

The Role of Doctors During Apprenticeships and Medical Residents in Knowledge Transfer in Teaching Hospitals

Jolanta Chluska

Częstochowa University of Technology, Poland

jolanta.chluska@pcz.pl

Abstract: In the era of the knowledge economy, knowledge is the most important asset of an organization. Teaching hospitals are medical entities that provide healthcare services to patients. The specialized medical staff not only provides medical care, but also educates future healthcare professionals, while also conducts clinical research and supports the advancement of medical technologies. Knowledge transfer in teaching hospitals is essential to their growth and serves as a key operational goal. Future healthcare professionals undertaking apprenticeships and placements in teaching hospitals not only contribute to knowledge transfer, but also play a strategic role in addressing current and future challenges facing the healthcare system. The aim of this paper is to identify knowledge-sharing processes within teaching hospitals as part of the medical staff education system. The following research question was posed: Is the education of doctors during apprenticeships and residents an element of the knowledge transfer strategies of teaching hospitals? The analyses indicate that the training of doctors during apprenticeships and residency is central to the mission and strategy of teaching hospitals, particularly in terms of knowledge transfer and the development of intellectual capital. The analyses are professional by nature, conducted from the perspective of a certified auditor and long-term researcher of the operational challenges of hospitals as healthcare institutions. The reflections presented in this paper offer an important perspective on the conditions required for the development of teaching hospitals as institutions with intellectual capital capable of addressing global health challenges. The paper continues the author's previous research on the development of intellectual capital among staff in Polish teaching hospitals.

Keywords: Knowledge transfer, Doctors during apprenticeships, Medical residents, Intellectual potential of hospital employees

1. Introduction

Human resources are the most valuable intangible asset of any healthcare organisation. In recent years, it has become evident that developing and effectively managing human capital and its associated knowledge is crucial. The rising average age of medical staff and their departure from the workforce may compromise the effective functioning of healthcare institutions and the efficiency of the entire health system. The significance of this issue was clearly illustrated during the COVID-19 pandemic. Thus, a key challenge for the healthcare sector is the education of the next generation of medical professionals. In this educational process, teaching hospitals play a leading role as institutions closely cooperating with medical universities. As specified in legislation, the responsibilities of teaching hospitals include not only the provision of healthcare services and health promotion, but also the following:

- conducting teaching and research activities,
- educating medical professionals,
- carrying out health-related tasks and implementing health programs,
- executing assignments commissioned by scientific institutions, social organisations, local authorities and other bodies,
- providing consultancy, expert opinions, and reference services to other entities (Law of 15 April 2011).

The founding bodies of teaching hospitals are most often medical universities. They oversee compliance with legal regulations, internal statutes, and organisational policies, as well as the purposefulness, cost-effectiveness, and reliability of the hospital's core functions. The tasks of preparing individuals for medical professions and providing continuing education are embedded in the statutes, which form the legal foundation for hospital operations. The statutes of a teaching hospital are adopted by its founding institution. Detailed rules regarding training in medical professions, together with the provision of health services and health promotion, along with access to necessary training infrastructure, are defined in agreements between teaching hospitals and medical universities.

2. Doctors During Apprenticeships and Residents in the Medical Education System

The framework for practising the medical profession and the sources of funding for doctors' work are regulated by law. Key legislative acts include:

- the Act of 5 December 1996 relating to the professions of physicians and dentists,

- the Act of 8 June 2017 relating to the method of determining the minimum basic salary of certain employees working in medical entities,
- the Act of 15 April 2011 relating to medical activity.

These legal acts define the rules governing medical practice, education, licensing, professional accountability, working hours, and remuneration, including how the lowest salaries in medical institutions are calculated.

The practice of the medical profession involves providing healthcare services by individuals with appropriate qualifications, confirmed by relevant documentation, including health assessments, disease diagnosis and prevention, treatment and rehabilitation, medical consultations, while also issuing medical opinions and certificates. The law also recognises medical education as part of medical practice. Physicians are required to engage in ongoing professional development, including postgraduate training, which encompasses both apprenticeships and specialized education. The postgraduate apprenticeship focuses on improving practical skills and deepening theoretical knowledge in specific medical fields. This apprenticeship must last no less than 12 months. It is carried out under a fixed-term employment contract dedicated to vocational training. During apprenticeship a doctor operates under the supervision of a specialized physician. The organisation, funding, and provision of conditions for postgraduate apprenticeships fall under the responsibility of the voivodeship marshal as part of governmental administration. Funding for the postgraduate apprenticeship is provided to the voivodeship marshal by the competent voivodeship governor based on a formal agreement between them. These funds are then transferred to the institution hosting the apprenticeship. The content of the postgraduate apprenticeship programme is defined by the Minister of Health.

