 on the possibility of settlement of diagnostic tests for SARS-Co-V-2 in medical students doing their student internships in medical institutions – regulation of the Council of Ministers on the establishment of certain restrictions, orders, and prohibitions in connection with the occurrence of an epidemic – **June 26** – Regulation of the Minister of Health on the amount of basic monthly remuneration of physicians and dentists undergoing specialization within the framework of residency – determines the adjustment of remuneration of doctors during their residency – **June 29** – Ordinance of the Minister of Health of June 29, 2020 amending the Ordinance on infectious diseases giving rise to the obligation of hospitalization, isolation, or home isolation and the obligation of quarantine or epidemiological surveillance – established a quarantine period for persons who had contact with an infected person of 14 days	
VII.	– **July 2** – Communication from the Minister of Health – a higher valuation has been established for POZ and AOS (Outpatient specialist care) facilities that issue electronic referrals – **July 15** – Order of the President of the NFZ No. 109/2020/DEF on release of general reserve included in the financial plan of the National Health Fund for 2020 – request for release of the general reserve in the amount of PLN 1.000 million – **July 20** – Ordinance of the Minister of Health amending the ordinance on standards for restrictions on the provision of healthcare services to patients other than those suspected of or infected with SARS-CoV-2 by medical professionals having direct contact with patients suspected of or infected with SARS-CoV-2 – introduced the possibility of providing services by restricted personnel only with the consent of the head of the health care unit – **July 30** – Message from the Ombudsman – removes the stipulation necessitating attendants at family births to show a negative COVID-19 test result	– **July 16** – Information from the Director dated July 16, 2020 regarding the separation of the "SARS-Co-V-2 diagnostic area for elective admissions" and the schedule of swab collection by individual departments Information regarding the possibility of visiting a family member with a dying or critically ill patient by prior arrangement with the managing physician – **July 28** – Information from the Director on resumption of admission of patients for elective procedures
VIII.	– **August 7** – The Ombudsman's communication – impunity of doctors for manslaughter or grievous bodily harm is introduced – **August 12** – Ordinance of the Minister of Health on the organizational standard of teleportation in primary health care	– **August 18** – Director's note dated August 18, 2020 regarding the forwarding of paper correspondence to and from the main secretariat by designated secretaries at specific times

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Table 1. Continued

Month	Recommendations and Ordinances of the Minister of Health and the Council of Ministers of Poland and Decisions of the Silesian Viovode	Procedures and actions of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój
	– **August 14** – Law of August 14, 2020 on amending certain laws to ensure the functioning of health care in connection with and after the COVID-19 pandemic – **August 18** – Order of the Minister of Health on the appointment of a Team for purchasing COVID-19 vaccine – The term of office of the bodies of the professional chambers of medicine has been extended. – **August 25** – Order of the President of the NFZ No. 130/2020/DEF on the change of the financial plan of the National Health Fund for 2020 – costs of healthcare services in regional branches were increased to the total amount of PLN 1.093.166 million The Regulation of the President of the NFZ No. 131/2020/DSOZ amending the regulation on conditions for conclusion and performance of agreements on provision of healthcare services in the scope of basic healthcare – introduced obligation for doctors to report services provided remotely – **August 27** – Communication from the Ministry of Health – the quarantine period for asymptomatic persons has been shortened to 10 days	
IX.	– **September 1** – Ordinance of the Council of Ministers of September 1, 2020 amending the Ordinance on the establishment of certain restrictions, orders, and prohibitions in connection with the occurrence of an epidemic – specified the necessity of a negative diagnostic result test for SARS-CoV-2 taken not earlier than 6 days before the designated date of admission to ZOL or ZPO (tests financed from public funds) – reduced quarantine period to 10 days – **September 3** – Decision of the Silesian Voivode – WSS2 was instructed to prepare beds for patients with suspected SARS-CoV-2 infection, which meet the requirements ensuring prevention of the virus infection (isolation rooms) Announcement of the Ministry of Health – an autumn strategy for combating COVID-19 was presented, which, among other things, refers to the establishment of three levels of hospital security – **September 5** – Communication from the NFZ Headquarters on the recommendation of PCP (primary care provider) doctors to test for SARS-CoV-2 – **September 10** – Communication from the Minister of Health – rapid antigen tests allowing identification of the virus in 10–30 min have been allocated to EDs and Admissions Chambers	– **September 8** – Response to the Voivode decision dated September 8, 2020 – preparation of 22 places meeting the requirements in question: – OAiIT (anaesthesiology and intensive care unit) – one bed, – Department of Rehabilitation – one bed, – Neurosurgery Ward – two beds – Department of General Surgery – two beds – Department of Trauma and Orthopedic Surgery – two beds – Obstetrics and Gynecology Ward – one bed – Department of Otolaryngology – one bed – Urology Ward – one bed – Gastrologic and Internal Medicine Ward – one bed – Cardiology-Internal Ward – one beds – Ophthalmology Ward – one bed – Nephrology-Internal Ward – one bed – Dialysis Station – one bed – Neurology Ward – two beds – Pediatrics Ward – one bed – OICU (Obstetric Intensive Care Unit) – one bed – Accident and Emergency Department – one bed – **September 10** – Announcement by the Director on the transfer of the NaHH for children to the second hospital site – **September 15** – Procedure for visiting patients in special situations in ZOL and ZPO

(*Continued*)

Table 1. Continued

Month	Recommendations and Ordinances of the Minister of Health and the Council of Ministers of Poland and Decisions of the Silesian Viovode	Procedures and actions of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój
	– **September 15** – Information to the President of the National Health Fund on SARS-CoV-2 screening for students of medical faculties and students of post-secondary schools training for medical professions – **September 23** – Recommendation of the National Health Fund of September 22, 2020 with reference to the decision of the Voivode of September 3, 2020 to provide information on the cells in which isolation beds of level I were separated – **September 23** – Communication from the Ministry of Health – rules for ordering SARS-CoV-2 tests and detailed algorithms for the management of independent and dependent patients have been established	– **September 21** – Information from the Director regarding the temporary closure of one of the two entrances/exits for hospital employees – **September 29** – Order 103/2020 of September 29, 2020 on the organization of the work of WSS2 in connection with the epidemiological situation – entrance to specialist outpatient clinics reopened – Pre-qualification at the entrance to the green zone for outpatients was created. – Specific eligibility criteria were established – The main entrance was made available to patients collecting medical documentation (test results, discharges, photocopies of medical documentation) – A schedule is established for the issue of documentation by individual departments
X	– **October 7** – Information of the Silesian Voivode regarding the indication of medical entities that provide health services in selected specializations for infected patients – Act of October 7, 2020 amending certain acts to counteract the socio-economic effects of COVID-19 – **October 8** – The Ordinance of the Minister of Health of October 8, 2020 on the organizational standard of health care for patients suspected of or infected with SARS-CoV-2 – specified detailed tasks of Primary Health Care physicians – Communication from the Minister of Health – 16 coordinating hospitals have been established – Regulation of the Minister of Health of 8 October 2020 amending the regulation on the organizational standard of care in isolation facilities – possibility for HCPs to refer patients to an isolation facility – no need to refer people waiting for a test result to an isolatorium – **October 14** – Decision of the Silesian Voivode of October 14, 2020 on the necessity to create 45 beds for COVID-19 patients (including 7 ventilator beds) in WSS2 from October 16, 2020 with simultaneous maintenance of 22 isolation beds from September 15, 2020 Communication from NFZ Head Office – it was recommended to temporarily suspend scheduled services – **October 19** – Communication from the Minister of Health – introduced a COVID-19 medical staff benefit of 100% for doctors, nurses, and paramedics – established 100% of remuneration for medics arriving in quarantine or isolation – voivodeship hospitals have been instructed to transform their internal medicine wards into "Covid" wards	– **October 7** – Information from the Director about the need to immediately suspend admissions to the Ophthalmology Department due to the need to designate an area for ENT (Otolaryngology) patients, and to suspend the operation of the ophthalmology outpatient clinic – **October 8** – Information from the Director on the need to immediately stop admissions to the Cardiology and Internal Medicine Department due to the need to prepare the Gastrologic and Internal Medicine and Nephrology Departments for hospitalization of patients with a positive test result for COVID-19 with simultaneous appointment of a contact person, update of reports once every 3 h – **October 14** – Order 116/2020 of October 14, 2020 on the organization of work in connection with the epidemiological situation. – It was ordered to create hospital places for patients with a positive test result for SARS-CoV-2: – Gastrologic and Internal Medicine Department – 11 beds (October 16, 2020) – Rehabilitation Ward – seven beds (October 16, 2020) – Nephrology and Internal Medicine Ward – 18 beds (October 16, 2020) – Otolaryngology Ward – nine beds (October 22, 2020) – The establishment of an isolation facility for patients with unknown outcome was ordered: – Department of General Surgery – six beds – Trauma and Orthopedics Ward – six beds – an area was separated in the Ophthalmology Ward for the activity of the Otolaryngology Ward – the operation of the operating theatre was limited to two tables – admissions were suspended except for acute cases, oncology patients, children, and pregnant women – all medical staff were stopped from availing planned leaves, internships, and secondments – it was recommended to prepare seven "covidien" beds in the Anesthesiology and Intensive Therapy Department – it was recommended to change the organization of the admission room in order to eliminate the crossing of communication routes (emergency and COVID-19 patients)

