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Article

The Effectiveness of Healthcare System Resilience during the COVID-19 Pandemic: A Case Study

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Abstract: Introduction. The outbreak of the COVID pandemic was a period of uncertainty and tension for healthcare managers, resulting from the lack of knowledge, i.e. about the transmission of the virus, but also from the lack of uniform organisational and treatment procedures. It was the period where the ability to prepare to a crisis situation, to adapt to the existing conditions and to draw conclusion from the situation were critical to keep ICUs operating. The aim of this study was to show the preparation of an ICU in Poland to ensure resilience, and also the methods of reacting during the COVID-19 pandemic on both central and local level. **Methods**. Based on the EC and WHO guidelines on resilience a matrix of 6 elements and 13 standards assigned to them was created, with a series of questions from a survey questionnaire. **Results**. Good management in resilient systems is free access to any resource. A free and transparent flow of information and also well motivated human resources in an appropriate number. **Conclusion**. Appropriate preparation, adaptation to the existing situation and effective management of crisis situations is an important element of ICU resilience.

Keywords: resilience; nurse; ICU; nursing care; Health Care System; Covid-19

1. Introduction

The outbreak of the COVID pandemic was a period of uncertainty and tension for healthcare managers, which resulted from the lack of knowledge, i.e., concerning the transmission of the virus, but also from the lack of uniform organisational and treatment procedures. Good management requires, among other things, transparent flow of information, which is also a key element of resilience necessary to create management staff resilience. At the level of practice, a manager requires stable access to an undisturbed flow of resources of all kinds, should have the ability to react to crises and be able to manage in crisis situations. This should enable achieving an appropriate level of reacting to such turbulences as the COVID pandemic.

1.1. Healthcare systems resilience — global context

Ensuring resilience, which could be a cure for health debt in a pandemic, is a challenge for the healthcare system. After the Ebola epidemic (in 2014) we have obtained knowledge of what to do and how to appropriately react to the next turbulence [1, 2]. Management support tools were provided by the World Health Organisation (WHO) [3] and by the European Commission (EC) [4]. The authors of the article have undertaken to

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show the preparation of an ICU unit in Poland in order to achieve resilience. The manner of reacting during the COVID-19 pandemic at the central and the local level both was shown. The authors are attempting to respond to the question whether it was possible to achieve Universal Health Coverage (UHC) due to resilience, and if so, then within what scope. The following definition of resilience was adopted: "*resilience as the ability to prepare for, manage (absorb, adapt, and transform) and learn from shocks"* [4] Resilience is access to UHC understood as: 1. An adequate number of trained health workers; 2. Available medicines; 3. Robust health information systems, including surveillance; 4. Appropriate infrastructure; 5. Sufficient public financing; 6. A strong public sector to deliver equitable, quality services [5].

The European Commission has indicated the main pillars of resilience in 2014 already, at the same time requesting member states to prepare for another crisis in healthcare. The indicated elements of resilience include: *stable funding mechanisms; sound risk adjustment methods; good management, information flows in the system and adequate costing of health services, a health workforce of adequate capacity and with the right skills* [4]. They are all important and interdependent. It is believed that the process of creating resilience may be supported by improvement of healthcare policy, directing it at health promotion and infectious disease prevention, and also structural reforms which ensure maintaining healthcare financing balance [6]. World Health Organisation has distinguished 13 strategies [3], which fit into the EC's concept of 6 pillars of resilience. For the purposes of the article, they were classified in a table (Tab. 1.) [3,4], in order to present the pandemic preparation of an ICU unit in Poland in a structured form in subsequent sections of the article.

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Table 1. ICU resilience matrix with assigned questions.

I. Good management	II. Sound risk adjustment methods	III. A health workforce of adequate capacity and with the right skills	IV. Information flows in the system	V. Stable funding mechanisms	VI. Adequate costing of health services
1. Effective and participatory leadership with a strong vision and communication **Q 18; 24; 25; 27; 39**	5. Surveillance enabling timely detection of shocks and their impact Q 14; 15; 38	10. Appropriate level and distribution of human and physical resources Q 14; 15; 19; 21; 22; 23	4. Effective information systems and flows Q 10; 28; 30	6. Ensuring sufficient monetary resources in the system and flexibility to reallocate and inject extra funds Q none	9. Comprehensive health coverage Q none
2. Coordination of activities across government and key stakeholders **Q 13; 15; 35**	8. Purchasing flexibility and reallocation of funding to meet changing needs Q none	12. Motivated and well-supported workforce Q 32; 39		7. Ensuring stability of health system funding through countercyclical health financing mechanisms and reserves Q none	
3. Organizational learning culture that is responsive to crises **Q 16; 17; 29; 36**	13. Alternative and flexible approaches to deliver care Q 16				
	11. Ability to increase capacity to cope with a sudden surge in demand. Q 15; 16; 32; 34				

It was assumed that in case of the EC's Good management (I) the following may be important: Effective and participatory leadership with a strong vision and communication (1) (WHO) and Coordination of activities across government and key Stakeholders (2) (WHO). Whereas for Information flows in the system (IV) the **Effective information systems and flows (4)** are important.

1.2. Readiness of the system for a pandemic-caused crisis

I. Good management in resilience applies to the roles of bodies at all management levels [EC 4, WHO 3]. This is primarily an issue of cooperation between sectors, agreements with, e.g., international agencies, service providers, non-governmental organisations. The ***Effective and participatory leadership with a strong vision and communication (1)*** and ***Coordination of activities across government and key***

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Stakeholder (2) were assigned to this category, as well as ***Organizational learning culture that is responsive to crises (3).***

In the scope of *Coordination of activities across government and key Stakeholders*, in which inter-sector cooperation is necessary [3], in March of 2020 only 32 countries of 47 have "managed the pandemic" on a governmental level. The ICUs were a key location where services were provided to COVID patients. The manner of ICU organisation, necessary equipment and detailed requirements concerning the qualification of medical staff is standardised [7]. Due to their lack of efficiency 21 hospitals in Poland were transformed into COVID hospitals [8], in every province a temporary hospital was created, thus increasing the number of beds with the necessary infrastructure by 5500. At the central level, the National Consultant in Nursing has established procedures [9] based on the Ministry of Health guidelines [10, 11].

Good management understood as *effective and participatory leadership with a strong vision and communication* [3] and strong and flexible leadership [12] has a special impact on employees during a crisis. A strong connection/link between manager resilience and employees' problem-solving ability was demonstrated [13, 14]. The role of the manager was adapting the infrastructure to existing needs, managing of available competencies, monitoring of risks, following procedures and securing of Personal Protective Equipment (PPE) [15, 16, 17]. In 2021 34% of all countries have reported the lack of PPE, the lack of possibility of financing of PPE, 22% the lack of distribution capacities, and 1 out of 10 WHO countries have stated the lack of clear procedures for handling PPE [18]. The report has no data from Poland.

Effective and participatory leadership with a strong vision and communication (1) is understood by the authors as, among others, good international cooperation, sharing of models for proceeding or of data necessary for the creation of predictive models. We have focused here on the communication of data, using it to create databases and ensuring the flow of information necessary to make administrative and clinical decisions [19]. Nursing care data were unavailable. In many countries the recommended statistics terminology [20] was not implemented in the nursing practice [21]. In Poland it was piloted in electronic documentation, and the results of the pilot programme were published in the December of 2020. There were no implemented indicators available in the IT tools for the assessment of the impact of nursing care on e.g., patient deaths [22, 21]. The nurses did not prepare care plans [1] and administrate them, they had no access to an IT system which would enable their collection, analysis and evaluation.

