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Competencies of a Healthcare Manager in the Context of Hospital and Ambulateral Diagnostic Imaging Centers

Agnieszka Mierzwa [1], Magdalena Syrkiewicz-Świtała [2], Bernadeta Kuraszewska [3], Rafał Świtała [4], Jolanta Grzebieluch [5], Beata Detyna [6] and Jerzy Dariusz Detyna [7,*]

1 Lux Med Ltd., 02-678 Warszawa, Poland; agnieszkaa.mierzwa@interia.pl
2 School of Public Health in Bytom, Medical University od Silesia in Katowice, 41-902 Bytom, Poland; mswitala@sum.edu.pl
3 Department of Medical and Health Sciences, WSB University, 41-300 Dąbrowa Górnicza, Poland; bernadeta.kuraszewska@gmail.com
4 Department of International Economic Relations, University of Economics in Katowice, 40-287 Katowice, Poland; rafal.switala@uekat.pl
5 Department of Organisation and Management, Faculty of Health Sciences, Wroclaw Medical University, 50-367 Wrocław, Poland; jolanta.grzebieluch@umed.wroc.pl
6 Institute of Natural Sciences and Technology, The Angelus Silesius University of Applied Sciences in Wałbrzych, 58-300 Wałbrzych, Poland; bdetyna@ans.edu.pl
7 Department of Mechanics, Materials and Biomedical Engineering, Faculty of Mechanical Engineering, Wrocław University of Science and Technology, 50-370 Wrocław, Poland
* Correspondence: jerzy.detyna@pwr.edu.pl

Abstract: *Background*: Today's healthcare requires a modern style of management that adapts to the needs of both patients and employees. Imaging diagnostics has its specificity in the entire area of hospital logistics and influences the organization of work and patient care. Modern managers should have special competencies to meet the expectations of patients, employees, and organizations. *Aim*: The main purpose of article was to define the role, competencies, and skills that managers should have in the field of diagnostic imaging. *Methods*: In the research part, a questionnaire survey and in-depth interviewing were used. The research group consisted of 10 managers and 300 medical staff, i.e., radiologists, nurses, and electroradiology technicians. *Results*: The decision-making role of the manager and their interpersonal skills were recognized to be most crucial. According to the respondents, managers should ensure good work organization and provide safe working conditions. Employees appreciated the manager's ability to react in crisis situations as well as their high professionalism. The ability to communicate and resolve conflicts in a team was considered the most important psychological and social competence. *Conclusions*: A good manager, in the opinion of the respondents, is a decision-making, empathetic, and flexible person with strong leadership characteristics.

Keywords: diagnostic imaging; management; management competencies; health services; logistics

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1. Introduction

Diagnostic imaging is the basis of modern medicine, the specificity of which affects both the organization of work, methods of management, and patient care. Its proper functioning requires an efficient and competent manager who knows the specific field of imaging diagnostics and who understands the needs of both patients undergoing tests and the staff employed in the facility, as well as the expectations (goals) of the organization itself. The growing and rapidly changing expectations of various stakeholder groups, as well as emerging new challenges, result in the need for the continuous development of managerial competencies and the introduction of modern management methods [1–4]. The multitude of processes within medical facilities leads to the development of modern, specialized logistical tools that streamline the rotation of diverse resources [5,6]. As health and life are

paramount for every individual, establishing an effective logistical system in the healthcare sector is of immense importance for society [7,8]. Similar to logistics, in the healthcare sector, there are continuous physical, decision-making and information processes taking place among key stakeholders, such as patients, providers, payers, regulators, medical advisors, and the Ministry of Health. Healthcare logistics encompasses not only operational aspects but also ensuring high-quality care for patients. Managers must be able to organize processes in a way that ensures patients receive personalized, effective, and safe care [9].