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Table 1. Continued

Month	Recommendations and Ordinances of the Minister of Health and the Council of Ministers of Poland and Decisions of the Silesian Viovode	Procedures and actions of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój
	– **October 20** – Decision of the Silesian Voivode concerning the reporting of: number of occupied and free beds for patients with suspected infection, number of occupied and free beds for infected patients, and number of occupied and free ventilator beds for infected patients – **October 23** – Ordinance of the Minister of Health amending the Ordinance on the organizational standard of health care provision for patients suspected of or infected with SARS-CoV-2 – Allows feldspersons to provide care for patients suspected of infection with SARS-CoV-2 – **October 24** – Announcement of the National Health Fund Headquarters – operation of health resorts suspended – **October 28** – Announcement from the NHF Headquarters – conversion of some spa hospitals and sanatoriums into isolation facilities – **October 30** – Information from the Consultant in Anesthesiology and Intensive Care Nursing on the necessity to prepare nursing staff to work with infected patients and to familiarize themselves within the framework of internal or individual training with materials concerning adaptation to work in the ICU and management of intubated patients – the information concerns the remaining nursing staff, i.e., those not experienced in work in the ICU	– **October 22** – Information from the Director that in the newly opened ENT Department, medical care shall be provided by doctors of the Cardiology and Internal Medicine Department – **October 27** – Director's recommendation on the daily appointment of a COVID-19 coordinating physician – **October 28** – Information from the Director concerning a change of location of the Information Centre (place of collection and return of keys to the premises)
XI	– **November 1** – Announcement from NFZ Headquarters: – Additional remuneration has been granted to the staff of EDs, emergency rooms, medical rescue teams, and laboratory diagnosticians in connection with the fight against the COVID-19 pandemic – **November 2** – Regulation of the Council of Ministers of November 2, 2020 amending the regulation on the establishment of certain restrictions, orders, and prohibitions in connection with the occurrence of an epidemic state: – abolition of the obligation of quarantine for medical practitioners after the test – **November 3** – Ordinance of the Minister of Health of November 3, 2020 amending the Ordinance on infectious diseases giving rise to the obligation of hospitalization, isolation, or home isolation and the obligation of quarantine or epidemiological surveillance: – recommended daily antigen test for personnel providing health services for a period of 7 days in order to avoid quarantine and thus removal from work Ordinance of the Minister of Health of November 3, 2020 amending the ordinance on detailed requirements to be met by the premises and equipment of an entity conducting medical activity: – standards for field hospitals have been established	– **November 5** – Information from the Director concerning the reopening of the Hemodynamics Laboratory – **November 6** – Information from the Director in connection with reorganization of the work environment and organization of work in the Central Sterilisation Department, enabling decontamination of rooms by employees of the Sterilisation Department after SARS-Cov-2 infected patients have vacated them – **November 12** – Director's briefing on the opening of further "covidium" beds – maintenance of 67 beds, i.e., 22 observation beds + 45 beds for positive patients including 38 oxygen beds [Nephrology – Internal Medicine (18), gastrologic – Internal Medicine (11), Laryngology (9), and 7 ventilator beds (Rehabilitation Ward)] – in the decision from November 30 to provide 145 beds for patients with confirmed SARS-Cov-2 infection – creation of a 12-bed ICU for infected patients, in place of the current anesthesiology and ICU – establishment of a five-station anesthesiology and ICU for COVID-19 negative patients on the other side of the Rehabilitation Ward – creation of a 10-bed (ultimately 46) ward for COVID-19 positive patients in the place of the current Trauma and Orthopedics Ward – reduction of the rooms occupied by the Neurology Ward and the Stroke Ward to rooms in one section – change of the location of the Trauma and Orthopedic Ward – rooms in the vacated part of the Neurology and Stroke Ward

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Table 1. Continued

Month	Recommendations and Ordinances of the Minister of Health and the Council of Ministers of Poland and Decisions of the Silesian Viovode	Procedures and actions of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój
	– **November 4** – Announcement from NFZ Headquarters – support has been granted to hospitals in the form of people working for the Territorial Defence Army in updating data on vacant beds – **November 9** – Decision of the Silesian Voivode of November 9, 2020: – the need to create 145 beds for COVID-19 patients in WSS2 (130 oxygen beds for adults, 5 oxygen beds for children, 7 respiratory beds for adults, and 3 respiratory beds for children) – **November 16** – Announcement from NFZ Headquarters – traditional hospitals have been divided into 4 types: – I level – hospitals for patients with suspected infection with SARS-CoV-2 – II level – hospitals that treat patients infected with SARS-CoV-2 – Level III – hospitals that treat patients infected with SARS-CoV-2, but the main reason for hospitalization is not COVID-19 – Level IV – Hybrid hospitals, coordinating – **November 18** – Information from the District Chamber of Nurses and Midwives on the new training rules for nurses returning to work after a break in their profession – **November 26** – Order of the President of the NFZ No. 188/2020/DEF of November 26, 2020 on releasing the general reserve included in the financial plan of the National Health Fund for 2020: – general reserve was released for increasing the financing of healthcare services – **November 27** – Decision of the Silesian Voivode – 95 "covidien" beds including 15 ventilator beds to be opened in WSS2 – **November 28** – Act of November 28, 2020 amending the law on certain acts in connection with countering emergencies related to COVID-19: – increased the minimum wage from 150% of the basic wage to 200% in the entity to which the employee was referred – allowed paramedics to collect material for COVID-19 testing	– **November 16** – Information from the Director on the absolute prohibition to enter the Personnel Department – **November 19** – Director's Order 145/2020 of November 19, 2020 on the organization of nursing staff work in view of the epidemiological situation – instructed ward/coordinating nurses to appoint from among their staff a person to secure the "Covid" sections – presented the scheme of transfers of nurses from December 1, 2020 – **November 30** – Information from the Director about the possibility of transmitting to the Head of the Registry Office the Death Certificate in the form of an electronic document
XII.	– **December 8** – Communication of the Prime Minister – announcement by the Government of the National Vaccination Programme – **December 14** – Announcement from NFZ Headquarters – announcement of a list of hospitals that perform vaccinations for the staff of medical institutions – **December 21** – Regulation of the Council of Ministers of December 21, 2020 on the establishment of certain restrictions, orders, and prohibitions in connection with the occurrence of an epidemic state: – removal of quarantine obligation for vaccinated persons; removal of restrictions for vaccinated persons when using care and treatment facilities	– **December 2** – Management order 166/2020 of December 2, 2020 on taking measures to increase the hospital's preparedness for an increase in hospitalizations related to SARS-CoV-2 infection – the role of hospital coordinator for "Covid" wards has been established – a scheme was prepared for the activation of additional posts with access to oxygen – an obligation was introduced to provide practical training to physicians on providing medical services to patients infected with SARS-CoV-2 – **December 11** – Information from the Director dated December 11, 2020 on the designation of the hospital as a vaccination point for personnel of medical entities performing therapeutic activities (nodal hospital): – It was recommended to prepare a preliminary list of those willing to be vaccinated against COVID

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Table 1. Continued

Month	Recommendations and Ordinances of the Minister of Health and the Council of Ministers of Poland and Decisions of the Silesian Viovode	Procedures and actions of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój
	– **December 30** – Communication from the Minister of Health on Comirnaty – concentrates for the preparation of mRNA (messenger RNA) vaccine against COVID-19: – recommendation one vial allows the preparation of five doses, – the product is administered intramuscularly after dilution of the vial as a series of two doses 21 days apart – the dose to the patient is 0.3 ml – vial contains 5 doses with a possibility of up to seven doses – inject 1.8 ml NaCL0.9% into the vial – do not combine residual doses from two different vials	– **December 18** – Information from the Director regarding the suspension of the operation of the Pediatric and the Internal Medicine Wards due to the confirmation of SARS-CoV-2 infection among patients and staff of these wards – **December 21** – Order No. 178/2020 of December 21, 2020 on the appointment of the COVID-19 vaccination coordinator – **December 29** – Information from the Director concerning the dates of vaccination against COVID-19 for employees of the Hospital

COVID-19, Coronavirus Disease 2019; ICU, intensive care unit.