Organizational learning culture that is responsive to crises **(3)** Building resilience is also the ability to draw conclusions from experience — successes and failures, which ensures effectiveness of actions taken during a crisis situation [23]. International Nurses Day (IND) and Chartered Institute of Personnel and Development (CIPD) [24] have indicated, among others, organisational structure and culture and the importance of the ability to introduce changes during a crisis situation as important in the building of resilience. During the pandemic the concept of dealing with a crisis situation was changing thanks to, among others, new data and feedback from colleagues. Turbulent environment is dynamic and requires significant attention. It also carries the possibility of changes which would result in the lowering of risk and introduction of innovative solutions necessary for the correct functioning of the unit.

II. Sound risk adjustment methods are, according to the authors, the ***Ability to increase capacity to cope with a sudden surge in demand*** **(11)**. For the duration of pandemic, European Centre for Disease Prevention and Control (ECDC) has issued recommendations which indicated three organisational zones within the ward: green, yellow and red [25]. Recommendations of a team of national consultants have established that in a 10-bed unit during a shift (12 h) there should be: 5 anaesthesia nurses, 2 general nurses, 2 EMTs

[1] A **nursing care plan (NCP)** is a formal process that correctly identifies existing needs and recognizes potential needs or risks. Nursing care plan formats are usually categorized or organized into four columns: (1) nursing diagnoses, (2) desired outcomes and goals, (3) nursing interventions, and (4) evaluation.

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and 2 students [26]. The unit was converted to a 2nd reference level unit for 9 patients with COVID-19 by a decision of the province governor. The authors have included CPD (Continuous Professional Development) as a part of ***strategy of Alternative and flexible approaches to deliver care*** **(13)** — understood as the provision of training necessary to maintain readiness to react to crisis situations and cross-training [27], such as: treatment of specific or at-risk population groups; ensuring the provision of services for these groups, and maintaining of the standards of quality and safety of all services. Training was conducted at the level of hospital, concerning: the procedures for a patient's hospital admission, isolation procedures, the use of PPE, pathogen transmission routes, handling of infectious material, decontamination of the environment, handling of medical documentation and patient visits. The deficit of nursing resources progressing for years and deficiencies of the infrastructure have resulted in care being provided to a limited number of patients. Therefore, at the governmental level appropriately equipped multi-bed hospitals were opened in sports or exhibition halls. The personnel in these hospitals received additional financial incentives. The basic salary amounted to no less than 200% of average pay at the given position [28]. The strategy ***Surveillance enabling timely detection of shocks and their impact (5)*** during the pandemic was based mainly on the dissemination of proven knowledge, creation of procedures intended to, among others, ensure early detection of threats and implementation of actions and quick reaction. European Observatory [3] emphasises the significant role of effective flow of information to all participants of a given activity.

III. A health workforce of adequate capacity and with the right skills was referred to Appropriate level and distribution of human and physical resources (10), which was key for the safety of patients and was emphasised in nursing organisations' resilience documents [EFN 29, ICN 30]. The data indicate that up to 66% of countries have reported insufficient resources for the provision of care during the COVID pandemic [31]. In Poland the number of nurses employed in the system for the day of 31.12.2020 amounted to N = 231,612, whereas on 2021 N = 234,117 [32]. There were 5.1 nurses per 1000 inhabitants, and it was one of the lowest indicators per 1000 patients in the EU [33]. According to the data of Centre of Postgraduate Education for Nurses and Midwives (CKPPiP) [34] in the year 2020 there were 11,945 specialists in anaesthesiologic and intensive care nursing in Poland. In 2022 this number increased to 14,123 specialists. During this time (23.1.2021) the number of occupied respirator beds exceeded 1500 [31]. The lack of competencies necessary to ensure the optimum quality of care [35], which would prevent the avoidable deaths or reduce the cost of care [36] is also key for the financial resources. The nurses were frequently the only point of contact between patients and families. They enabled direct contact with patients using IT devices. Thus, the assessment of available nursing resources [37] Motivated and well-supported work-force (12) to retain the necessary competencies are the priorities which impact the nurses/patients ratio [38]. Despite that fact, the nurses/patients ratio standards were suspended and a 3-months training was introduced for nurses which were not practising the profession for 5 years, and nurses without the required competencies were requested to complement them before the date of 31 December 2022 [39]. To meet the needs, the Polish Association of Anaesthesia and Intensive Care Nurses (PTPAiIO) created and implementing emergency disaster plans to support patients and communities while strengthening their workforce has drawn up a programme for rapid training for general nurses [40]. The systemic encouragement of nurses to familiarise themselves with work in the ICU did not achieve the expected effects. Support was received from medical higher education schools. The students of medicine and nursing when working with patients were credited with selected learning outcomes, resulting from the curriculum. The pandemic situation has negatively impacted the motivations for actions, causing a tension in relationships and fear against the provision of health services and the proven relationship to PPE access. This has increased the anxiety and stress at work during the pandemic [41]. The non-financial incentives which could support the retention of employees during the pandemic include, e.g., team relations, support on the part of colleagues (OR=5), access to equipment (OR = 2) — they are important factors of

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Positive Practice Environment — which have an impact on the decision to leave work/profession, already demonstrated in Poland before the pandemic [42]. The COVID-19 pandemic has intensified this phenomenon [43, 44]. The impact of the lack of staff on the quality of care [45] and deaths of patients [46, 47] was proven in many studies, just as the impact of working conditions [48, 49].

At the level of the described ward actions were undertaken which consisted of assessment of the nurses ratio, leaves were suspended (this applied to 92% of employees on a national level) [50]; nurses were delegated from other wards and additional medical on-call shifts were planned [51]. Other hospital wards have delegated nurses for the delivery of nursing care [52]. Adaptation at the ICU was related to the feeling of insecurity and fear of infection. It should be emphasised that a total of 115,000 healthcare worker deaths from COVID-19 exposure were noted, and 30% of the infected personnel were nurses [53]. It was reported that their families were also suffering [54], and due to the fear of infecting their loved ones, nurses were living at the wards or remained isolated (accommodation was organised outside of the hospital), which frequently resulted in their children remaining without care. Thus, access to personal protective equipment (PPE) became a key issue [55], and its lack in the initial phase of the pandemic increased the fear of infection. Support was provided by society and by entrepreneurs. However, working in PPE was a hindrance for nurses, since it impacted concentration and motor skills, and the temperature inside the overalls has caused dehydration, cardiac arrhythmias and headaches [56], hindering the possibility of relieving physiological needs of the body. Problems in communication with the team and the patients were also reported, which could cause a risk to patient safety.