A doctor may undergo specialized training in residency mode, which includes on-call medical duties specified in the specialized training program, under an employment contract with the training provider, for the duration necessary to complete all components of the program. This duration is set out in the official specialized training programme. The programme is reviewed at least every five years and updated as needed based on advancements in medical science by a panel of experts. The specialized programme must be approved by the Minister of Health. Residency positions are awarded and financed by the Minister of Health using state budget resources under the Minister's control (Law of 5 December 1996, Article 16j). Residency funding covers both salaries and social security contributions. Remuneration levels for various specializations within residency training are set by the Minister of Health. The doctor undergoing specialized training is supervised by a designated physician, known as the head of specialization.

Basic salary levels for apprentices and residents are also determined by the Minister of Health. According to the Act of 8 June 2017 relating to the method for determining minimum remuneration in medical entities, as of 1 July 2024, the salary for doctors in postgraduate apprenticeships will be PLN 6,798—an amount calculated by multiplying the job factor for apprentices (0.95) by the average gross monthly wage in the national economy for 2023 (PLN 7,155.48).

The Act of 15 April 2011 relating to Medical Activity sets out, among other things, the principles for conducting therapeutic activities, the rules for the functioning of healthcare entities, working time standards, and guidelines for monitoring both therapeutic activities and entities that provide them, including the execution of educational and research tasks. A healthcare entity established or operated by a medical university is required not only to provide medical care but also to fulfil obligations related to undergraduate and postgraduate education in the medical professions. It is also obliged to provide the university with access to organisational units and resources necessary for training.

As the aforementioned legal provisions illustrate, the rules for educating doctors during apprenticeships and residents are clearly defined: ranging from programme content, through remuneration frameworks, to the structure of the educational process. Since funding for the education of trainees and resident doctors involves public resources, its use is subject to oversight and accountability. Healthcare providers involved in education must account for such funding separately and disclose it in their financial statements.

The analysis of healthcare practice and the relevant literature reveals several challenges related to human capital management. Key negative trends contributing to staffing shortages and high turnover in healthcare institutions include:

- limited financial resources of healthcare providers,
- Numerous ongoing organisational and systemic reforms in healthcare,
- rising operational costs associated with maintaining the operational readiness for providing healthcare services (inflation, energy, pandemics),

- the long and highly formalized nature of medical education and continuous training,
- shortages in specific medical specializations,
- globalization and privatization of health services.

If human capital is acknowledged as the most critical factor in the effective operation and development of healthcare entities, then the education and upskilling of medical staff, particularly the younger generation, should be a top priority in all such organisations. This is especially true for teaching hospitals, which work in close partnership with medical schools at various stages of training. The complexity of medical education, its structured nature, the multi-level career path, while also the potential held by medical students all justify the conclusion that the training of doctors is an integral part of a broader talent management strategy. An overview of the definitions of talent presented in Table 1, including those used in the health services sector, may serve to confirm the validity of considering doctors during apprenticeships and residents as individuals with talent.

Table 1: Selected definitions of talent

Author	Definitions of talent
Kaczmarska A., Sienkiewicz Ł., 2005	Individuals with key skills, abilities, and even a gift.
Silzer, R., Dowell, B., 2010	Talent refers to those individuals and groups with the strategic competencies that enable a company to achieve its short and long-term goals. They exhibit the competencies that will add the most value to customers and in doing so, help to differentiate the organization from its competition.
Tansley C., 2011	A complex amalgam of employees' skills, knowledge, cognitive ability, and potential. Talent in an individual needs to be recognised as a complex and dynamic mix of such key characteristics.
Jędrych E., 2013	Talent is defined as a high-potential employee who contributes to the organization's value and enhances its current and future competitive position.
Cannon J.A., McGee R., 2015	Innate predispositions that determine individual success, competencies recognised and valued by organisations, and the initiation of activities aimed at discovering and developing exceptional qualities and skills.
Taha V. A., 2015	Talented people are considered the strategic asset of the organizations, and ability to identify, recruit, retain and deploy these employees is a prerequisite for sustainable competitive advantage and success.
Stuss M., 2021	Talent is shaped by ability, achievement, competence, adopted ideas, potential, while also the degree of commitment.

Source: Author's self-study based on literature.

Implementing Talent Management strategies for the health services organizations positively impacts the organization itself, the personnel, and the patients-beneficiaries (Mitosis, 2021) G. Ogden (2010, p. 80) is convinced that despite the "shrunken" budget, it is necessary to invest in developing talent because "healthcare organizations without the right processes in place to identify and develop talent will struggle to perform and compete at a high level in the new healthcare economy".