4 Assessing the impact of the COVID-19 pandemic on the logistical operation of the hospital in 2020

The analysis of pandemic changes shows how quickly and dramatically the health care situation in Poland, particularly with regard to the availability of health care service for patients, has changed. All decisions taken had a huge impact on the development of the epidemic situation in the country, and in particular on the functioning of many economic areas. In 2020, proper and effective provision of medical services became a priority in the fight against SARS-CoV-2; therefore it was necessary to introduce legal regulations specifying a particular goal in the fight against the COVID-19 pandemic.

The constantly changing epidemic situation in Poland, which is manifested in the infection statistics, influenced many decisions that had to be made. Table 2 presents an annual summary of SARS-CoV-2 infections with an indication of positive test results in the Silesian Voivodeship.

It may be noted that the first cases of infection with SARS-CoV-2 were diagnosed in March and very quickly gathered strength throughout the country. Already in May, the first peak of the epidemic in Poland was recorded, which prompted those in power to take quick steps to prevent the spread of the virus at that time. In the above table, one can also note the period of "control" over the SARS-CoV-2 epidemic (June–September), which quickly gave way to the much more difficult phase, namely the second wave. The drastically worsening situation significantly influenced the reorganization of medical service providers, which stood on the front line of the fight against the COVID-19 pandemic. It became necessary to carve out isolation zones for patients in hospitals, to avoid contact between potentially infected and healthy individuals, which triggered necessary changes in the infrastructure of hospitals, e.g. transforming wards, creating locks, putting up partition walls, etc. The allocation of separate pathways, creation of separate rooms, and assignment of particular staff to designated rooms caused chaos, which prevailed not only among staff but also among patients. Constant changes to decisions on scheduled admissions to hospitals and the rules governing medical facilities had a very significant impact on reducing the effectiveness of treatment.

Table 3 shows the rapidly changing situation in the number of patients treated by individual wards of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój in 2020. Bold part indicates those areas which were the first to be transformed (to a greater or lesser extent) into "Covid" or isolation wards. Along with an increase or decrease in infections in the Silesian Voivodeship, fluctuations in the number of patients treated

Table 2. Annual summary of SARS-CoV-2 infections [Map of COVID-19 infections 2021]

Month in 2020	Poland	Silesian Voivodeship
January	0	0
February	0	0
March	2,311	264
April	10,566	1,975
May	10,909	6,170
June	10,607	4,430
July	11,295	3,481
August	21,684	4,327
September	24,142	2,125
October	249,320	25,135
November	649,977	79,912
December	304,067	27,764

Table 3. Number of patients treated in WSS2 in individual departments in 2020 [Own study]

Department	Number of patients treated											
	01	02	03	04	05	06	07	08	09	10	11	12
Pediatric Intensive Care	8	17	12	8	9	9	7	7	13	9	11	9
ICU	35	33	37	27	31	37	38	30	22	38	36	38
Obstetrics-Gynecology	330	327	314	250	249	291	305	304	326	280	262	240
Neurosurgery	119	131	88	38	76	103	93	81	108	75	40	54
General Surgery	201	193	161	108	101	118	134	127	153	130	113	106
Trauma-Orthopedics	165	163	133	62	76	114	127	119	118	96	68	88
Otolaryngology	53	75	60	14	17	22	27	35	44	**40**	**29**	**25**
Urology	223	210	154	39	88	121	164	151	191	127	94	122
Gastrological-Internal	180	152	118	101	116	108	119	94	122	**129**	**121**	**139**
Cardiology-Internal	189	206	141	107	176	167	174	163	179	155	147	169
Rehabilitation	**102**	**109**	**71**	**6**	**0**	**0**	**20**	**83**	**91**	**64**	**0**	**6**
Ophthalmology	162	180	109	22	141	183	182	169	211	99	133	172
Nephrology-Internal	106	100	88	72	69	69	105	74	71	**83**	**73**	**75**
Neurology	168	151	117	91	92	95	106	102	131	89	71	90
Neonatology	119	122	140	128	130	112	120	134	131	106	106	101
Pediatrics	0	0	0	7	43	50	49	51	60	52	38	53

ICU, intensive care unit.

in individual wards can be seen, which was caused by the restrictions introduced and decisions taken. The overriding aim of every medical facility is to provide its services to as many people as possible with the best possible result, which was significantly disturbed during the COVID-19 pandemic. An important element is that the number of patients in the intensive care unit (ICU) – which was a 13-bed ward – has remained the same, as the availability of these services, throughout the year, has remained unchanged. However, at different times of the intensity of the pandemic, the type of patients admitted was affected: when infections decreased, COVID-negative patients were treated in the OAIT; when infections increased, the general ward was converted into an isolation ward and treated as a "Covid" ward, in this case containing 12 beds for Covid-positive patients.

The number of patients treated in the four wards (as of October 2020) highlighted in grey in the table above is also shown in the graph below (Figure 1), where the differences in the number of patients treated are indicated. The Rehabilitation Ward, which was the first to be converted into an isolation ward and dealt with COVID-positive patients from October 2020, shows the greatest fluctuations, which were caused by the development of the epidemic in Poland. On the other hand, wards such as Gastrological-Internal and

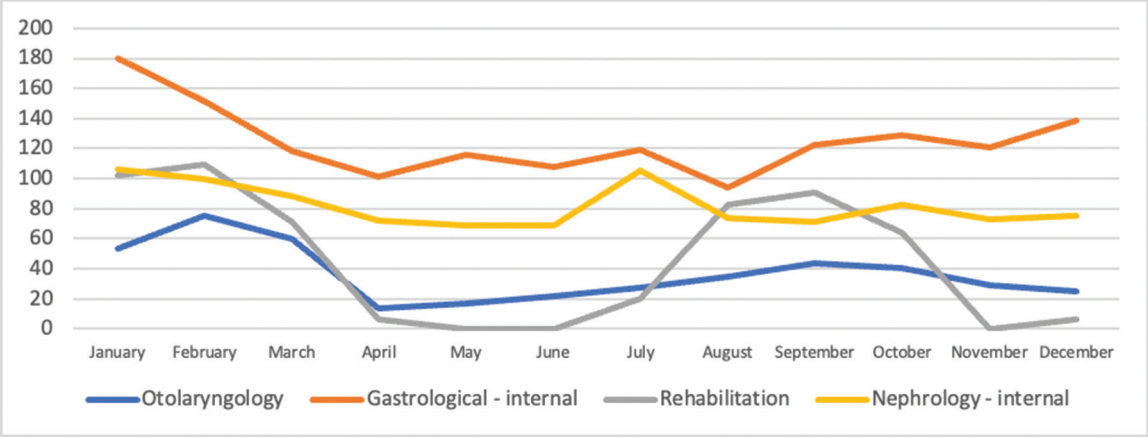


Figure 1. Number of patients treated in wards reorganized during the COVID-19 pandemic in Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój [Own study]. COVID-19, Coronavirus disease 2019.