The low financial resources also had an impact on the lack of personnel (OECD 2021) [33]. The financial incentives , also for hospital employees, were supposed to become an incentive. Covid financial incentives were introduced (in April 2020), to which employees practising a medical profession and providing healthcare services in direct contact with patients with suspected or established SARS-CoV-2 virus infection were entitled. These bonuses were 100% (but no more than PLN 15,000) of the gross remuneration [57] and also applied to freelance personnel [58]. Their principles and the groups that were entitled to them were corrected by subsequent requests by the Minister for Health (not in the form of a legal act). A total of PLN 8.5 billion (€ 1,868,747,938.88) were assigned or this purpose [59] in 2021, including (for the first time since the pandemic) PLN 223 million (€ 49,027,151.81) for one-time financial incentives for non-medical personnel [PLN 5,000 per person (approx. 1099 €)] This bonus was in force until the March of 2022 [60]. The list of entitled persons was drawn up by facility managers. Until today, the manner of assigning of incentives is a cause for employee claims [61]. Until the February of 2022 the NFZ fund has paid out PLN 8.9 billion (€ 1,930,585,683.2972) [62] for 105,000 employees in 690 of healthcare entities [63].

IV. Information follows in the system on national level was classified as, among others, monitoring the continuity of essential health services, long-term effects of essential health service disruptions, tracking and addressing the infodemic and health misinformation, collecting or collating data on COVID-19 and comorbidities; collecting or collating data on post-COVID-19 condition, which due to the lack of IT systems were kept in Excel and thus were distributed [64]. At a later stage of the pandemic, at the central level from EU funds the eHealth Centre has started a system for recording of entries into the territory of Poland (EWP). It is monitoring the state of epidemic risk in Poland. The data related to incidence of COVID-19, quarantine stays, isolation stays are collected and analysed for the purposes of pandemic management. EWP contains a central database of all persons under quarantine and isolation at home [65]. Access to medical information was also provided by the Internet Patient Account (IKP) portal which was commissioned before the pandemic, which the patients have used for access to their prescriptions. Since the moment the pandemic started a record-breaking increase in the number of IKP users was noted, from 875,000 at the beginning of the pandemic to 4,700,000 in January of 2021 [66]. A monitoring and forecasting team was also appointed by the Minister for Health, which

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was required to compare the data of various classes of epidemiological models and approaches to the forecasting of the epidemic [67]. Nursing care was not visible in the system. Nurses did not have tools available for preparing of care plans, which were necessary for inclusion in predictive models, even though their importance in this area was proven [68]. In clinical practice in Poland, the nurses do not prepare care plans and no not manage them, which may disturb the Care Transition process for COVID-19 patients.

V. Stable funding mechanisms enabling the planning and optimum use of funds in the future guarantees the ensuring of multiple elements of resilience. The plan of public expenditure for health care in 2020 amounted to PLN 107.8 billion (€ 23,744,493,392.07). During the year it was increased to an amount of PLN 123.6 billion, and their actual execution was PLN 116.3 billion (€ 25,616,740,088.11), including PLN 6.8 billion from the COVID-19 Prevention Fund transferred to NFZ. It amounted to 5.5% of the GDP [69] (of 2020) [70]. These funds in 2020 were almost PLN 13.7 billion (€ 3,017,621,145.37) higher (by 13.3%) than in 2019. In 2021 the plan of public expenditure for health care amounted to PLN 172.9 billion (€ 37,505,422,993.49) [61] and amounted to 6.6% of GDP and was higher by 21 billion compared to 2019. In 2022 the plan was PLN 130,590,664 (€ 27,263,186,638.83) [71] and was increased in the middle of the year by 6.5 billion / (€ 1,356,993,736.95) [72, 73]. At the national level agreements with private health facilities to deliver essential health services supported through public funds were deemed important. Such agreements applied to 46% countries worldwide [74]. The ICU services were financed by an agreement with the public payer (National Health Fund — NFZ). Units of the 1st and 2nd level of COVID protection general hospitals) [75] received funds for keeping beds in readiness [76] and it was on an average € 157 (PLN 717) [77] /per day/per bed (compensation for the lost income from health services provision agreement) [76]. The National Health Fund (NFZ) also financed beds not covered by an agreement € 21.96 (PLN 100) /day/bed and access to respirators not covered by an agreement € 43.9 (PLN 200)/day/1 respirator. The effect of the pandemic was the limitation of UHC (cancer screening diagnostics were limited and waiting times for specialists increased, among others) and shortening of average lifespan of Poles. The healthcare debt is increasing [33].

2. Materials and Methods

An attempt to assess the resilience of an organisation which is the ICU. A question was posed — what solutions were implemented in order to meet the challenge of the pandemic and how they were assessed by their direct users — the ICU nurses. How did they assess the preparation of their entities for crisis management. In the first phase, in order to sort the assessed variables, a panel of experts have assigned the 13 WHO strategies [3] to the VI EC pillars of resilience [4]. In the subsequent phase questions from a survey questionnaire were assigned to WHO strategies shown on table 1. The article has also performed qualitative analysis of resilience, assessing the described ICU during the COVID-19 pandemic using a "case study" method, by applying the *as is* condition of the ICU in the M. Pirogow Specialist Province Hospital in Łódź to the 13 WHO strategies. The quantitative study is a survey questionnaire consisting of 39 questions, including 2 open-ended and 37 closed-ended or semi-open-ended questions, with single or multiple choice and with a version of presenting answers — assessing the preparation of units which provide services in the ICU, which was drawn up based on literature in this area [78, 79]. It was divided into a section with socio-demographic questions, that is: gender, age, education or position and a section assessing the preparation, prevention, reacting to and mitigating the effects of a crisis situation (pandemic). The data was collected in an electronic format with Google Forms. Participation in the survey was anonymous. The study was conducted in the period of 13 July 2020 until 4 April 2022 by (1) publishing a link on the website of Polish Association of Anaesthesia and Intensive Care Nurses — www.ptpaio.pl and (2) e-mails directed to randomly selected entities with ICU units. A total of 40 responses were collected as a result of the study.

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The data analysis was conducted using the Microsoft Excel 2014 software (Łódź, Poland). Due to the low number of the answers the results were presented using descriptive statistical data.

3. Results

3.1. Readiness of the system for a pandemic-caused crisis

I. Good management described in the publication as ***Coordination of activities across government and key stakeholders (2)*** at the local level was assigned to the following answers: hospital possessing its own crisis management plan, which was indicated by ¾ of respondents (Q35). As the most important of the management cycle phases over half (60%) have considered all phases (Q13) and education of personnel (a vast majority, 90%), the ability to prepare and simulate procedures and improving of the ward's infrastructure (70% of the surveyed) (Q15). In the context of ***Effective and participatory leadership with strong vision and communication (1)*** the respondents (over 80%) have indicated effective decision-making skills, effective communication skills and the ability to motivate the personnel (over 70% of respondents) (Q39). As the most important of managerial practices in a crisis situation over 70% have indicated "continuous assessment of situation" and the "ability to delegate tasks", and more than half "composure when making decisions" and "knowledge about the crisis situation that has occurred" (Q18). Almost all questioned persons have responded that „full information should be addressed to all employees" (Q24). Up to 60% of the surveyed have indicated electronic means as the communications channel. Only every 8th surveyed nurse (20%) considered direct meetings of the supervisor with employees to be important. Only 20% of nurses have received written information about the procedures (Q25). The distribution of answers for the most effective manner of information management was almost even for every descriptor. Provision of information in written format was indicated by almost 28% of the surveyed persons, in an electronic form and oral form by 25% of respondents. Slightly less, 20% have indicated the provision of information using a messenger application [80]. Only providing information in written form was indicated by almost 30% of the surveyed (Q27). ***Organizational learning culture that responsive to crises*** **(3)** To the question concerning the necessary elements of the response phase 82,5% of the surveyed have indicated immediate response to threats and almost 70% the importance of coordinating the maintenance of operational continuity of the ICU and launching support for medical personnel (Q16). In the recovery phase 30% of respondents have indicated the assessment of the current status as the most important. Whereas only 17% of the surveyed have indicated the assessment of the effectiveness of the actions taken. Nobody has indicated the evaluation of the notification system as a necessary action in the recovery phase (Q17). The surveyed have considered the establishing of procedures or their modification, recommendations, and maintaining a good flow of information and using proven sources of information to be the most effective actions. Every fourth surveyed has indicated the above actions to be most effective (Q29).