Diagnostic imaging (DI) in Poland is carried out at a high level. According to A. Urbanik, many Polish centers have modern equipment, and the staff of radiologists is educated according to world standards. In addition to X-rays, DI units provide services in the field of computed tomography, ultrasonography, and magnetic resonance imaging. They also use hybrid methods, which combine radiology and nuclear medicine or combine various imaging methods, e.g., PET and computed tomography (PET-CT) or PET and magnetic resonance imaging (PET-MRI). Thanks to these methods, it is possible to detect even small foci of disease, especially cancer, at an early stage [10]. Interventional radiology is developing in parallel to these classic areas. Under the control of diagnostic equipment, minimally invasive procedures are performed that replace or supplement classic operations. Logistics in the healthcare sector encompasses planning, organization, and coordination of processes, including patient registration, conducting diagnostic tests, and delivering results [11]. A competent manager must ensure that these processes run smoothly, guaranteeing patients swift and effective care [12]. In this dynamically changing environment, there are many challenges faced by managers and employees of DI centers. They include, for example, eliminating geographical inequalities and improving access to procedures, including unequal distribution of equipment and medical personnel [13]. These elements contribute to the formation of queues. According to the Alvia Foundation, access to diagnostic tests depends on where someone lives. In some provinces, patients wait for a diagnosis and effective treatment up to two months longer than in others [14]. Patients looking for shorter queues for examinations within a few weeks or even months use various portals, e.g., onkoskaner.pl (previously: kolejkoskop.pl) [15]. However, this is not a systemic solution that interested people (including employees of diagnostic centers) are waiting for. The national averages for computed tomography (CT) published on the website are 27 days, magnetic resonance imaging (MRI) is 58 days, and positron emission tomography (PET-CT) takes 26 days to be published (as of 19 March 2023). Huge differences in the length of queues are also visible within cities. For example, in Gdańsk, patients who choose the Voivodeship Oncology Center wait over four months for an MRI. However, if they look for another facility, the test can be performed in up to 26 days. The queues for an MRI also differ in Krakow, and these differences (depending on the facility) can be more than three months. The situation is similar in Wrocław, where the waiting time for MRI can vary by 74 days. However, the greatest degree of differentiation is observed in the capital city. In Warsaw, in one hospital, patients must wait more than 200 days for an MRI, while in another hospital, they wait only 8 days [14]. Another important challenge for the employees and managers of DI centers are the activities in the field of processing, transmission, and archiving of image data [10]. Progress in these areas affects the development of teleradiology, i.e., remote description and consultation of radiological examinations. At the same time, algorithms based on artificial intelligence are being used more and more often.

The currently proposed improvement activities (and, thus, challenges) in diagnostic imaging include the extension of the database of diagnostic imaging equipment maintained in Poland, with data on the degree of equipment utilization and staff availability. Specialists also emphasize the need to follow the guidelines for physicians referring patients for imaging tests. This could eliminate unnecessary radiological examinations and optimize the diagnostic process.

The specificity of the activities conducted by DI centers, including numerous challenges, shows how complex (cross-sectional) and even interdisciplinary competencies should be pos-

sessed by people managing these facilities [2,16–19]. They must skillfully combine technical competencies, including those related to the IT area, with social competencies [10,20]. The number and variety of problems occurring in DI centers forces the search for increasingly effective methods of resource management. The key to the effectiveness of activities is proper human resource management [21], as well as the exchange of information between other DI centers (cooperation with these institutions for better patient service). In the context of contemporary challenges faced by hospitals and outpatient imaging diagnostic centers, the competence of the managers of these units becomes extremely important [19]. Improving organizational and medical solutions may lead to more effective diagnosis of patients, rational use of available resources, achieving the strategic goals of the organization, and maintaining a stable, qualified medical team at the facility, etc. [1,16,17,22–24]. The expectations concerning leaders vary depending on the specificity of the medical procedures performed, the employees employed, and their expectations, as well as the needs of the organization and the intensity of competition. Regardless of the area of activity of a given institution or organizational unit, leaders are required to have high knowledge, awareness of ongoing processes (internal and market), the ability to adapt to changes, and complete awareness and responsibility for their entrusted tasks [25–28]. The concept of healthcare logistics suggests the need for embracing modern management methodologies. In today's dynamic and competitive healthcare environment, managers must be flexible and adapt to changing needs and challenges. They must be open to innovations and new technologies that can improve the efficiency and quality of care. In efficient healthcare logistics, paramount importance is placed on delivering high-quality healthcare, particularly within the realm of diagnostic imaging, and the necessity for proper management of the processes, resources, and personnel within it. The main task of service providers in the field of magnetic resonance imaging and computed tomography is to provide high-quality services, comprehensive care during their performance, and to ensure medical safety of both patients and employees performing procedures, as well as providing the test result as soon as possible and directing the patient to further diagnosis or treatment. From the organization's point of view, it is extremely important to ensure the economic and organizational efficiency of the facility. Considering the specificity of this type of facility and the problems faced by managers, this is now becoming a task that requires a lot of effort. This applies to both problems related to medical equipment, its servicing, and its failure rate, and human resources, including the maintenance of highly qualified medical staff. It is necessary to create and maintain appropriate and employee-friendly working conditions, encouraging the team to be professionally active. In light of the current shortage of medical workers, it may be crucial to provide the necessary training and to create development and promotion opportunities [28,29].