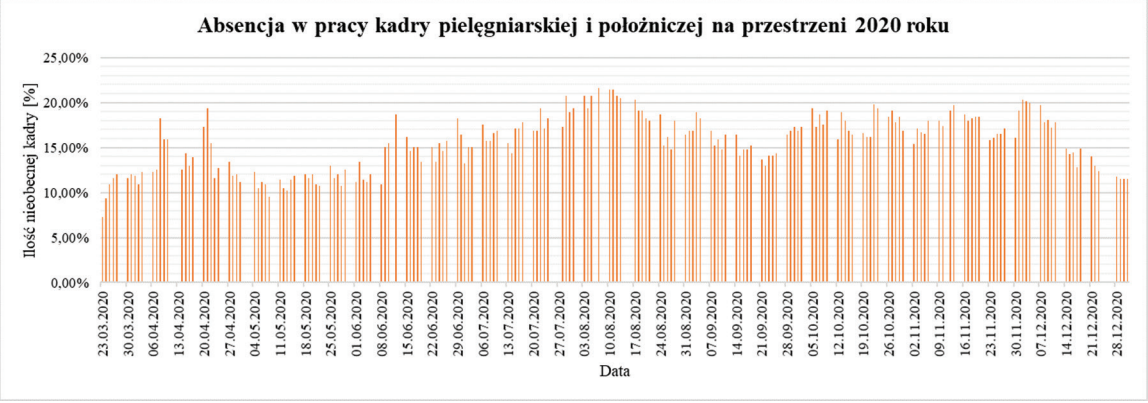


Figure 2. Number of patients treated in wards reorganized during the COVID-19 pandemic in Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój [Own study]. COVID-19, Coronavirus disease 2019.

Nephrological-Internal are internal medicine wards, where the number of patients treated has decreased slightly and the duration of their hospitalization has increased significantly.

The proper functionality of the entire system depended to a large extent on the medical and nursing staff, whose awareness and readiness to work contributed to the control of the COVID-19 pandemic. However, it should be noted that their availability was largely limited due to the prevailing wave of SARS-CoV-2 infection, which resulted in sickness absences caused by infection with the virus, as well as due to imposed quarantines or sickness absences for other reasons (as shown in Figures 2 and 3).

Figure 2 shows three increases in absenteeism of nursing and midwifery staff. The first was in April when SARS-CoV-2 was identified, and thus the high percentage of absence was due to fear and also parental or medical leave. Also, in April, there was a mistake in the diagnostic laboratory when samples were contaminated, and thus all the tested staff were removed from work. After clarification and re-testing, the staff with negative results were allowed to work again (that is why there was such an increase in the period April 6, 2020 to April 13, 2020). The same situation occurred with regard to the number of absent medical staff in the first week of April. The second increase took place during the holiday period. As the outbreak died down in June, there was a real opportunity to take the holiday leave encouraged by the WSS2 board, and therefore, this high absence was acceptable. A third increase in absenteeism occurred in October with the approach of the second wave (Figure 4). The high percentage of absenteeism of all staff was mainly due to the need for quarantine due to the positive result for COVID-19, as well as fear and opening of wards for hospitalization of patients who had tested positive for SARS-CoV-2. In the week of September 28 to October 5

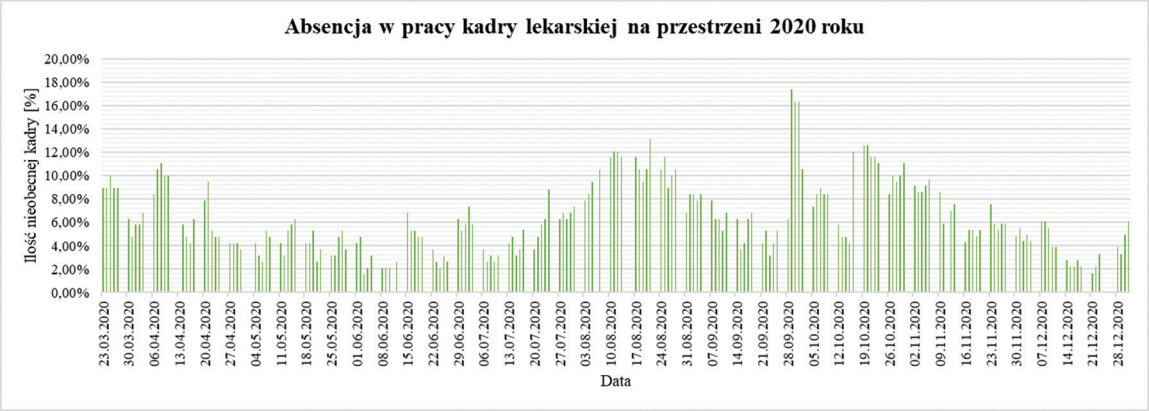
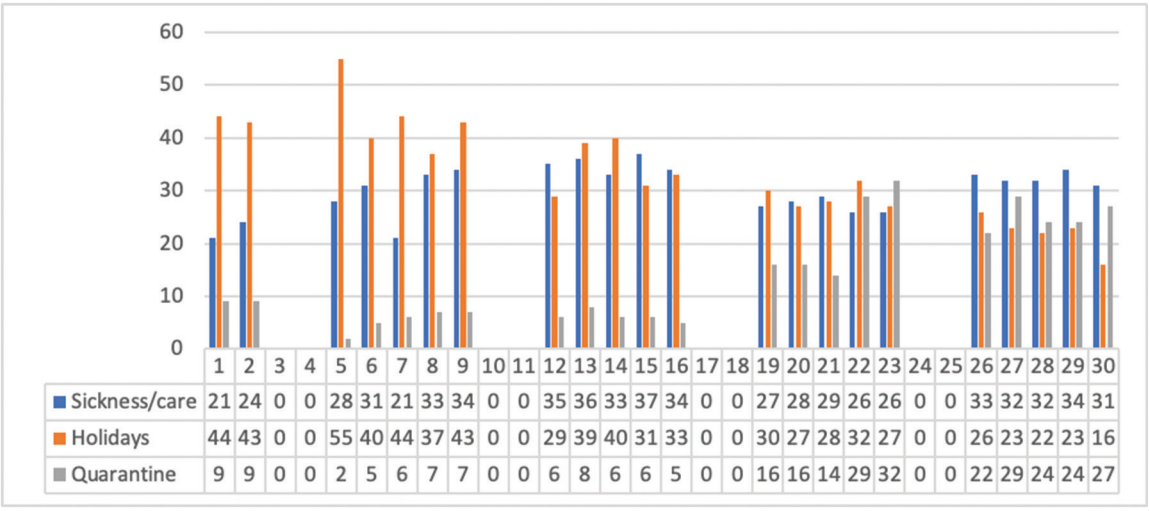


Figure 3. Medical staff absenteeism by 2020 [Own study].



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Sickness/care	21	24	0	0	28	31	21	33	34	0	0	35	36	33	37	34	0	0	27	28	29	26	26	0	0	33	32	32	34	31
Holidays	44	43	0	0	55	40	44	37	43	0	0	29	39	40	31	33	0	0	30	27	28	32	27	0	0	26	23	22	23	16
Quarantine	9	9	0	0	2	5	6	7	7	0	0	6	8	6	6	5	0	0	16	16	14	29	32	0	0	22	29	24	24	27

Figure 4. Work absenteeism of nursing and midwifery staff in October 2020 [Own study].

there was a very high percentage of absenteeism of medical staff, which was caused by the outbreak of infection in the Neurology Ward. Absenteeism of nurses and midwives also increased significantly during this time, as shown in the graph below (Figure 4).

It can be noted that with the introduction of new wards for hospitalization of SARS-CoV-2-infected patients, the level of staff absence due to quarantine has increased significantly. It should also be noted that during the month with the highest increase in infections in Poland, at Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój, the average number of absent nurses and midwives due to leave was about 30. This is a very high level of absence considering the pandemic situation prevailing in the country.

However, it is indisputable that all medical and nursing staff were as vulnerable to SARS-CoV-2 infection as the rest of the population. Mandatory quarantine or removal from work due to contact with an infected patient was unavoidable. Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój, despite the dynamically changing situation, fulfilled the tasks assigned to it, both in terms of infrastructure and staff. During the first infections in Poland, an isolation room was established on the premises of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój and, in addition, the staff undertook to perform swabs for miners in whom an outbreak of SARS-CoV-2 was identified. In mid-October, it was necessary to establish beds for patients infected with SARS-CoV-2, which resulted in further infrastructural changes and rotations among nursing and medical staff. Additionally, in December, the studied entity became a nodal hospital, because it undertook a vaccination program for medics. All these "extra" activities resulted

in staff shortages, which had a direct impact on the amount of medical services provided. However, similar to many other hospitals, Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój had to find itself in a new (pandemic) situation.

5 Studies on the impact of the COVID-19 pandemic on the functioning of hospital units

The survey was conducted among the employees of the Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój in December 2020. The survey involved 165 employees from various areas and its main objective was to ascertain the opinions of the staff working at WSS2 on the effectiveness and safety of the introduced solutions. The results of the survey are presented in the following section.

One of the first and more important questions was to determine the occupied position, which is shown in the graph below (Figure 5).