An answer to the crisis is related to decision making at all organisational levels. According to 3/4 of respondents (75%) an important element of crisis management is the knowledge of availability of resources (material, information, human and financial). Over 60% of respondents have pointed out the need for communication of full information [81] from superiors. Only ¼ of the surveyed have indicated knowledge of the law on crisis management, 40% of respondents have identified knowledge of the threat as the basis for crisis management (Q36).

II. Sound risk adjustment methods. The ward was qualified as 2nd reference level unit [82, 83] and has provided high complexity of care [84] for 9 intensive care beds, with the possibility of being expanded by 2 beds. Actions were undertaken in accordance with the ECDC guidelines [35, 85] and the unit was divided into zones. The green zone contained, among others, the social facilities zone. The yellow zone, demarcated by a tent placed between the social facilities zone and the medical zone was intended, among others, for the transport of patients. It was used to decontaminate medical equipment, and the

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personnel used it to doff PPE after leaving the patients. A simulation of donning and doffing PPE was implemented [55]; average time required to don PPE amounted to 5 minutes [86] with the participation of two nurses — the second nurse checked whether the protective suit was airtight, with the complete PPE being prepared by the nurses at the beginning of their shift, reducing the time. The use of PPE resulted in discomfort and the feeling of mental and physical exhaustion, intensified by working in non-air-conditioned rooms (temperature > 25°C). The red zone was the place where COVID-19 patients were hospitalised. Preparing for caring for a COVID-19 patient included the planning and providing of necessary disposable items. Per one patient there were: 10 infusions operated by infusion pumps and 4 drip infusions. On the average on one shift (12 h) the nurses have prepared approximately 100 continuous infusion syringes and 40 intravenous injections. The time-consuming nature of the procedures has required a change in the organisation of work. The shift team (4-5 nurses/shift) was divided into nurses: (1) preparing and performing doctor's orders, (2) participating in ward rounds, (3) providing patient care. After estimating the available competencies of hospital nurses, attempts were made to obtain competencies necessary at the ICU. Individual talks were made, encouraging cooperation. The ICU ward was supported by operating department nurses which were providing basic nursing care. It was calculated that the average time necessary to prepare medications and infusions = approx. 30 min/per 1 patient (drugs administered in the morning) [87]. The time needed for personal care of an intubated patient under mechanical respiration, with a central arterial line and control of diuresis (Foley catheter) is 1h/2 nurses.

Ability to increase capacity to cope with a sudden surge in Demand (11) includes, among other, factors indicated by respondents as motivating the medical personnel for action, such as access to PPE (75 %) and financial incentive (77,8%) (Q32) described earlier. Almost 90% of the surveyed have indicated the education of personnel, over 70% conducting simulation and improving of the ward's infrastructure as significant elements of the preparation phase (Q15). The ability to immediately respond to threats (> 80%), to launch support for medical personnel (67,5%) and to coordinate the maintenance of operational continuity of the ICU (70%) (Q16) were indicated as necessary in the reaction phase. The most important aspects of crisis management, enabling the organisation of care over ICU patients were access to PPE (62.5%), the possibility of regular testing of personnel for the presence of COVID-19 (57.5%) and the possibility of isolating patients awaiting results. (Q34) ***Surveillance enabling timely detection of shocks and their impact (5)*** According to 75% of the surveyed one of the most important elements of the prevention phase was the risk assessment and the assessment of the ward's infrastructure (65%). Effective communication was also indicated as a significant component by 60% of respondents. Only 2.5% (1 person) has indicated the following of procedures created in other locations as important during the prevention phase (Q14). Whereas in the preparation phase most of the respondents have indicated the education of medical personnel as necessary, and 60% of the employees have emphasised the need for monitoring of potential threats and improving of the ward's infrastructure as necessary. Almost half of the surveyed persons have opted for the updating of procedures (Q15). Almost all respondents have indicated the assessment of SARS-CoV-19 infection risk for the entire personnel working in the ICU as necessary (Q38). ***Alternative and flexible approaches to deliver care*** **(13)** During the reaction phase the surveyed personnel has pointed out immediate response to threats (82.5%) and coordinating the maintenance of operational continuity of the ICU (70%) (Q16).

III. Resilience understood as ***A health workforce of adequate capacity and with the right skills,*** are elements 10, 12 of the WHO strategy (table 1). In the described ward the nurse employment indicator before the pandemic (January 2020) amounted to 2.2 full-time equivalent posts per 1 ICU bed and was in accordance with the standards in force. The number of employed nurses in the ICU N = 39, including 3 men. Persons employed for indefinite duration n = 30, and for definite duration n = 6, and part-time employment n = 3. The age of the personnel was between 24 and 65 years. Work experience from 1 year to 37 years, 54% had more than 25 years of professional experience; 84% of nurses have

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worked in a time equivalent system (extending the daily duration of work to 12 hours in a day and night shift), 7 employees were in the basic system (shift 8 h) [88]; 32 nurses — 1/3 of personnel have BCN (Bachelor of Science in Nursing); n = 17 have MSN (Master of Science in Nursing), and n = 7 medical vocational school (the old system). It should be emphasised that the absence of personnel in 2020 amounted to 2.3 FTE (full-time equivalent), in 2021 — 7.9 FTE and in 2022 already 18.4 FTE. The average number of nurses caring for patients during the day vs. absence of nurses in January of 2020-2022 is shown on Fig. 1.

