

The Intellectual Potential of Employees in Hospital Crisis Management During a Pandemic

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Abstract: Hospitals are medical entities that provide health care services to patients. The specialized medical staff does not only provide medical services, but also educates future medical professionals, conducts clinical research, and supports the development of medical technology. The important role of employees in hospital operations is evidenced by the dominant percentage of labour costs in the cost structure of the health care entity. The article aims to analyse the changes in remuneration of teaching hospital employees as a factor stimulating the increase in the intellectual potential of hospital employees, including medical staff as the main resource of knowledge workers, in hospital crisis management during a pandemic. The inference was made based on the available financial data on the formation and growth of labour costs of hospital employees as a factor in stimulating the development of intellectual potential. The following research questions were posed: Is the level of remuneration of hospital employees during a pandemic an expression of building the intellectual potential of hospital employees and do current legal regulations on financing the operations of teaching hospitals in Poland, including the financing of salaries and other labour costs of medical staff, support crisis management during a pandemic? The research was conducted based on the reporting data for 2018-2020 in selected teaching hospitals as primary entities employing high-level medical professionals. The research was empirical by nature and was based on quantitative and qualitative data. The analyses were of an expert nature from the perspective of a certified auditor and a long-term researcher of the problems of the functioning of hospitals as medical entities. The investigations presented in the paper help identify the conditions for the development of the intellectual potential of hospital employees as actors involved in solving health problems of an international scope. The effects of the analyses are mainly addressed to the bodies establishing medical entities, bodies influencing the form of the health care system and hospital management staff.

Keywords: intellectual potential of hospital employees, salaries of physicians, hospital crisis management, knowledge workers in hospitals

1. Introduction

The COVID-19 pandemic in the European Union began at the turn of March 2020. In Poland, pandemic containment measures were taken as early as mid-March, just 11 days after the first case of COVID-19 was detected. According to the European Centre for Disease Prevention and Control (ECDC), as of 30 October 2020, Poland was 11th in Europe in terms of cumulative 14-day incidence per 100,000 inhabitants.

The dynamic increase in the number of new infections observed in the fall of 2020 forced a new model of hospital bed organization. Level 1 hospitals (hospitals within the hospital network) were tasked with:

1. increasing the number of places to admit a patient with suspected disease pending receipt of a COVID-19 test result,
2. implementing life-saving procedures if necessary,
3. organizationally increasing access to COVID-19 diagnostics by increasing the number of laboratories.

Starting in October 2020, the payer (the National Health Fund) accepted applications from hospitals to extend the settlement period of contracts for the provision of medical services. Applications could be submitted by service providers who were unable to fully deliver contracted services during the COVID-19 restriction period. The settlement period was extended to 2021.

Crisis management in Poland is regulated by legal regulation in the form of a legislative act. The Act of 26 April 2007 on crisis management defines the types and tasks of authorities competent in crisis management, and the principles and financing of activities in the field of crisis management.

Crisis management is defined as the activity of public administration bodies being an element of national security management, consisting of the prevention of crisis situations, preparation to take control over them through planned activities, reacting in case of crisis situations, elimination of their effects, and reimplementation of resources and critical infrastructure. An important concept defined in the Act is that of a crisis situation. A crisis situation should be viewed as "a situation that adversely affects the level of security of people, property of significant size, or the environment, which cause significant limitations in the operation of the relevant public

administration bodies due to the inadequacy of their resources". In the case of the COVID-19 pandemic, this situation has been observed since 2020.

The Act relates to public administration. Its findings, however, can be applied to entities on the front line of pandemic control, such as hospitals. The health care system is the area of interest for crisis management (Act of April 26, 2007, art. 3).