In this graph, it can be seen that the vast majority of respondents were sectional nursing staff, who accounted for 58.79% of all responses. This is an extremely important fact because these staff were essential to the provision of medical services during the COVID-19 pandemic, and they were the ones working on the front line of the fight against SARS-CoV-2 in hospitals. Among the respondents, 23.03% were classified under the job type "other", as most of them were administrative staff who were affected by the pandemic activities only to a very little extent. One of the next questions in the survey was to distinguish the area of work, i.e., the department in which the respondent worked (Table 4).

In the table above, it can be seen how the statistical number of answers has been arranged according to the area of work. Taking into account the fact that the questionnaire was originally administered in electronic form, most responses were received from people having direct access to computers in their work (i.e., administration, technical department, etc.). A high number of responses was also observed in the Cardiology and Internal Medicine Ward, the Nephrology and Internal Medicine Ward, and the emergency room, as well as in the anesthesiology and ICU and the Obstetrics and gynecology Ward. It should also be emphasized that, at the time of organizational changes and transformation of general facilities into those specialized for COVID-19-care, employees may have worked in several wards – e.g., in the pediatric ICU and in the Rehabilitation Ward – and thus some assessments might be duplicates. The assessments by employees of the effectiveness of the measures introduced—separately for employees whose wards were transformed as part of the hospital reorganization and employees whose wards remained in their respective area of specialization—are presented below (Figures 6 and 7).

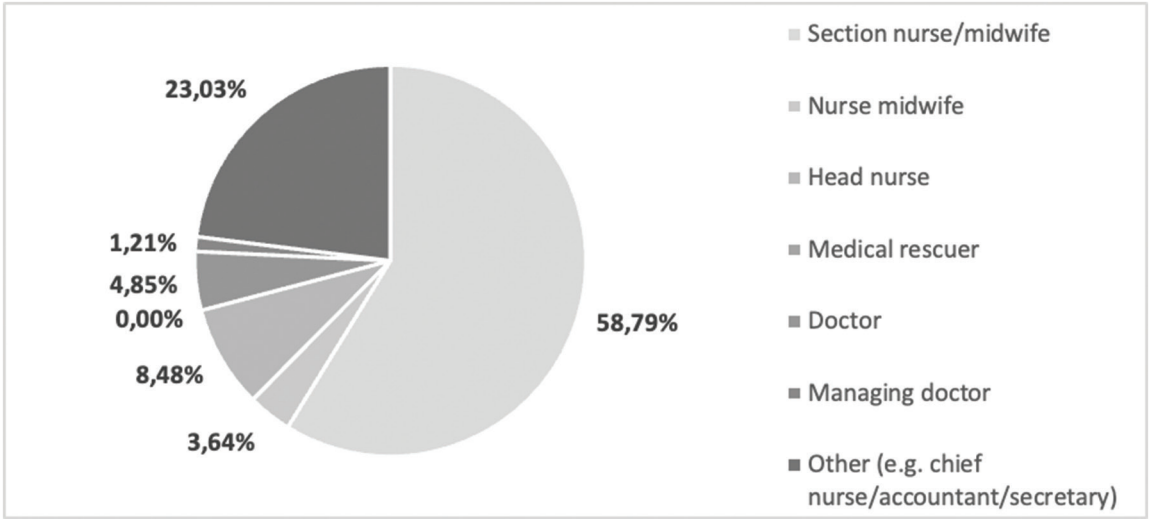


Figure 5. Workstation [Own study].

Table 4. Work area [Own study]

Branch/work area	Number of persons	Quantity as a percentage [%]
Pediatric	6	3.5
Anesthesiology and intensive care	15	8.7
Nephrology-internal	11	6.4
Pediatric intensive care	5	2.9
Rehabilitation	6	3.5
Gastrological and internal	2	1.2
Cardio-internal	12	6.9
Urology and urological oncology	4	2.3
Otolaryngology	5	2.9
Ophthalmology	2	1.2
Obstetrics and gynecology	11	6.4
Neonatology	8	4.6
General surgery	6	3.5
Neurosurgery	6	3.5
Neurology	10	5.8
Trauma and orthopedic surgery	7	4.0
Emergency room	13	7.5
Specialist clinics including primary health care	5	2.9
Administration	13	7.5
Hospital management	2	1.2
Other	24	13.9

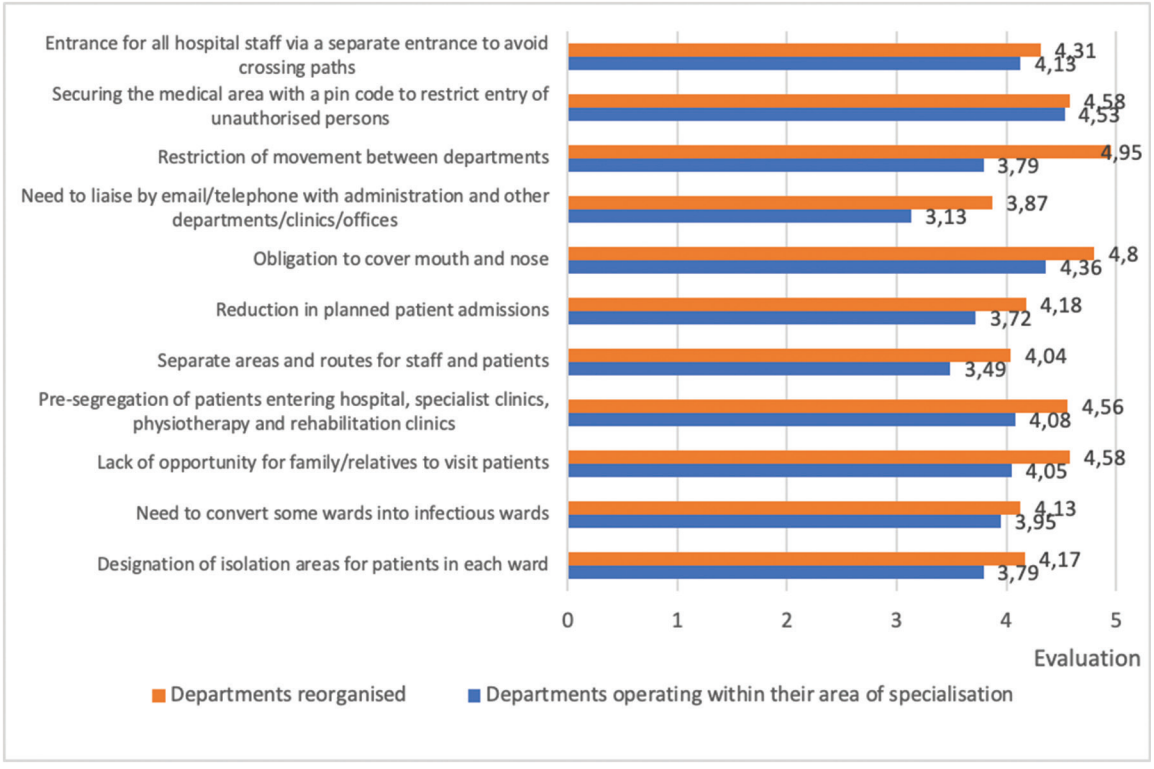


Figure 6. Assessment of the effectiveness of the introduced solutions by the staff of the reorganized wards and specialized wards [Own study].