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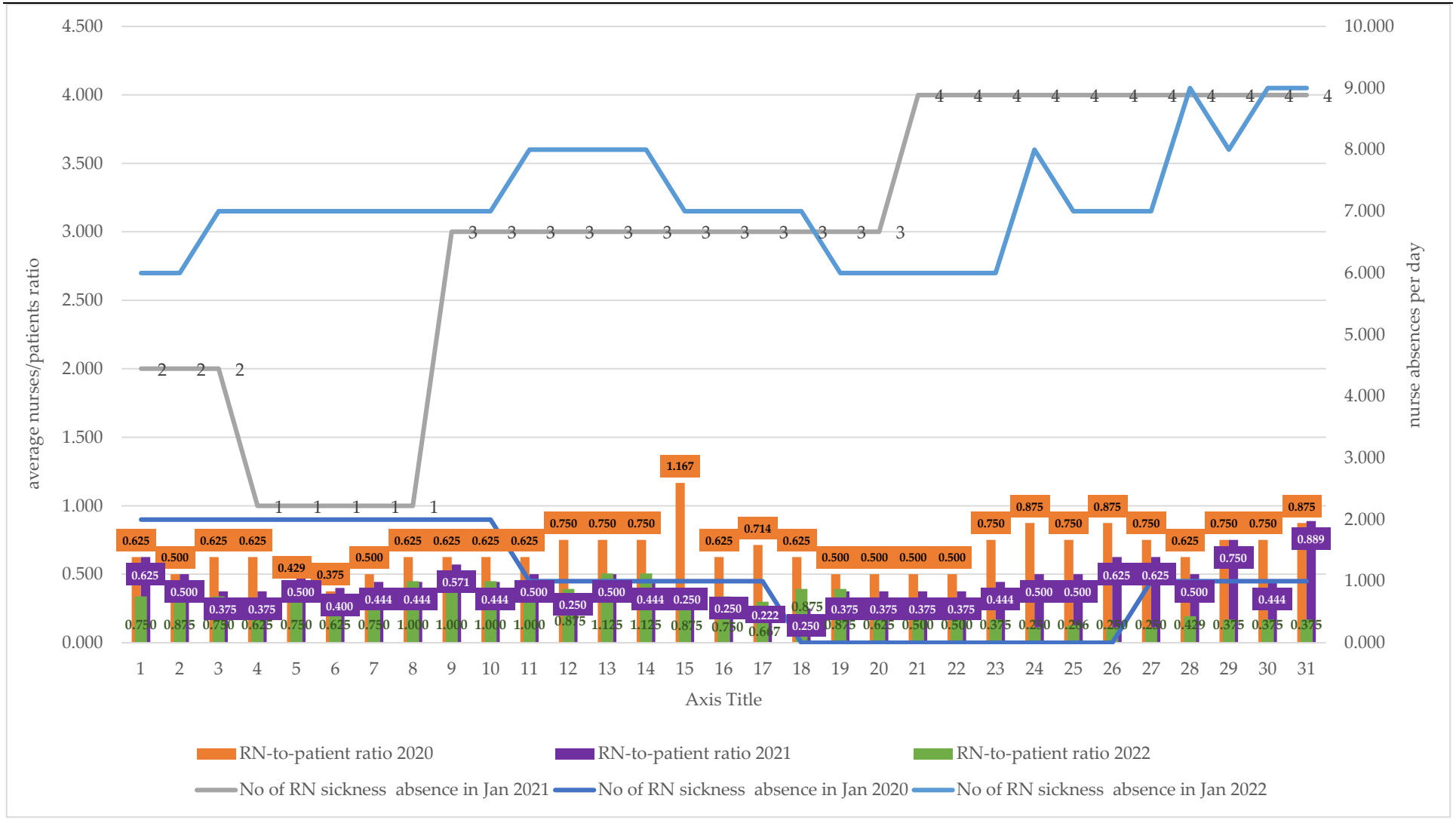

Figure 1. RN-to patients ratio during a 24 h shift and the absence of nurses between 2020-2022 in January.

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Legend: RN – nurses according to ICN definition 2002, TDS – the day shift. TDN – the night shift.

Nurse-to-patients ratio in January every year did not reach a standard level and was the lowest in the second half of January 2022. Therefore, the workload of nurses has increased compared to 2020 and 2021. The number of patients hospitalised at the ward in January (before the pandemic) amounted to 24 patients, in other years it was in 2021 n = 20 and in 2022 n = 26.

Number of working hours in January [89] of 2020 amounted to 159 h 15', sickness leaves = 372 h (31x12 h) (2.3 FTE), hospitalised patients n = 24, number of deaths n = 10/month. A total of 427' of care should be assigned to a single patient, x 0.66 of the average nurses to patients ratio — on average this results in 281.82 (4h42'22" of direct care). In 2021 the nurse working hours = 136 h 30'; absences = 1080 h (90x12 h) = 7,9 FTE; number of patients n = 20; per single patient during a day (average nurses to patient ratio — average 0.44 = 427' = 187.88 (3h07'52" x h care); number of deaths (month) n = 8. In 2022 the nurse working hours = 144 h 05'; absence = 2664 h (222 x 12h) = 18.4 FTE hospitalised patients n = 26; to a single patient during the day a total of 0.68 nurses were assigned on average 290.36 min (4h 50'36" x h of care. Number of deaths = 23 (Fig. 2).

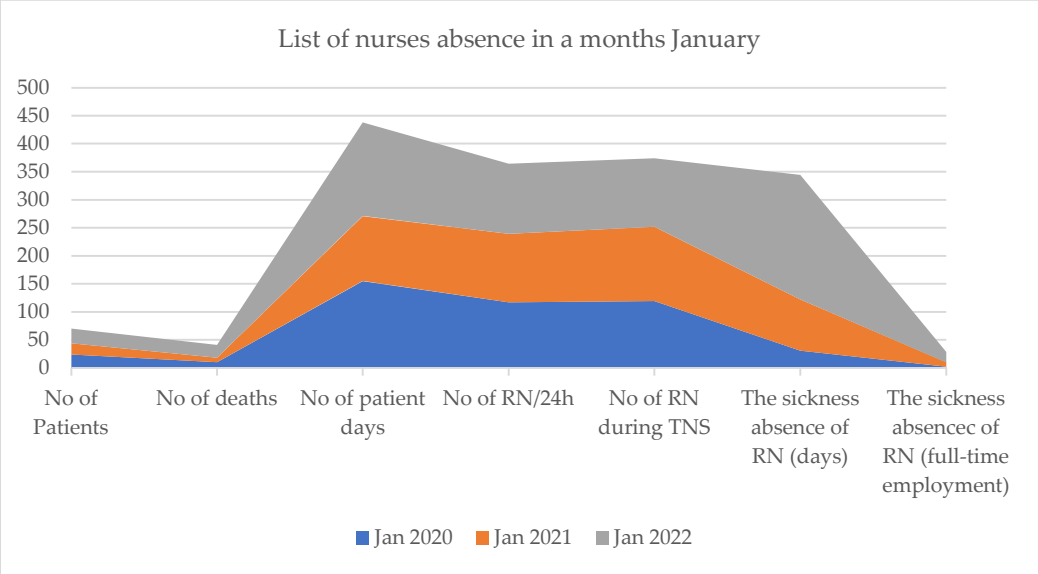

Figure 2. A list of data for the month of January in the years 2020, 2021, 2022.

Appropriate level and distribution of human and physical resources (10). All respondents have indicated human resources as significant in management (Q23). Over than 70% consider that during the organisation of resources the priority was to ensure the continuity of care and the employee's high sense of responsibility for themselves and for others. More than half (52.5%) have indicated as important in resource planning: regular rest of the employee (52.5%) and individual assessment of the employee infection risk (52.5%) (Q22). Almost everybody (90%) has indicated the provision of PPE as a priority. In the infrastructure assessment 75% have indicated equipping the nursing care station with permanent technical devices (cardiac monitors, ventilators, infusion pumps etc.) (Q21). The obstacles which hindered the adaptation of the ICU unit to the pandemic crisis: deficit of infrastructure (e.g., inability to designate zones) (n=75%), only 60% have indicated the lack of human resources as an obstacle to the adaptation of the unit (Q19). The surveyed persons have also pointed out the evaluation of resources in the prevention phase (62.5%) (Q14) and managing resources for times of crisis (Q15). ***(12). Motivated and well-supported work-force*** depends on, among others, the effective management of first line employees and effective resource management. An almost 80% of respondents have noted a significant impact of financial incentive and PPE access. More than 60% of respondents have indicated reliable information as supporting the motivation of the personnel (Q32). As necessary management skills in a crisis situation the surveyed persons have indicated

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effective decision-making skills (80.1%), effective communication skills (72.2%) and the ability to motivate personnel to action (72.2%). Only 13.9% has indicated the ability to provide the employees with support as necessary (Q39).