Important systemic solutions of crisis management in health care in Poland in the fight against COVID-19 affecting the tasks performed by hospitals included:

1. creating hospital wards that specialize in admitting patients with COVID-19,
2. creating temporary hospitals,
3. providing hospitals with specialized equipment,
4. COVID-19 treatment task funding,
5. fixed rates for remaining on standby for medical services for people infected with the virus,
6. immunization of medical and other staff members,
7. a nationwide COVID-19 vaccination program,
8. coronavirus testing system,
9. payment of additional cash benefits for medical personnel involved in the fight against COVID-19,
10. simplifying access to selected health professions.

Crisis management tasks are performed directly in healthcare entities.

Hospitals and other health care providers are characterized by high levels of intellectual capital in all areas of its occurrence. A specific element of these important resources is high-quality specialists, i.e. medical professionals. Therefore, teaching hospitals provide a knowledge management environment for intellectual capital (Bose, 2003). Developing the intellectual potential of employees is a long-term process and is part of the hospital's strategic management system.

The article aims to analyse the changes in remuneration of teaching hospital employees as a factor stimulating the increase in the intellectual potential of hospital employees, including medical staff as the main resource of knowledge workers, in hospital crisis management during a pandemic.

2. Hospital as an object of crisis management. Literature review.

The occurrence of a crisis situation requires taking quick measures while remaining calm. An entity operates in a complex and changing environment, and the degree of its dependence on the various elements of this environment is becoming greater (Huczek, 2015).

Subject-related literature shows that during a pandemic, health care facilities face many difficulties in terms of operations. These primarily include the following:

1. the need to admit a disproportionate number of patients compared to the capacity of the health care system,
2. shortages of personnel, medicine, vaccines, or medical equipment,
3. absenteeism among medical professionals,
4. problems resulting from the high number of deaths,
5. logistical problems associated with transporting patients or running out of supplies, such as medication,
6. financial problems of individual health care facilities (Buchelt, Kowalska-Bobko, 2020).

Crisis is an umbrella term referring to different spheres of activity. A. Zelek argues that a crisis should be viewed as a consequence of disturbances in the existence or realization of one or more factors determining the existence and development of an entity, both those of external and internal impact, which are dependent on the efficiency of management (Zelek, 2003). Crisis management tasks faced by hospitals to combat COVID-19 include as follows:

1. developing plans for hospital operations while taking consideration of nationwide pandemic control system solutions,
2. preparing structures and resources to perform tasks,
3. preparing a crisis management information system,

4. preparing solutions in the event of significant disruptions to task performance.

These tasks had to be included in the budgeting (planning) of hospital activities. Although planned admissions of patients with diseases other than COVID-19 were kept to a minimum, some hospitalizations could not be excluded (for example, in gynecology, oncology wards). Coordination of pandemic activity planning areas is the responsibility of the hospital manager.

Hospital employees are an important link in the operation of the hospital during emergencies. They are assigned to three main areas of evaluation:

1. crisis management (hospital administrator, deputy directors, hospital office, head nurse, IT staff, pharmacy staff),
2. logistics (maintenance and operations personnel, IT specialists, engineers),
3. providing medical assistance (physicians, nurses, support staff).

Task forces are especially important during triage, infection control, lifesaving, and intensive care (Davoli, 2007). The pandemic has brought medical personnel to the forefront as the most important group in pandemic control and strategic efforts to contain the spread of the pandemic. It is therefore important not only to provide medical assistance, but also to identify the causes of the pandemic, modify the factors that cause the disease, create vaccines and new medicine, while also analyse the determinants of the course of the pandemic. Hospital employees with their intellectual capital are therefore the most important resource in the fight against a pandemic.

Models of human capital measurement are a function of multiple variables and are based on the capitalized cost of living, cost of education, growth in experience over years of work, creativity, and the minimum fair wage. The measurement of intellectual capital has also been linked to the value of salaries (Renkas, 2016; Dobija, 2003, 2015; Dobija, Kurek, 2013). Remuneration affects the motivation and morale of knowledge workers (Smith, Rupp, 2003; Orzano et al., 2008).

As research shows, remuneration can be considered as a percentage of capital. According to research, this percentage is defined as a random value whose average value is 8% per year. It is recognized that such level of remuneration guarantees the preservation of human capital and prevents its depreciation (Renkas, 2016).