The effectiveness of the introduced solutions (Figure 6) was rated much higher by the staff of the "Covid" wards, which means that the staff of these areas assess the introduced and undertaken measures much better, as they were the ones who implemented them or directly supervised their implementatio It should

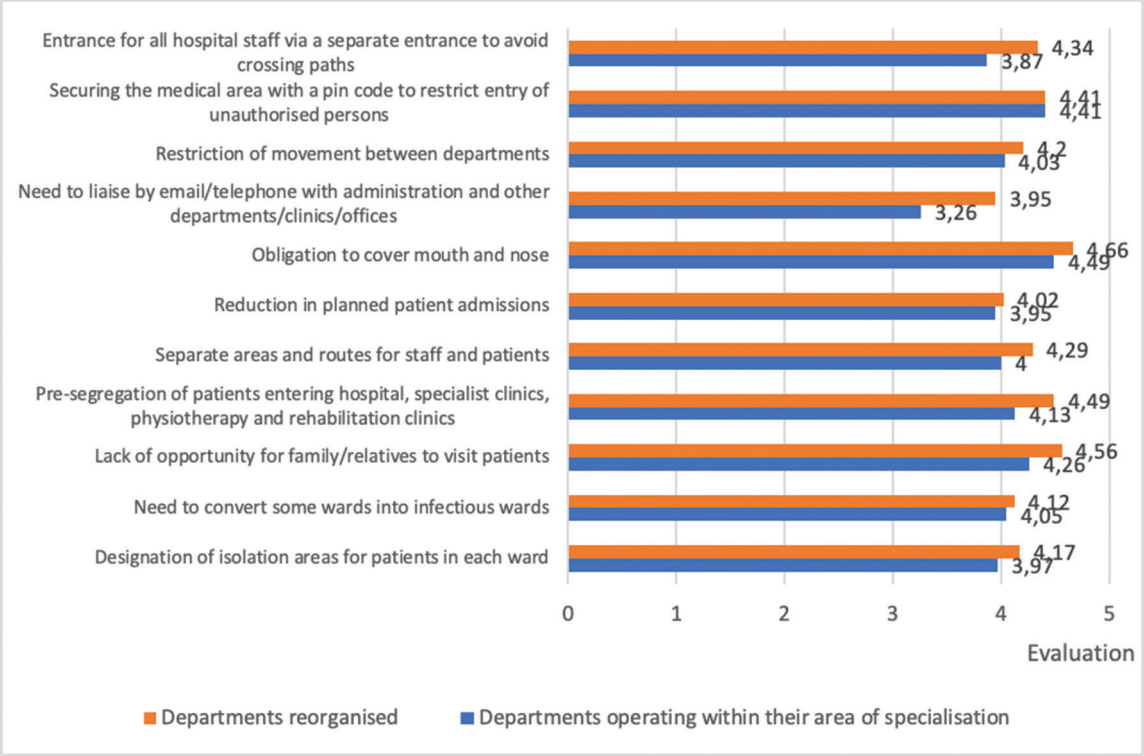


Figure 7. Assessment of the safety of the introduced solutions by the staff of the reorganized wards and specialized wards [Own study].

be recalled here that the transformed wards are Rehabilitation, Gastrointestinal, Nephrology-Intestinal, and Otolaryngology Wards. The biggest difference can be seen in the action "Restriction of movement between wards", as it is as high as 1.16 points. Employees providing medical services to patients infected with SARS-CoV-2 were required to use protective clothing and observe all sanitary strictures, which is why their score regarding movement within the hospital is so high. Their "Covid" awareness is much higher, as they had direct contact with the virus, while not all organizational measures taken in the hospital facility were approved by the staff. (A similar experience can be found in Ali et al., 2020). The "need to contact by e-mail/telephone..." was rated the worst (in terms of effectiveness) by staff in areas remaining in their specialties, as it imposed the obligation for staff to remain in the area of their department.

The safety of the introduced solutions is assessed at a similar level as their effectiveness. The wards which were subject to reorganization assessed the introduced measures slightly better in terms of safety. The staff of the wards operating in the unchanged structure assessed the safety of the solution related to the limitation of direct contact with employees of other organizational units rather poorly, which results from the fact that these wards in their specialty provided consultations to patients of other wards, e.g., surgery, preparing the patient for surgery, utilizing consultations with other specialists (e.g., cardiologists, anesthesiologists), and it was not always possible to provide consultation by telephone.

The chart below (Figure 8) shows the assessments of all WSS2 staff regarding the safety of the implemented solutions and their effectiveness.

It can be seen that workers rated the need to cover their mouths and noses very highly, both in terms of effectiveness and safety. This solution was imposed by the government and applied not only to health workers but also to the general public. It should be noted that the restriction of elective admissions was rated very low in terms of effectiveness and safety, because as medical personnel, they are aware of the consequences of the cessation of essential health services. Most medical facilities in 2020 have focused on "Covid" patients, ceasing to provide specialist services. Therefore, the effectiveness of the services provided has significantly decreased and this solution has not necessarily had a positive impact on the health situation in Poland. The measure to separate zones and routes for staff and patients was assessed

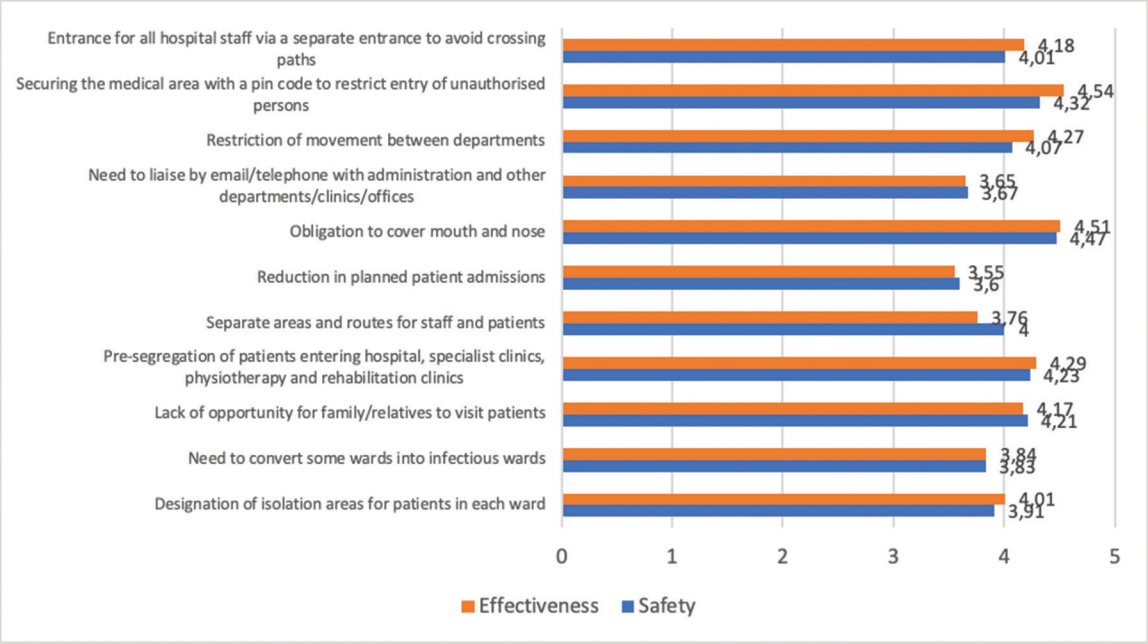


Figure 8. Assessment of the effectiveness and safety of the introduced solutions by the surveyed WSS2 staff [Own study].

Table 5. Monthly staff working time in the "Covid" ward [Own study]

Number of hours worked per month	Number of responses
Up to 132 h/month	15
Between 132 h/month and 160 h/month	16
160 h/month and over	27

as safe, but not necessarily effective. The reorganization of hospitals forced a change to be made in the infrastructure of traffic routes, which in some cases could not be fully implemented. The separation of entrances for different patients and staff took time and meant additional infrastructure.

The reorganization of the entire hospital forced the staff to undertake frequent interdepartmental rotations, with simultaneous provision of services in "Covid sections" or isolation rooms. Therefore, it became inevitable to appoint people to work with SARS-CoV-2 infected patients. The total number of respondents who were appointed to work in the "Covid" ward was 57 and their monthly working hours are shown in the table below (Table 5).

The above table shows that the monthly working time of the staff, on "Covid" sections, exceeded the normal working time. Due to staff shortages, it was necessary to perform work out of hours, which became a necessity in hospitals. Health care personnel, after some time, became overburdened with excessive duties and the number of hours spent in treatment facilities, and their constant reorganization and the prevailing chaos were not conducive to the exercise of their profession. Government measures, in the form of payment of additional funds, were to encourage medical and nursing staff to work with infected patients, but even this did not have the intended effect. The pandemic situation caused staff shortages due to mandatory quarantine or isolation, which contributed to calls for "help" from the military, miners, or firefighters.

The effectiveness of the medical services provided depended on the pandemic situation among staff, and thus testing for COVID-19 among WSS2 staff was important.