IV. Information follows in the system is another key variable necessary to prepare the organisation to react flexibly to crises or turbulences. One of the methods of assessment and information flow was a report on the condition of patients and on the maintenance of continuity of nursing care. An important information for the unit manager was the ongoing availability of PPE and of resources necessary for patient care and treatment. In case of high-flow therapies and ventilator therapies it was necessary to continuously control the level of supplied gases.

There is no Electronic Patient Record (EMR) at the unit, which could be used by a nurse to provide information to another nurse. What is important, over 70% of the surveyed have indicated that the priority was maintaining a good flow of information, establishing of procedures and recommendations of the National Consultant in Anaesthesiology and Intensive Therapy (Q28). What is important, over 70% of the surveyed have provided as the source of knowledge for the establishing of procedures the recommendations of the Polish Association of Anaesthesia and Intensive Care Nurses, with guidelines of the National Consultant in Anaesthesiology and Intensive Therapy at the second place (60%), and MOH information on the third place (over half of respondents) (Q30). Over half of the surveyed have obtained information about SARS-CoV-19 by participating in webinars and internal trainings. Almost 70% of respondents have used information from the Ministry of Health (Q10).

V. Among the variables on which the preparation of the system to react to crises depends the following were listed: ***Stable funding mechanisms*** enabling the planning and optimum use of funds in the future. In case of fees for the treatment of a patient on mechanical ventilation at the Intensive Care Unit the payer has provided from PLN 978 (approx. € 215) to PLN 5691 (approx. € 1250) [74] /person-day (PD). This amount depended on the point rate assumed at the moment a contract was signed with the NFZ. Additionally, respirator beds outside of the ICU were also financed, at the amount of PLN 1154 [90] (approx. € 253) /person-day [73,74]. The financing of healthcare employees' remuneration was specified by the Act [91]. The hospital has received, among other things, PPE from the Material Reserves Agency, a government institution intended to secure strategic reserves in case of a crisis situation [92]. The hospital also received financing from EU Funds for *Prevention and control of SARS-CoV-2 virus infections and the spread of the disease caused by this virus in humans within the Łódź province.*

VI. Appropriate calculation of health costs, ***Adequate costing of Health service Comprehensive health coverage*** (9**)** The patients without the right to universal health coverage during the pandemic could were granted the right to use the available health care services. This also applied to foreigners. The services provided as a result of controlling the pandemic, treating the disease and sanitary and epidemiological tests related to it were financed from the state budget [93].

4. Discussion

This study aimed to assess the health care system at the local and central level during the COVID-19 pandemic. The complexity of the processes of treatment and care over the ICU patients became a significant challenge for the ward's managers. It is precisely during the pandemic that ICU became a focus for the issue of the health care system's resilience. The presented case study concerned the assessment of the six components indicated by the EC. They include *good management, sound risk adjustment methods* and also *health workforce of adequate capacity and with the right skills*. The next important elements are *information follows in the system, stable funding mechanism* and the last one: *adequate costing of health services* [4]. Despite a significant body of work on resilience at the ICU, few studies were conducted concerning resilience understood as preparation, adaptation or the ability to react and draw conclusions from the occurring crisis situation. The available literature

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mostly refers to mental endurance in the ICU. Despite a small studied group, the results of the study reflect the observations of other authors. The study concerned resources, effective communication, managerial skills and management in a crisis situation presented by the Covid-19 pandemic. The results concerning resources have indicated unequivocally that human resources are the most important element of the crisis management, which is important in maintaining the continuity of ICU operations [94, 95, 96]. The authors also emphasise the significant impact of patient ratio on the quality of care and on the related risk of complications related to hospitalisation [91, 97]. The material resources and PPE access were also important during this time [98, 99] as well as the ability to conduct technical skills simulations [96], which mobilised the nurses, providing them with psychological safety [98]. These results also conform with other studies concerning the importance of PPE availability and the risk of increase of COVID-19 incidence among the employees and their families [1, 100,]. This could be an additional cause of professional absences and of the impossibility of providing a continuity of nursing care on an appropriate level. Our studies demonstrated that the preparation or adaptation of the infrastructure to the existing needs is important. In a crisis situation the establishing of safety zones also acted as a prevention measure for ICU nurses. This is confirmed by both ECDC recommendations [101] and also by research [102]. A well-adapted infrastructure with established zones enables safe rest without increasing the risk of falling ill with COVID-19. This also impacts the ICU nurses' feeling of safety.

During the pandemic, nurses managing the ICU had to face multiple challenges. During the first wave there were problems with lack of information about the emissions causing the threat, with insufficient availability of PPE [103] and with disinformation [104]. Frequently the organisation of work and resources was related to the ability to make rapid decisions under time pressure. According to the surveyed persons the most important managerial skill was effective decision making, skilled motivation and effective communication. The lack of the aforementioned skills could lead to conflicts on ethical grounds [105,95]. It should be noted that a manager's resilience translates to the team's resilience, which was described by Liang [106]. Frequently, nurse managers were required to manage a team which suffered work overload and fear for their health at the same time[95, 107, 108]. This is why mental resilience of the leaders was priceless. Amongst the informational, decisional and interpersonal roles the surveyed personnel have indicated the continuous assessment of the situation, composure when making decisions, the ability to delegate tasks and possessing knowledge about the situation that has occurred [67,109]. Providing support to employees, sharing of knowledge and motivating of employees has a significant impact on their resilience [105] and on the ICU nurses' resilience in connection with positive practice environment [110]. The ability to participate in workshops, regular assessment of management quality and evenly spreading the workload were important during the pandemic.

Good communication is one of the primary working tools, and effective communication is the basis of management. We use the provided information to plan, organise or to motivate employees to action. An important function of information is integration of jointly undertaken tasks and exchange of experiences [111]. The quality of information impacts work satisfaction and quality of cooperation within the team [112]. This was also reflected in the research, where the surveyed expected full information to be provided to all employees. AACN (American Association of Critical-Care Nurses) in its guidelines emphasises the importance of full information sharing between the medical personnel, patients and their closes ones [108]. During the pandemic the forms of communication between the personnel and also between the patients and the personnel have changed significantly, due to the barrier formed by the PPE [113]. According to the surveyed persons, electronic transmission of information formed an important part of communication in a crisis situation. This form of communication also reduced the risk of falling ill with Covid-19, which was also recommended by the WHO [114, 115].

Risk management also includes access to resources and the ability to anticipate risk. In case of a pandemic atypical phenomena have to be taken into account, such as the rapid

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transmission of a virus. Due to the scale of the hazard and the key importance of health care employees in the ensuring of health safety during the pandemic, procedures for prevention of SARS-CoV-2 infections were introduced. The established procedures included, among others, the manner of handling of patients suspected of a coronavirus infection, the use of personal protective equipment and the decontamination of medical equipment after coming into contact with the virus. Recommendations [110, 116]. The phase of ward preparation included the assessment of current human, physical, informational and financial resources (the PPE described earlier). The risk assessment should apply to the most important elements of each resource, which was reflected in research results, where the surveyed persons have indicated the possibility of assessing SARS-CoV-19 infection risk for the entire personnel working at the ICU. Also, the Lancet Commission [101] in its document has emphasised the significance of effective communication specifying the risk of falling ill, of the provision of PPE, of training courses and of appropriate medical personnel.