Previous studies of the identification of human capital based on models containing remuneration elements have been conducted in entities such as companies (Kozioł, 2010), in the Labour Office in Ukraine (Renkas 2012), and various economic units of the private and state sector (Oliwkiewicz 2018). Similar studies were not conducted in teaching hospitals as medical entities operating during a pandemic. The analyses presented in this paper fill a research gap in identifying the intellectual potential of hospital employees during a pandemic and can be an important complement to the ongoing research on human capital measurement models.

3. Methodology of the research. Characterization of the research subject

The article aims to analyse the changes in remuneration of teaching hospital employees as a factor stimulating the increase in the intellectual potential of hospital employees, including medical staff as the main resource of knowledge workers, in hospital crisis management during a pandemic.

The following research questions were asked in the study:

1. Is the level of remuneration of hospital employees during a pandemic an expression of building the intellectual potential of hospital employees?
2. Do current legal regulations on financing the operations of teaching hospitals in Poland, including the financing of salaries and other labour costs of medical staff, support crisis management during a pandemic?

The analysis was based on economic and financial data resulting from the financial statements, supported by the certified auditors' examination.

The relationship between the increase in salaries of clinical hospital employees in 2020/2019 (pandemic period) and the previous period, i.e. 2019/2018, were analysed. Similar periods were also analysed for the cost of material consumption and the cost of third-party services.

The research process consisted of the following steps:

1. analysis of legal acts concerning the rules of operations of hospitals, including financing their activities during a pandemic,
2. identification of the role of human capital in combating the effects of COVID-19 (literature review, review of websites of teaching hospitals, National Health Fund (NHF), Ministry of Health, review of statistical data, synthesis),
3. obtaining data from financial statements from the National Court Register (selection of data from profit and loss accounts, additional information, other reporting data),
4. compilation and selection of selected data characterizing human resource costs, and other costs incurred by teaching hospitals during a pandemic,
5. the application of selected measures of structure and dynamics to characterize the relationship between the analysed costs, and expert analysis of data relations from financial statements.
6. analysis of conclusions of selected areas of research conducted by the author in previous years on the financial statements of hospitals and the intellectual capital of hospital employees,
7. conclusions from studies conducted during the pandemic.

The study subjects were teaching hospitals. As medical entities, teaching hospitals are active not only in such areas as health services and health promotion, while also the implementation of health programs, but their responsibilities also include:

1. educating medical professionals,
2. serving as an opinion maker, consultant, and adjudicator,
3. completing tasks for defence needs.

In the Register of Medical Entities in Poland, 29 teaching hospitals were registered in the form of independent public health care institutions. The founding bodies of these hospitals are medical universities or local governments. Eleven teaching hospitals were analysed in the study. The inclusion criteria were the possibility to obtain complete financial data on the entity in the form of the financial statements, particularly the profit and loss account, and additional descriptive information in 2018-2020.

The choice of teaching hospitals as a research subject was also dictated by the very high level of qualifications of the medical staff and infrastructure resources. The trends observed in the teaching hospitals studied and in other hospitals were similar with respect to the scope and type of operations, education of the medical staff, and the legal basis of hospital activity.

4. Results. Human capital costs in the fight against COVID-19 versus other costs

Medical employees are undoubtedly the most important resource of hospitals as medical entities. Nowadays, managing these resources is an important task for managers. The scope of operations of teaching hospitals is much broader than in other hospitals.

The broad scope of operations requires a highly specialized workforce, which translates into salary levels and other labour costs. The salaries and work of medical professionals are governed by numerous laws, including:

1. Act of 15 April 2011 on medical activity,
2. Act of 5 December 1996 on the professions of physicians and dentists,
3. Act of 15 July 2011 on the professions of nurses and midwives,
4. Act of 8 June 2017 on the manner of determining the lowest basic remuneration of certain employees working in medical entities.