In the graph above (Figure 9), it can be seen that about 70% of the workers undertook a test for SARS-CoV-2, and out of this, only in 9% was the test due to a suspected infection not in the workplace. This

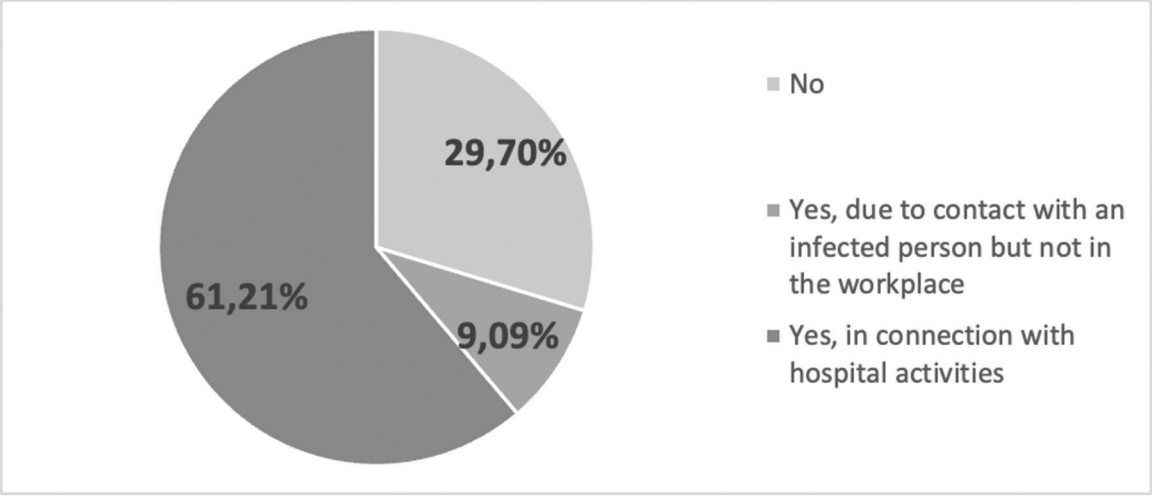


Figure 9. Performance of the COVID-19 virus test on WSS2 workers [Own study]. COVID-19, Coronavirus disease 2019.

Table 6. Assessment of the probability of infection by WSS2 employees [Own study]

Likelihood of infection (%)	
Patient	61.89
Collaborators	62.24
Families	51.39
Third parties (in a shop, walking, etc.)	61.82

result confirms that the hospital area was the place where there was the greatest risk of infection and, consequently, the obligation to isolate and quarantine medical staff. One of the questions to WSS2 staff was also to assess the likelihood of SARS-CoV-2 infection, as shown below (Table 6).

Despite small differences, this table shows that the most likely factor of infection, according to the assessment of WSS2 employees, was a co-worker, amounting to a likelihood of 62.24%, and the least, a family member, amounting to a likelihood of 51.39%. Although positive patients were treated in the hospital, they were not assessed as the main factor of possible infection. The answers thus given confirm the fact of high probability of acquiring the infection in the workplace from a colleague and this is due to the fact that, despite the applied restrictions, medical personnel spend time in direct contact with each other during breakfast breaks, in social rooms, and in changing rooms, not necessarily applying the principle of distance and masks. Moreover, the managers repeatedly made attempts to create working teams such that the created teams worked in a system of work without contacting each other – which theoretically appears to be a feasible procedure; in reality, however, in the area of work of doctors, nurses, and caregivers, it is very difficult to implement. Difficulties that accompanied attempts to apply such solutions were the fact of sickness absenteeism and the procedure of obligatory transmission of on-call reports. The assessment of the likelihood of high infectiousness among colleagues is also confirmed by the fact of infectious outbreaks occurring in the wards in 2020.

The whole prevailing situation, as well as organizational and infrastructural changes, had an impact on the well-being of healthcare workers. The question about fear for their health or life was answered by the respondents with 3.44/5 points, which means that the employees were not indifferent to the epidemiological situation in the country. On the other hand, the question of whether the possibility of contracting the virus negatively affects their work was rated at 2.71/5 points.

A total of 165 employees of Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój took part in the questionnaire survey. The questionnaire took place in December, i.e., at the end of the analyzed research

period, which significantly influenced the assessment of the introduced solutions. The survey was completely anonymous and voluntary, which made it possible to obtain reliable results.

6 Conclusions

During the state of pandemic in Poland in 2020, all establishments providing medical services were subject to constant reorganization. Legal changes, which were introduced in quick succession and at a very fast pace, did not allow for any kind of standardization of the work of health services.

The number and speed of the laws and soft-law measures did not allow for a stable situation to evolve in medical institutions, but caused their constant reorganization and introduced unnecessary chaos. Throughout the year, no coherent path was determined in the fight against the COVID-19 pandemic, which adversely affected the quality of health services provided. Decisions made throughout the calendar year focused solely on providing medical attention for COVID-19 patients, resulting in the cessation of essential health services. It should be remembered that during the COVID-19 pandemic, other diseases did not cease to exist. It was therefore necessary to treat them, but medical attention towards illnesses other than COVID-19 was significantly reduced in 2020. (Similar conclusions were reached in Peiffer-Smadja et al., 2020).

The reorganization of hospitals took place at a very fast pace, thus reducing the freedom of practice for medical and nursing staff. The rotation of staff between specialist wards and COVID wards caused, chaos, disorganization of working hours and, more importantly, disruption to the comfort of the health service. Fear of the virus among employees was evident in the number of holidays as well as the nursing or sick leave taken, and it should be stressed that it was they who became the "shield" of defense against the virus in 2020. Facilities providing medical services, especially those that dealt with COVID-19 positive patients, were most exposed to the possibility of another outbreak of infection, which, unfortunately, became inevitable.

As a result, another part of the medical and nursing staff was laid off, which resulted in staff shortages. Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój is one of the main multi-specialist hospitals in Silesia. Throughout 2020, it was called upon to carry out a wide variety of activities with which it has had to cope. The opening of isolation rooms and then "Covidium" sections was associated with the reorganization of infrastructure and also the beginning of providing medical services in "infectious wards". The solutions introduced by the management of the Voivodeship Specialist Hospital No. 2 in Jastrzębie Zdrój were assessed at a high level, which testifies to the awareness and rationalism involved in taking steps to combat COVID-19. The effectiveness and safety of the introduced solutions do not always go hand in hand, which was demonstrated by the opinion of the employees of WSS2. Limitations of planned admissions were negatively perceived by employees, as it was connected with discontinuation of medical services provided so far, which significantly influenced their effectiveness and quantity.

We managed to survive these challenges thanks to proper management; during this period, quick decisions and a good team were needed. Long-term contracts with suppliers also came in handy, preventing a shortage of personal protective equipment. It was also important to involve all staff members. Even the most refined system could not function properly if the speed of its evolution were too high to enable the staff members to keep pace.

Despite the arrival of the third wave at the beginning of 2021, the vaccination program put in place has significantly minimized the morbidity threshold. However, we must remember that this state of affairs we are living with, namely the constant changes in the global health situation, must contribute to the improvement of many systems. Organizationally, hospitals should be much more prepared for the forthcoming events. Above all, the state authorities should incorporate ways of tackling pandemics into their disaster management activities. The development of clear and transparent procedures for hospitals in Poland and elsewhere must take place immediately, so that the national health service can cope with similar cases. It is also worth emphasizing that the events that have taken place in recent years will teach everyone to react and help in various aspects of life.

References

Ali, Y., Alradhawi, M., Shubber, N., Abbas, A.R. (2020), Personal protective equipment in the response to the SARS-CoV-2 outbreak – a letter to the editor on "World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19)" (Int J Surg 2020; 76:71-6), International Journal of Surgery (London, England), Vol. 78, pp. 66–67, doi: 10.1016/j.ijsu.2020.04.051.

Ardebili, M.E., Naserbakht, M., Bernstein, C., Alazmani-Noodeh, F., Hakimi, H., Ranjbar, H. (2021), Healthcare providers experience of working during the COVID-19 pandemic: a qualitative study, American Journal of Infection Control, Vol. 49, No. 5, pp. 547–554, ISSN 0196-6553, doi: 10.1016/j.ajic.2020.10.001.

Chluska, J. (2021), The Intellectual Potential of Employees in Hospital Management, in: *ECKM 2021 22nd European Conference on Knowledge Management*, Coventry, UK, 2–3 September 2021, pp. 153–161.