An important element of resilience is also ensuring appropriate financing of the Health Care System, which should translate into, among others, provision of adequate remuneration [111] and the possibility of making urgent purchases during a crisis situation [12]. This will have an impact on mobilisation of the personnel to action, and therefore will have a significant impact on maintaining the stable operation of the system. This was also confirmed by our surveyed persons. The HCF financing should be provided by the government, but also by private founders, which occurred during the pandemic, where private decision-makers (business owners) provided PPE to HCS employees [12]. Although in our study we did not as directly about this element, some question descriptors were qualified as its components.

The notion of *Adequate costing of Health services* takes on a particular meaning during the pandemic. Understanding processes, which during this period are ambiguous and complex is of key importance [117]. The EC emphasises the importance of the assessment of the effectiveness of undertaken actions concerning, among others, the distribution of resources using accurate cost calculations and establishing key tasks or investments [4]. The pandemic has demonstrated the weak points of the system and the need for continuous assessment of the performance of the assumptions prioritised at the time. This was related, among others, to the reorganisation of many health care facilities into COVID hospitals, thus causing/increasing the health debt.

5. Limitations

The main limitation of this study is the low number of received answers, which has an impact on the general conclusions. It should be however noted that there are no standards concerning the number of questionnaires that have to be obtained. This was reflected in research conducted by Bergman [118] and von Vogelsang [119]. The manner of distribution could have an impact on this limitation: (1) publishing on the website of a nursing association, however, they were potential participants and it was difficult to establish the reach of the study; (2) to the unit managers, where it could not be established with certainty how many of the surveys sent were handed over to ICU nurses. Another restriction was the period of the study — the time when the pandemic was starting, the nurses had to focus on engaging in actions which are related to local safety, which could have resulted in a lower number of potential participants, despite the fact that a questionnaire was published on a website of a nursing association, which is an important source of knowledge for ICU nurses. Also, an electronic form of the survey may constitute a limitation on the number of obtained answers, especially when every answer has to be filled out in order to move to the next one, which may be discouraging in case of a large number of questions. It should however be emphasised that answers received on paper are incomplete [120] and have to be rejected at the study inclusion level, which is prevented by using an electronic survey with obligatory fields to be filled out. However, this form has its limitations

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—since electronic surveys usually result in 20% fewer answers [121]. Therefore, the results have to be interpreted with care and referred to a specific context.

6. Implications for Practice

The perspective of Health Care System Resilience applies to organisations, institutions but primarily to the smallest units of hospital wards. The ability to manage a crisis situation of the pandemic has a significant impact on the quality of care, but also on general efficiency of the Health Care System. The initial assessment of the ward's ability to handle a crisis situation has prompted the following recommendations for Nursing Practice in the ICU:

Good management — is caring to maintain good communication in the team and the ability to manage in a situation of continuous changes. An inseparable element of this process is the obtaining of knowledge and the ability to transfer the knowledge. Ensuring the continuity of resources.

Sound risk adjustment concerns proceeding according to the procedures, the possibility of detecting threats in advance, training concerning the transmission routes and prevention of infections among nurses, also learning lessons from failures.

A Health workforce of adequate capacity and with the right skills is the assessment of the available Human Resources, the possibility of professional adaptation and support by personnel. An important element is the financial support and continuity of material resources (including PPE) which facilitate work.

Information follows in the ICU applies to all employees of the ward. The most important element is the transfer of proven knowledge, prevention of disinformation, and regular feedback on every level of management.

7. Conclusions

Resilience of the ICU refers to appropriate preparation for a crisis situation, the ability of the ward or institution to adapt to the occurring situation and to effectively manage it. Such a dynamic environment carries a series of risks. An important element of this process is the ability to identify the threat and the management of risk, which in case of Covid-19 pandemic related to the introduction of multiple restriction. Within this scope, an ongoing assessment of the situation and drawing of conclusions on the basis of the collected experience as well as flexible approach to changes is no less important. The nurses are one of the most important elements of resilience in the area of the ICU. It is their abilities to prepare, to react to changes and to cooperate well that enable ensuring the continuity of operation of the ward and the continuity of care.

Author Contributions: For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used "Conceptualization, M.B., D.K.; R.K; and M.M methodology, M.B.; D.K. and R.K; software, M.B.; validation, D.K., M.M.,T.C. and S.M.; formal analysis, D.K.; M.B; R.K. and M.M.; investigation, M.B.; D.K.; resources, M.B. and S.M.; data curation, M.B. and S.M.; P.I. writing—original draft preparation, M.B.; D.K.; writing—review and editing, D.K.; S.M.;P.I. and M.M.; visualization, M.B.; and D.K.; supervision, M.M., R.K.;T.C.; project administration, D.K.; R.K. funding acquisition, M.M.; M. B. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, according to polish law the ethical statement is available only for experiment. In accordance with the law on scientific research in force in Poland, the consent of the bioethics committee can be obtained only in the case of experimental research. The Bioethics Committee of the

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Medical University of Lodz does not consider applications that do not have such premises, or if a doctor is not part of the research project.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. The content of the questionnaire contained information about the consent

Data Availability Statement: Non-digital data supporting this study are curated by Dorota Kilańska.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix 1

Survey: Intensive Care Unit Crisis Management Areas
1) Gender *
Woman
Man
2) Work experience in the Intensive Care Unit *
Up to 5 years
Over 5 to 10 years
Over 10 to 15 years
Over 15 to 20 years
Over 20 to 25 years
Over 25 to 30 years
Over 30 years of work
3) Professional qualifications related to work in the Intensive Care Unit *
Qualification course
Specialty training
4) Education *
Diploma in nursing
Bachelor of Science in Nursing
Master of Science in Nursing
Medical vocational school
Other:
5) Number of beds in the Intensive Care Unit *
6) Total number of nursing staff *
7) Position *
Coordinating nurse
Ward nurse
Ward manager
Other:
8) Type of hospital *
Province
District
Municipal
Institute
clinic
Covid Hospital
Other:
9) Is the hospital accredited?
Yes
No
Other:
10) Where did you learn about SARS-CoV-19? *
in-house training

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webinars
studies
social media
Ministry of Health
World Health Organisation
Agency for Health Technology Assessment and Tariff System
Other:

11) How often do you have direct contact with patients suspected of being infected with SARS-CoV-19? (direct contact means work in Personal Protective Equipment) *

daily
very often
rarely
no contact

12) How often do you have direct contact with a patient suffering from COVID-19? *

daily
very often
rarely
no contact

13) The crisis management cycle comprises 4 phases. Which of the phases is, in your opinion, the most important?

the prevention phase
the preparedness phase
the response phase
the recovery phase
all phases
no opinion