3. Teaching Hospitals as a Knowledge-Sharing Entity - Methodology of the Research

The aim of this paper is to identify knowledge-sharing processes within teaching hospitals as part of the medical staff education system. The conclusions were drawn based on available financial data from the financial statements of teaching hospitals, outlining the funding of education for doctors during apprenticeships and residents, relevant legal acts, and publicly available information on hospital websites.

The following research question was formulated: "Is the education of doctors during apprenticeships and residents an element of the knowledge transfer strategies of teaching hospitals?"

The research process included the following steps:

- analysis of legislation on the rules for the training of doctors, including trainees and residents,
- collection of financial statement data from the National Court Register (selected data from profit and loss accounts, explanatory notes, and other disclosures),

- compilation and selection of data illustrating costs and revenues related to the education of doctors during apprenticeships and residents, subsidies received for this purpose, and the number of doctors during apprenticeships and residents in the analysed period,
- application of selected structural and dynamic indicators to describe the relationship between total hospital revenues and revenues from educational subsidies, along with expert analysis of these financial relationships,
- identification of the role of human resources and intellectual capital in teaching hospitals in the education of future medical professionals and the processes of knowledge creation and transfer (based on literature and website reviews, while also synthesis),
- review of conclusions from selected research areas previously conducted by the author on the financial statements of hospitals and the intellectual capital of teaching hospital staff,
- conclusion of the study.

Clinical hospitals distinguish themselves among healthcare providers not only by the scope of specialized services they offer, but also by their significant roles in training medical professionals, conducting research and teaching, and fulfilling consultative, expert, while also other duties delegated by academic institutions, local authorities, or government bodies, hence their selection as the subject of this study.

There are numerous public rankings of healthcare providers, including teaching hospitals. One such ranking compiled a list of the 30 healthcare providers with the highest revenue from medical services. From this list, the 10 largest teaching hospitals were selected. (Jarosz, 2023) Clinical hospitals' operations are financed with public funds. The broader the scope of their activities, the greater the revenues generated from contracts with the National Health Fund and the Ministry of Finance. The selection of clinical hospitals with the highest revenues from the sale of medical services for the study reflects their recognition as the most important healthcare institutions in the training of medical personnel.

4. Practical Aspects of Knowledge Transfer in Polish teaching Hospitals - Results

The education of doctors during apprenticeships and residents is included in the operational scope of the hospitals analysed. The three stated missions of the teaching hospitals are particularly noteworthy:

- "Treating effectively, teaching well, and serving science",
- "We treat and educate with passion",
- "We save lives, we treat the sick, we teach the next generation",
- "The mission of the University Clinical Hospital is to provide health services at the highest level and to promote health, in conjunction with teaching and scientific research activities."

The missions of the remaining teaching hospitals analysed generally refer to the supreme value of human life and health.

In their statutes, teaching hospitals emphasize that one of their key objectives is, among other things: "the provision of health services and health promotion in conjunction with teaching and research activities," and their tasks include: "participation in the preparation of individuals for medical professions and the continuing development of professionals in medicine, nursing, and other healthcare fields." In these areas, the hospitals also express a willingness to collaborate with both domestic and international healthcare institutions, while also to educate and improve the skills of medical personnel.

Financial data was also collected from financial statements, particularly the income statement and accompanying explanatory notes for the years 2022 and 2023. The focus was on revenue from healthcare services, funds received for the education (salaries) of doctors during apprenticeships and residents, and the number of future medical professionals being trained. The relationship between these figures reflects the extent of the hospital's involvement in educational processes.

Information regarding the financing of medical education is disclosed in the financial statements of healthcare entities, particularly in the explanatory notes. These include data such as:

- the revenue structure of the medical facility,
- accrued income, and
- average annual employment, broken down into professional groups.

The level of detail in reporting on the training of doctors during apprenticeships and residencies varied across financial statements. Some teaching hospitals provided thorough descriptions, while others offered only limited

information. The relationships between the value of subsidies for training doctors during apprenticeships and residents and total income from operations are presented in Table 2.

Table 2: Funding for doctors during apprenticeships and residents

Hospital	Total revenue (thousands of PLN)		Subsidies for the training of doctors during apprenticeships and residencies (thousands of PLN)		Percentage of education grants in revenue (%)		Increase in value of grants (%)
	2023	2022	2023	2022	2023	2022	2023/2022
1	1,790,475	1,368,160	68,864	39,274	4	3	75
2	1,777,409	1,351,530	97,129	82,708	5	6	17
3	1,549,185	1,174,597	84,040	60,498	5	5	39
4	1,374,247	1,127,011	88,297	74,103	6	7	19
5	871,785	690,183	57,296	39,909	7	6	44
6	692,090	540,677	53,442	43,816	8	8	22
7	661,600	527,284	30,618	25,763	5	5	19
8	593,424	544,113	20,913	14,660	4	3	43
9	471,413	405,859	21,641	17,629	5	4	23
10	455,780	384,798	31,006	21,542	7	6	44