Czarnowska, A., Kapica-Topczewska, K., Zajkowska, O., Adamczyk-Sowa, M., Kubicka-Bączyk, K., Niedziela, N., Warmus, P., Kalinowska-Łyszczarz, A., Kania, K., Słowik, A., Wnuk, M., Marona, M., Nowak, K., Bartosik-Psujek, H., Lech, B., Perenc, A., Popiel, M., Kucharska-Lipowska, M., Chorąży, M., Tarasiuk, J., Mirończuk, A., Kochanowicz, J., La-sek-Bal, A., Puz, P., Maciejowska, K., Wawrzyniak, S., Niezgodzińska-Maciejek, A., Pokryszko-Dragan, A., Gruszka, E., Budrewicz, S., Białek, M., Zwiernik, J., Michałowska, A., Nosek, K., Zwiernik, B., Lewańczyk, B., Brola, W., Kułakow-Ska, A. (2021), Symptoms after COVID-19 infection in individuals with multiple sclerosis in Poland. Journal of Clinical Medicine, Vol. 10, p. 5225, doi: 10.3390/jcm10225225.

Debowska, A., Horeczy, B., Boduszek, D., Dolinski, D. (2020), A repeated cross-sectional survey assessing university students' stress, depression, anxiety, and suicidality in the early stages of the COVID-19 pandemic in Poland, Psychological Medicine, Vol. 2020, pp. 1–4, doi: 10.1017/S003329172000392X.

Demirhan, R., Çimenoğlu, B., Yılmaz, E. (2020), The effects of hospital organization on treatment during COVID-19 pandemic, Southern Clinics of Istanbul Eurasia, Vol. 31, No. 2, pp. 89–95, doi: 10.14744/scie.2020.32154.

Garbey, M., Joerger, G., Furr, Sh., Fikfak, V. (2020). A model of workflow in the hospital during a pandemic to assist management, PLoS ONE, Vol. 15, No. 11, pp. e0242183.

Gostin, L. (2006), Public health strategies for pandemic influenza: ethics and the law, JAMA, Vol. 295, No. 14, 1700–1704, doi: 10.1001/jama.295.14.1700.

He, Y., Liu, N. (2015), Methodology of emergency medical logistics for public health emergencies, Transportation Research Part E: Logistics and Transportation Review, Vol. 79, pp. 178–200, ISSN 1366-5545, doi: 10.1016/j.tre.2015.04.007.

Hospital Information System (June 2021), [Online], retrieved from https://szpital.slask.eu:4433/page/1,raporty-szpitali.html?id=100 [1st June 2021].

Iversen, K., Bundgaard, H., Hasselbalch, R.B., Kristensen, J.H., Nielsen, P.B., Pries-Heje, M., Knudsen, A.D., Christensen, C.E, Fogh, K, Norsk, J.B., Andersen, O, Fischer, T.K., Jensen, C.A.J., Larsen, M., Torp-Pedersen, Ch., Rungby, J., Ditlev, S.B., Hageman, I., Møgelvang, R., Hother, Ch. E., Gybel-Brask, M., Sørensen, E., Harritshøj, L., Folke, F., Sten, C., Benfield, T., Nielsen, S.D., Ullum, H. (2020), Risk of COVID-19 in health-care workers in Denmark: an observational cohort study, The Lancet Infectious Diseases, Vol. 20, No. 12, pp. 1401–1408, ISSN 1473-3099, doi: 10.1016/S1473-3099(20)30589-2.

Karakose, T., Malkoc, N. (2021), Psychological impact of the COVID-19 pandemic on medical doctors in Turkey, Social Behavior and Personality: an International Journal, Vol. 49, No. 1, pp. 1–10, Scientific Journal Publishers, doi: 10.2224/sbp.9890,

Kargar, S., Pourmehd, M., Paydar, M.M. (2020), Reverse logistics network design for medical waste management in the epi-demic outbreak of the novel coronavirus (COVID-19), Science of The Total Environment, Vol. 746, p. 141183, ISSN 0048-9697, doi: 10.1016/j.scitotenv.2020.141183.

Kulińska, K. (2020). The role of language policy of state in crisis management: a case study on the example of access to information and public services in polish sign language during epidemic of SARS-Cov-2 W, in: *Proceedings of the 35th International Business Information Management Association Conference (IBIMA)*, 1–2 April 2020, Seville, Spain. Education Excellence and Innovation Management: a 2025 Vision to Sustain Economic Development during Global Challenges/red. Khalid S. Soliman, 2020, s. 16353–16361, ISBN 978-0-9998551-4-0.

Ledwoń, P. (2020), Wybrane krajowe i unijne instrumenty prawne jako stymulatory mikroprzedsiębiorczości i konieczny interwencjonizm w okresie pandemii COVID-19, Ekonomia Społeczna nr 2/2020, pp. 107–114.

Lu, W., Wang, H., Lin, Y, Li, L. (2020), Psychological status of medical workforce during the COVID-19 pandemic: a cross-sectional study, Psychiatry Research, Vol. 288, p. 112936, ISSN 0165-1781, doi: 10.1016/j.psychres.2020.112936.

Malesza, M., Kaczmarek, M.C. (2021), Predictors of anxiety during the COVID-19 pandemic in Poland, personality and individual differences, Vol. 170, p. 110419, ISSN 0191-8869, doi: 10.1016/j.paid.2020.110419.

Map of Coronavirus Infections (June 2021), [Online], retrieved from https://www.gov.pl/web/koronawirus/mapa-zarazen-koronawirusem-sars-cov-2 [20th June 2021].

Muldoon, K.A., Denize, K.M., Talarico, R., Fell, D.B., Sobiesiak, A., Heimerl, M., Sampsel, K. (2021), COVID-19 pandemic and violence: rising risks and decreasing urgent care-seeking for sexual assault and domestic violence survivors, BMC Medicine, Vol. 19, p. 1.

Peiffer-Smadja, N., Lucet, J.-C., Bendjelloul, G., Bouadma, L., Gerard, S., Choquet, C., Jacques, S., Khalil, A., Maisani, Casalino, E., Descamps, D., Timsit, J.-F., Yazdanpanah, Y., Lescure, F.-X. (2020), Challenges and issues about organizing a hospital

to respond to the COVID-19 outbreak: experience from a French reference centre, Clinical Microbiology and Infection, Vol. 26, No. 6, pp. 669–672, ISSN 1198-743X, doi: 10.1016/j.cmi.2020.04.002.

Rossetti, M.D., Buyurgan, N., Pohl, E. (2012), Medical supply logistics, in: R. Hall, (Ed.), *Handbook of healthcare system scheduling. international series in operations research & management science*, Vol. 168. Springer, Boston, MA, doi: 10.1007/978-1-4614-1734-7_10.

Sartini, M., Del Puente, F., Oliva, M., Carbone, A., Blasi Vacca, E., Parisini, A., Boni, S., Bobbio, N., Feasi, M., Battistella, A., Pontali, E., Cristina, M.L. (2021), Riding the COVID waves: clinical trends, outcomes, and remaining pitfalls of the SARS-CoV-2 pandemic: an analysis of two high-incidence periods at a hospital in Northern Italy. Journal of Clinical Medicine, Vol. 10, p. 5239, doi: 10.3390/jcm10225239.

Turris, S.A, Lund, A., Bowles, R.R., Camporese, M. Green, T. (2017), Patient presentations and medical logistics at full and half ironman distance triathlons, Current Sports Medicine Reports, Vol. 16, No. 3, pp. 137–143, doi: 10.1249/JSR.0000000000000367.

Urooj, U., Ansari, A., Siraj, A., Khan, S., Tariq, H. (2020), Expectations, fears and perceptions of doctors during COVID-19 pandemic, Pakistan Journal of Medical Sciences, Vol. 36, No. COVID19-S4, pp. S37–S42, doi: 10.12669/pjms.36.COVID19-S4.2643.

Xiang, Y.-T., Zhao, Y.-J., Liu, Z.-H., Li, X.-H., Zhao, N., Cheung, T., Chee, H. (2020), The COVID-19 outbreak and psychiatric hospitals in China: managing challenges through mental health service reform, International Journal of Biological Sciences, Vol. 16, No. 10, 1741, doi: 10.7150/ijbs.45072.

Yu, H., Sun, X., Solvang, W.D., Zhao, X. (2020), Reverse logistics network design for effective management of medical waste in epidemic outbreaks: insights from the Coronavirus Disease 2019 (COVID-19) outbreak in Wuhan (China), International Journal of Environmental Research and Public Health, Vol. 17, p. 1770, doi: 10.3390/ijerph17051770.

Zhai, Y., Li, Y. (2017), The research on influencing factors of medical logistics cost based on ISM model, in: MATEC Web of Conferences, Vol. 100, 02030, doi: 10.1051/matecconf/201710002030.