The regulations stipulate both the rules of practicing particular medical professions, education, acquiring certificates to be licenced to practice a profession, professional responsibility, but also working time and ways of calculating salaries, including the way of calculating the lowest salaries of employees working in medical entities.

During the pandemic period, the afore-mentioned legal acts were supplemented by regulations governing the operation of hospitals under these difficult conditions. These are legal regulations with the nature of acts, regulations, and specific provisions issued by the key decision-makers, i.e. the Minister of Health and the President of the National Health Fund (payer).

Since 29 April 2020, medical professionals who had contact with patients or individuals with suspected COVID-19 infection have been prohibited from working at more than one treatment facility. To compensate for the loss of income due to this restriction, the Minister of Health instructed the National Health Service to provide these professionals with additional monthly cash benefits, funded from the state budget. These benefits were limited to PLN 10,000 per month and accounted for 80% of the wages received at the workplace where the employee stopped working after the restriction or at least 50% of the wages received at the workplace where the employee chose to work after the restriction. The compensation covered the employer's social security contributions (Buchelt, Kowalska-Bobko, 2020).

The analysed teaching hospitals had different financial results during the periods studied. The financial results of the hospitals surveyed are presented in Table 1.

Table 1: Financial results of hospitals studied from 2018 to 2020

No.	Year	Number of hospitals achieving the financial result	
		Net profit	Net loss
1	2020	5	6
2	2019	10	1
3	2018	9	2

Source: Self-study based on the financial statements.

Among the teaching hospitals surveyed in 2020, the number of entities experiencing a financial loss increased. This means that teaching hospitals, despite cutting back on non-COVID-19 services, were not able to cover the rising operating costs with revenue.

In 2020, six hospitals experienced an increase in staffing of 1% - 7%, whereas the increase was 8% - 11% in three hospitals and 2% in two others. This means that the number of employees remained stable. During the pandemic period, hospitals had staffing problems among both physicians and nurses. For many years, Poland has been witnessing an outflow of medical personnel to the private health care sector and due to migration. In 2020, there were 593,000 employees in the health care system. These included 153,000 physicians (26%), 303,000 nurses (51%), 43,000 dentists (7%), 40,000 midwives (7%), 37,000 pharmacists (6%), and 17,000 diagnosticians (3%). The mean age of a working nurse was over 51 years, a physician - almost 50 years, and a doctor with a specialization - over 54 years. Thus, a serious systemic problem is the lack of generation replacement, both in the group of physicians and nurses (Buchelt, Kowalska-Bobko, 2020).

The current shortage of medical staff is due to many factors such as:

1. problems with effective human resource management,
2. lack of a rational personnel policy,
3. mismatch between the structure of employment and the profile and scope of services provided,
4. planning deficits in the education system,
5. underfunding of health care (Buchelt, Kowalska-Bobko, 2020).

One of the factors stimulating the development of the intellectual potential of employees in medical entities is salaries. Therefore, it is interesting to analyse the rate of increase in medical worker salaries during the pandemic period relative to previous periods. The labour costs (salaries plus social security contributions paid by employers) of medical employees in selected teaching hospitals are presented in Table 2.

Table 2: Labour costs of employees of teaching hospitals (in thousands PLN)

Hospital	2020	2019	2018	2020/2019 (%)	2019/2018 (%)
1	93,382	78,158	65,672	119	119
2	82,870	76,357	64,323	109	119
3	327,812	280,869	239,445	117	117
4	407,976	252,661	205,019	161	123
5	220,364	199,613	173,665	110	115

Hospital	2020	2019	2018	2020/2019 (%)	2019/2018 (%)
6	97,754	97,313	88,134	100	110
7	195,363	181,370	160,145	108	113
8	112,586	105,104	92,515	107	114
9	81,219	73,422	63,677	111	115
10	151,910	140,614	117,525	108	120
11	151,074	137,647	113,167	110	122

Source: Self-study based on the financial statements.