Managers play several roles. They should know the specificity of a DI facility, have organizational intuition, be creative and decisive, especially in emergencies, and be real leaders. To perform these roles, a manager should have appropriate qualifications and competencies that will help them to be successful and, thus, provide the success of the team and the entire organization. The most valuable trait is the combination of experience and education [1,30]. Therefore, a combination of a theoretician and a practitioner with universal competencies, both hard and soft, is the most desirable trait among DI managers both in Poland and around the world. The DI manager is obliged to know the tasks, be responsible for the work performed, continuously develop and improve employees, and ensure the high quality of work and results expected by the organization [2,31,32]. It should be remembered that the greatest value of every organization, including the DI facility, are people who expect effective leadership [28]. For this to happen, a manager must be able to manage his or her own stress in difficult situations. The skills and predispositions of a person in a managerial position are of great importance. This is especially true in difficult situations related to the failure of medical equipment, and, thus, downtime in the functioning of the facility, staff frustration, or prolonged waiting time for patient diagnosis. Unfortunately, leadership is not always perceived as an important value by management [27,33,34]. Thus, such an

attitude demotivates employees to act and become more involved and reduces the level of satisfaction with performing the tasks [29]. At the same time, leadership behavior should focus on the implementation of many tasks, including medical procedures carried out by diagnostics, such as magnetic resonance imaging and computed tomography, ensuring safety and quality, complying with radiological protection guidelines, and taking actions for the development of employees. It should be emphasized that the ability to create a highly specialized, coherent, and satisfied team is a key condition in ensuring the continuity of operation of a given facility (or organizational unit). The structure of the facility is also an extremely important factor. A good leader can assess what the employee and the entire team expect and is able to set formal boundaries for the activities and responsibilities of each team member (e.g., nurses, electroradiology technicians, and radiologists). A good DI manager should also be able to correctly identify technical issues and respond to them quickly. In the event of a medical equipment failure, downtime associated with this becomes of great importance. A prompt and proper response reduces both the image and the economic losses of the institution. A manager must think analytically, look ahead at the same time, anticipate, and have cognitive skills. In the context of cooperation with people, including communication with employees, patients, and other stakeholder groups, one of the most important competencies of a DI manager is emotional intelligence. The emotional intelligence of the manager allows for a smooth introduction of necessary changes to the facility, which correlates with the commitment and satisfaction of the entire team. The mentioned satisfaction will be greater if fewer commands are issued from above. Engagement increases through cooperation and participation in decision-making, rather than by waiting solely for ready-made solutions. Therefore, a manager should be able to delegate tasks to appropriate employees, especially to coordinators of individual departments. The manager should skillfully equip them with powers and recognize their competencies [35]. It should be remembered that both the coordinators and each employee should have space to make mistakes. This manager's attitude minimizes the risk of increasing the level of stress among employees related to the fear of making any mistake.

One of the most frequently cited 'frameworks' for healthcare management skills today is the Management Competency Assessment Tool (MCAP). This tool was developed in collaboration with healthcare managers in Australia in 2014 [36,37]. This framework considers the definition of managerial competencies, where they are related to the presence of knowledge, behaviors, skills, attitudes, and values related to work performance [28,32,38]. The MCAP Managerial Skills Framework is an assessment tool based on the assessment of 6 core competencies and 79 related behavioral elements. The key competencies of managers in healthcare facilities boil down to the ability to make decisions based on evidence (1), skills in operations, administration, and resource management (2), knowledge of the environment and organization of health (3), interpersonal skills, including communication and relationship management (4), people and organization management skills, leadership (5) and, if necessary, to change management skills (6) [22,37]. In the light of the literature review, an interesting concept of healthcare manager competencies was proposed by the American consortium of several professional associations in the healthcare segment, namely the Healthcare Leadership Alliance (HLA), representing over 100.000 healthcare managers. For the key set, the HLA included communication, relationship management, leadership, professionalism, knowledge of the health environment, and business knowledge and skills [39]. In the last decade, a proposal regarding management competencies in healthcare facilities was put forward by the International Hospital Federation (IHF), which is an international, nongovernmental, nonprofit organization that has been cooperating with many health institutions around the world since 1929. In 2015, the IHF developed practical forms of using the managerial competencies previously described by the HLA. These are forms of action dedicated to various stakeholder groups of healthcare facilities [36]. In 2022, the American College of Healthcare Executives proposed the use of HLA studies as a healthcare management skills assessment tool, to identify strengths and areas that require professional skills development, as well as to formulate a development plan. These

initiatives are extremely inspiring and should be implemented in management practice, including the management of outpatient and hospital diagnostic imaging centers. They are about systematic monitoring and the improvement of resources owned by DI units, especially human resources. The key, in the context of the efficiency and effectiveness of medical facilities, is the staff of managers and their competencies, which should meet modern challenges (social, technical, technological, economic, etc.).

2. Purpose of the Article

Although there is already a certain amount of information on managerial competencies in healthcare, they have not yet been sufficiently analyzed in terms of practical application in a specific type of facility, such as imaging diagnostics facilities. Existing studies on managerial competencies mainly refer to management in healthcare in a broad sense, and not to the specific challenges related to diagnostic imaging. Filling this gap could significantly contribute to improving management practice in healthcare, enabling managers to use knowledge more effectively and to implement solutions that improve the quality of care.