14) Which of the elements of the prevention phase should be implemented in the Intensive Care Unit? *

risk assessment (distance in time, personnel exposure)
the scale of the threat (small, medium, large loss — refers to the loss of human resources)
assessment of the closer environment (competition, suppliers, recipients of services)
assessment of the farther environment (economic, political, social and demographic conditions)
assessment of the ward's infrastructure (power supply, ventilation, gas supply, possibility of isolation)
evaluation of resources (human, material, information, financial resources)
collection of current legal regulations
knowledge of the necessary time of preparedness (in this case, donning Personal Protective Equipment)
effective communication
control of the sanitary and epidemiological status of the ward
Other:

15) Which elements of the preparedness phase of crisis management in ICU do you consider necessary?

preparing and simulating of procedures
monitoring of potential threats
defining of effective communication
preparing for reorganisation of human resources
updating of procedures
managing of resources for time of crisis
education of medical personnel
assigning of personnel responsibility
improving of the ward’s infrastructure (e.g., communication routes, delimitation of zones)

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Other:

16) Which elements of the response phase in the ICU do you consider necessary? *

launching the procedure(s)
feedback on the effect of preparing the procedure
continuous improvement of procedures
launching support for medical personnel
epidemiological control
continuous modification of human resources
maintaining a constant level of material resources
incident management
immediate corrective action
immediate response to threats
disseminating reliable information
collecting information relevant to the target audience (other wards)
coordinating the maintenance of operational continuity of the ICU
Other:

17) Which of the elements of the recovery phase, in your opinion, is necessary in crisis management in the ICU? *

initial assessment of the effectiveness of the actions taken
assessment of the current status and replenishment of resources
reorganization of the ward's infrastructure
reorganisation of human resources
evaluation of the notification system
threat monitoring
return to the initial state
Other:

18) Which of the following practices do you consider the most important in fulfilling the role of a manager during a crisis situation? (Managerial roles — informative, decision-making and interpersonal)

continuous assessment of the situation
control of information flow
composure when making decisions
speed of decisions made
knowledge about the crisis situation that has occurred
appointing of deputies
support for people in need
ability to delegate tasks
Other:

19) Which obstacles made it difficult to adapt the department to the existing crisis caused by SARS-CoV19? *

lack of material resources (e.g., personal protective equipment)
deficit of the infrastructure (e.g., inability to designate zones)
lack of a clear procedure regarding the manner of personnel movement
failure to provide information on the location of zones in the ward
lack of strict routes for medical personnel to move
lack of training in moving around the zones
lack of human resources
lack of good information flow
Other:

20) Which element, in your opinion, is the most important in determining the mobility zones? *

appropriate infrastructure
material resources
ready procedure
training of medical personnel

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the ability to find a consensus in the absence of adequate infrastructure
continuous improvement of the created procedure
feedback from the employees
Other:

21) When organizing physical resources during crisis management in the Covid-19 pandemic, which of the following will be your priorities? *

equipping the nursing care station with permanent technical devices (ventilator, cardiac monitor, bed, infusion pumps, resuscitator, laryngoscope, etc.)
disposable equipment
personal protective equipment
medications
antiseptic agents
professional chemistry and equipment necessary to keep the department clean
isolation room
means of communication (telephone, computer)
instruments enabling quick laboratory diagnostics
social rooms
clean rooms
prepared infrastructure (adapted)
Other:

22) When organizing human resources during crisis management related to a pandemic, your priority will be: *

planning of human resources
recruiting of human resources
ensuring continuity of care
the purpose of human resources planning
individual assessment of the employee infection risk
regular rest of the employee
possibility to choose a motivational tool
employee's high sense of responsibility for themselves and for others
employee availability
Other:

23) Which areas/resources of crisis management do you consider important in maintaining the continuity of ICU work? *

information area
human resources
material resources
financial resources

24) How should information on conducted crisis management actions be communicated? *

full information (addressed to all employees)
partial information (addressed to management staff)
lack of information
Other:

25) Which channel was used to provide full information on the resulting procedures?

electronic means
telephone
written information
direct meeting of the superior with employees

26) By which channels was partial information communicated, for example, concerning the established procedures?

electronic means
telephone
written information
face-to-face meeting with employees

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a hospital radio hub
messenger (SMS, WhatsApp, Messenger etc.)
Other:

27) Which method of information management was the most effective in your opinion?

written information
oral information
information by electronic means
information via a communicator
Other:

28) When organizing information resources during crisis management related to a pandemic, your priority will be: *

establishing procedures
intra-departmental training
maintaining a good flow of information among the team
analysing of the provided information
using proven sources of information
using the experience of other units/departments
possibility to modify procedures/algorithm
recommendations of the National Consultant in Epidemiology
recommendations of the National Consultant in Anaesthesiology and Intensive Therapy
Other:

29) Which activities from the above resources were the most effective in your opinion? Please enter a maximum of 3 actions. *

30) Which knowledge about the Covid-19 pandemic was useful in developing a plan to prepare procedures? *

risk assessment of medical personnel's exposure to the SARS-CoV-19 coronavirus
guidelines of the National Consultant in the field of Anaesthesiology and Intensive Therapy
recommendations of the Polish Society of Anesthesiological and Intensive Care Nurses
Regulations of the Ministry of Health
guidelines of the National Consultant in Epidemiology
recommendations of the Agency for Health Technology Assessment and Tariff System
recommendations of the World Health Organisation
knowledge of resources (material, information, human, financial)
Other:

31) Which resources, in your opinion, were the most important in the preparation of procedures in the case of contact with a patient diagnosed with a COVID-19 infection?

information resources
material resources
financial resources
human resources

32) Which of the selected resources, according to your observations, mobilized the staff to action?

access to Personal Protective Equipment
reliable information
financial incentive
possibility of rest
the possibility of introducing changes to new procedures
Other:

33) Which of the resources listed above was the most difficult for you to implement/secure?

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access to Personal Protective Equipment
reliable information
sufficient staff
providing rest
maintaining the continuity of nursing care
Other:

34) Which aspects of crisis management in times of the SARS-CoV-2 pandemic should be considered when organizing patient care in the Intensive Care Unit?

the possibility of regular testing of personnel for the presence of SARS-CoV-2 genetic material
the possibility of isolating patients awaiting results
professional Personal Protection Equipment
the possibility of changing the work organization of nursing staff
Other:

35) Does the hospital have its own crisis management plan?

Yes
No
I have no knowledge

36) What elements of knowledge do you think constitute the basis of crisis management?

knowledge of social reactions to the occurring threat
knowledge of the phases of crisis management
full information from superiors
knowledge of the law on crisis management
knowledge of the crisis management plan at the work place
knowledge of the threat
availability of resources (material, human, financial, information)
risk analysis
Other:

37) Do you agree with the statement: the possibility of increasing knowledge on crisis management enables effective decision making in urgent situations?

I fully agree
I do not agree
no opinion

38) Do you think the assessment of SARS-CoV19 infection risk should apply to:

the entire personnel working in the ICU
personnel present in close contact with SARS-CoV-2 patients
systematic assessment of the personnel working in close contact with SARS-CoV-2 patients
personnel working in indirect contact with SARS-CoV-2 patient
Other:

39) What management skill do you consider necessary to manage crisis situations?

interpersonal skills
effective communication skills
effective decision-making skills
technical skills
perspective thinking skills
time management skills
strategic thinking skills
ability to delegate tasks
ability to motivate the personnel
ability to provide personnel with support
ability to adapt to changing environment
Other:

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40) What knowledge of crisis management would you like to share? Please provide a short comment. *

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