As research shows, the increase in labour costs in 2019/2018 was 110 - 123%. For the 2020/2019 pandemic period, the increase in labour costs was 101 - 119%, which was lower than in the previous period. The increase in labour costs in 2020 was higher than in the previous period in only one case. It should be noted that COVID-19 patient work allowances were a significant component of pay in 2020. Significantly lower growth in labour costs means that the systemic factors of wage growth that underpinned their increase in the previous period did not occur.

Besides labour costs, the second major element in the cost structure of hospitals is material consumption. This group of costs includes the consumption of medicines, medical and non-medical supplies, including dressing and personal care materials, small medical equipment, and energy. The costs of material consumption and their growth in the analysed periods are presented in Table 3.

Table 3: Costs of material consumption in teaching hospitals (in thousands of PLN)

Hospital	2020	2019	2018	2020/2019 (%)	2019/2018 (%)
1	28,921	21,990	20,276	132	108
2	10,488	7,482	7,367	140	102
3	217,388	195,331	189,356	111	103
4	120,132	147,222	151,452	82	97
5	198,359	185,760	188,962	107	98
6	287,341	268,440	244,501	107	110
7	232,937	207,867	176,004	112	118
8	84,512	75,008	71,489	113	105
9	48,816	50,959	41,721	96	122
10	106,185	110,783	100,949	96	110
11	118,985	105,064	100,019	113	105

Source: Self-study based on the financial statements.

In the 2019/2018 period, the cost of material consumption in teaching hospitals increased from 97% to 122%. For the pandemic period of 2020/2019, the increase was from 82% to 140%. At six teaching hospitals studied, the increase in costs of material consumption during the pandemic period was significantly higher than in the previous period. In addition to the material needs of fighting a pandemic (oxygen, drugs, dressings, protective gear), the level of these costs is also determined by the scope of the hospital's medical services and its size. Smaller hospitals have limited stockpiling capacity, so each new task involves a significant increase in supplies and material consumption (Hospital 2 is an example of this).

The costs of third-party services, which are medical (pharmaceutical, sanitary transport, diagnostics, medical subcontracting of doctors, nurses, and other personnel) and non-medical (transport, repair and maintenance, repair of medical and non-medical equipment, disinfection, laundry services, nutrition of patients), also play an important role in the fight against the pandemic. The values of costs of third-party services and their changes in the periods studied are presented in Table 4.

Table 4: Costs of third-party services in teaching hospitals (in thousands of PLN)

Hospital	2020	2019	2018	2020/2019 (%)	2019/2020 (%)
1	23,023	19,620	16,782	117	117
2	10,075	9,465	9,532	106	99
3	60,846	53,215	46,738	114	114
4	114,651	87,284	74,377	131	117
5	100,596	84,163	75,981	120	111
6	63,460	61,809	56,671	103	109
7	21,814	16,725	14,738	130	113

Hospital	2020	2019	2018	2020/2019 (%)	2019/2020 (%)
8	18,499	16,300	14,043	113	116
9	26,790	25,986	22,794	103	114
10	11,554	9,125	8,794	127	104
11	66,392	60,151	55,834	110	108

Source: Self-study based on financial statements.

During the 2020/2019 pandemic period, the increase in third-party costs of 103% - 131% at 6 hospitals was higher than in the previous period (99% - 117%). The increase in the costs of labour, material consumption, and third-party services should be analysed, taking account of the fact that other inpatient services of hospitals were reduced to a minimum during the pandemic period. For example, in hospital 10, scheduled hospitalizations were down 17.8% in 2020 compared to 2019, whereas surgical procedures were down 27.2%. The bed occupancy rate was 10% lower. The number of outpatient consultations decreased by 23.3% from the previous year, and there were 18.7% fewer services provided in emergency rooms. From March to June 2020, this hospital did not admit scheduled patients and did not provide consultation in outpatient clinics. Only life-threatening cases and patients infected with Sars-Cov-2 were hospitalized. In hospital 2, 24.33% of the value of the contract with the National Health Fund for medical services (over 20 million PLN) was not completed. In light of the above examples, the increase in the level of labour costs, material consumption, and third-party services in teaching hospitals studied should be considered significant. The percentages of these cost groups in the operating costs are presented in Table 5.