Source: Author's self-study based on financial statements of teaching hospitals

As the data on the scale of funding allocated to the training of doctors during apprenticeships and residents shows, it remains below 8% in both periods. A positive development is the 75% increase in funding at the teaching hospital with the highest level of sales revenue. In the analysed years, the share of funding for doctors during apprenticeships and residents in total income remained at a similar level, with growth ranging from 17% to 75% between periods. Of the ten teaching hospitals examined, only four provided detailed figures on the number of doctors during apprenticeships and residents in the explanatory notes to their financial statements. The proportion of trainees and resident doctors in 2023 at these teaching hospitals ranged from 10% to 14% of the total staff.

Revenue from the sale of healthcare services at teaching hospitals is financed through contracts with the National Health Fund (the payer) and through grants and subsidies from the Ministry of Health. Public funding of these activities creates a clear obligation to support the education of doctors as a critical resource within the healthcare system. The number of students in the field of medical and health sciences increased by 14% between 2019 and 2022, reaching 196,600 in 2022 and 202,800 in 2023 (a 3% increase). In 2022, students in this field accounted for 16% of the total student population. The increase in student numbers in medical and health sciences is likely to translate into a rise in the number of doctors during apprenticeships and residents in the coming years. (Report 2023)

5. Costs and Benefits of Training Doctors During Apprenticeships and Residency. Discussion on Results and Implications for Practice

Health systems worldwide are facing the major challenge of addressing complex population health needs. Key challenges include:

- ageing populations,

- globalization, pandemics,
- sustainable development tasks,
- the adoption of artificial intelligence in healthcare,
- robotization and emerging technologies.

It is essential that young, capable, and open-minded individuals choose careers as doctors, nurses and other healthcare professionals. Without investment in the education of young medical professionals, meaningful progress in medicine becomes difficult to achieve. The analyses presented in this paper show that teaching hospitals, as institutions closely connected to medical schools, are aware of these challenges. There is a clear need to intensify efforts in this area. Globalization has accelerated the pace of change, and therefore, activities related to the education of future medical professionals must also be accelerated. Greater investment in the resources needed to develop the sector's intellectual capital is equally necessary. Given the ongoing demographic decline, this will be a significant challenge. As the COVID-19 pandemic demonstrated, the long-term cost-benefit analysis clearly supports the conclusion that the benefits of strengthening education for doctors during apprenticeships and residents outweigh the costs. (Chluska, 2022)

Financial statements serve as a key source of information for stakeholders and informed decision-making processes. It is expected that by providing more comprehensive information about the education of future medical professionals, both medical universities and teaching hospitals will improve public communication and encourage future applicants to pursue medical careers. As shown in the author's previous research, the missions and strategies of teaching hospitals and their founding institutions (medical universities) indicate a strong alignment in the areas of intellectual capacity development and knowledge transfer. This contributes to a comprehensive approach to knowledge transfer strategy.

6. Conclusions and Future Directions

The analyses presented in this paper continue the author's ongoing appeal to strengthen and enhance the intellectual potential of teaching hospitals and medical universities as a foundation for healthcare transformation strategies in response to the challenges of the 21st century (Chluska, 2024). Recognising the role of the financial statements of teaching hospitals as a primary means of communicating with the public and stakeholders led to the conclusion that the current regulations regarding the disclosure of operational revenue, including education-related grants and employment data by professional groups, are implemented by the hospitals analysed at an average level of detail. It should be proposed that given the challenges faced by teaching hospitals in training and upskilling their medical personnel, such disclosures become more comprehensive and precise. Summarizing the findings in relation to the research question posed, it may be concluded that the education of doctors during apprenticeships and residents is part of the knowledge transfer strategies of teaching hospitals, albeit it requires further enhancement and better communication of results to stakeholders, including decision-makers in the healthcare sector. These activities are also in line with public expectations for transparency regarding the implementation of sustainable development goals. While teaching hospitals are not formally required to produce sustainability reports, it is the author's view that the current components of financial statements, particularly the explanatory notes, may serve as a platform for disclosures related to human capital development and enhancement, including the intellectual capital of doctors during apprenticeships and residents. The education of current and future medical personnel not only fulfills the goals of sustainable development on a global scale but also constitutes an obligation arising from coordinating international efforts to prevent pandemics and other global health threats. The globalization of health risks requires strategic actions at the global level.

Ethics declaration: No ethical permission was required to conduct the research. I conducted the research independently, based on the data available in the National Court Register. The data is public.

AI declaration: I declare that I have not used AI resources or tools.

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