Table 5: Percentage of selected cost groups in the value of operating costs (%)

Hospital	Percentage of costs in the value of operating costs (%)					
	Labour costs		Material consumption		Third-party services	
	2020	2019	2020	2019	2020	2019
1	57	59	18	17	14	15
2	77	79	10	8	9	10
3	49	48	33	33	9	9
4	60	49	18	28	17	17
5	40	39	36	36	18	17
6	21	22	62	60	14	14
7	42	43	50	50	5	4
8	50	51	37	36	8	8
9	46	44	28	31	15	16
10	50	49	35	38	4	3
11	43	43	34	33	19	19

Source: Self-study based on financial statements.

As shown in the table, the percentages of the three major cost groups in the value of operating expenses in 2019 and 2020 changed insignificantly. Health system resources were used for COVID-19 treatment. The pandemic crisis situation forced a short-term focus on the most urgent life-saving measures.

5. Discussion on results and implications for practice

In many countries, political authorities have turned to public health experts and medical specialists (in epidemiology, infectious diseases, virologists, and microbiologists) to provide information, advice, and consultation on pandemic control. In some, this was done with the participation of the Ministry of Health, whereas in others - within the Ministry of the Interior, institutes of public health, and special task forces. Scientists and physicians were by far the most trusted experts (82% and 83%) (Golinowska, Zabdyr-Jamroz, 2020).

The statutory limitation on the working time of medical workers, the statutory rules of the practice of physicians and other groups of medical professionals, the statutory method of calculating the lowest remuneration of workers employed in medical entities, and the limited financial resources of the health care sector in Poland significantly affect the trends in salaries and other costs of labour of employees of teaching hospitals during the pandemic period.

It was observed that the functioning of teaching hospitals in Poland during the pandemic period was characterized by the following conditions:

1. failure to provide health care services other than COVID-19 treatment,
2. the conversion of many hospital wards into COVID-19 treatment wards,
3. limiting the professional activity of physicians to a single health care location,
4. the focus of physicians' professional activity on pandemic treatment processes.

As a result, the salaries and other labour costs of pandemic treatment have largely replaced the salaries of medical professionals for specialized health services.

6. Conclusions and future directions

A significant part of Poland's specialized hospital health services has been delayed until 2021. If it is considered that some non-performed medical services accounted for about 25% of the hospitals' annual contract, then, for a complete picture of COVID-19 medical costs in terms of the labour costs of physicians and other medical personnel, the conclusions of the analyses need to be adjusted. Labour costs for medical professionals at teaching hospitals treating COVID-19 patients were replaced by salaries and wages for health services discontinued and carried forward in 2021.

The increase in labour costs during the period studied did not show any significant deviation from the trends observed in previous years. The claims accompanying media coverage of special bonuses for medical professionals for working in crisis conditions of pandemic COVID-19 are not substantiated.

The trend of changes in salaries of medical professionals in the 2020/2019 period does not warrant consideration as a tool to stimulate the development of the intellectual potential of these employees. Which confirms the implementation of the purpose of the article.

In her previous research on the development of the intellectual potential of employees of teaching hospitals, the authors found that the current legal and information environment of teaching hospitals in Poland ascertains the existence of the intellectual potential of employees and the management of intellectual capital, but, due to several significant limitations, it does not provide a basis for its precise measurement (Chluska, 2021).

The current research indicates that the short-term goals of crisis management during the pandemic dominated the long-term policy of developing the intellectual capital of the medical workforce. Although the intellectual potential of knowledge workers such as those in teaching hospitals is crucial to the development of the health care system, the objectives pursued by hospitals in times of the pandemic must take the conditions of the crisis into account. Legal regulations embedded in crisis management processes performed the functions of coordinating and controlling the use of limited resources of the health care system.

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