The aim of this article is to present the competencies and role of a manager in a diagnostic imaging facility. The article should help identify the most important competencies and necessary skills that effectively support both the organization and the employees of the facility.

3. Materials and Methods

3.1. Research Techniques and Tools

To collect data, two original research tools were developed: a questionnaire addressed to medical staff employed in DIs and an in-depth interview questionnaire for managers managing DI studios. In both studies, the selection of the sample was intentional. The study had a mixed, quantitative, and qualitative character. The original survey questionnaire was directed at radiologists, radiology technicians, and nurses employed in diagnostic imaging facilities. It included a demographic section with 5 questions, followed by 8 closed-ended questions. The questions aimed to gather the medical staff's opinions on various aspects, including what, in their opinion, is the most crucial factor in the proper functioning of a diagnostic imaging facility, which areas of work need improvement for better facility functioning, and whether the organization of work affects the health and safety of medical staff and patients during medical procedures. The in-depth interview was directed at managers of diagnostic imaging facilities and included 6 open-ended questions concerning the desirable competencies and skills that a good manager should possess, as well as the difficulties and challenges they face while performing their job. The research was carried out in the first quarter of 2021 in four hospital laboratories (three in Kraków and one in Mielec) and six DI outpatient facilities (three in Kraków and Wrocław, Częstochowa and Poznań). The study group consisted of 10 managers and 300 medical personnel, that is, radiologists, nurses, and electroradiology technicians. The survey questionnaire was implemented in two formats, namely electronic and paper, which allowed for comprehensive outreach to study participants and increased their accessibility. The online version was made available through a Web platform, facilitating quick and convenient completion of the survey from any location and enabling automatic data collection and processing. The paper version, on the other hand, was distributed directly within diagnostic imaging facilities, ensuring access for individuals who preferred traditional research methods or lacked digital tools. The interview process included both telephone and face-to-face meetings. Telephone interviews enabled effective reach to participants located in various geographic areas, eliminating the need for physical presence, and allowing for flexible scheduling of interview sessions. In contrast, face-to-face interviews facilitated direct contact with respondents, promoting the acquisition of more detailed and qualitative information through personal engagement and interaction. Both types of interviews were conducted in accordance with ethical and methodological standards, ensuring that questions were asked in a consistent and objective

manner and that responses were documented and analyzed according to established research norms. This varied approach to data collection aimed to provide a broad and representative understanding of the investigated issues, considering different participant preferences and availability. Furthermore, the questionnaire sought to identify which roles of the manager overseeing the facility are considered crucial for its proper functioning, what competencies a good facility manager should possess, and what gains respect for the person managing the facility. The interview aimed to explore what, in their opinion, are the most essential factors for the proper functioning of the facility, which areas in the facility require improvement, and in which areas they encounter the greatest difficulties. It also sought to understand which competencies and skills of a manager are essential for addressing difficulties and how they handle them, which psychosocial competencies are considered the most important for the development of the organization, and what qualities a good manager should possess.

3.2. Characteristics of the Study Group

The study group, which included medical personnel, consisted of 300 people, with 62.7% women (n = 188) and 37.3% men (n = 112). The average age of the surveyed persons was 44.73 $\pm$ 11.47 years and ranged from 22 to 77 years. A total of 14.7% of the respondents (n = 44) were not older than 30 years old. A total of 21.3% of people were in the 31–40 age group (n = 64). The largest group (n = 98, i.e., 32.7%) were the respondents between 41 and 50 years of age. Furthermore, 23.3% of the respondents were aged 51–60 (n = 70), and 8.0% of the respondents were over 60 (n = 24). The average seniority in diagnostic imaging was 14.45 $\pm$ 10.04 years and ranged from 1 to 50 years. Most of the respondents had work experience of 1–10 years (n = 113, i.e., 37.7%) or 11–20 years (n = 105, i.e., 35.0%). Every fifth person (n = 60, i.e., 20.0%) had worked in diagnostic imaging for 21–30 years. On the other hand, 7.3% of people had more than 30 years of work experience (n = 22). A total of 30.0% of people (n = 90) worked as nurses. Additionally, 37.7% of the respondents (n = 113) were technicians. Radiologists constituted 32.2% of the study group (n = 97). Most of the respondents (n = 204, i.e., 68.0%) worked under a civil law contract. A total of 32.0% of the respondents were employed under an employment contract (n = 96). Detailed data are included in Table 1.

The in-depth interview was attended by 10 people, including 6 women and 4 men. Nine of the respondents had a higher education degree, and one person had a secondary education. The seniority of the respondents was usually 10–20 years (n = 4) or 5–10 years (n = 3). Pearson's χ^2 test of independence was used in the statistical analysis. A significance level of $p < 0.05$ was assumed. Calculations were made using the SPSS 20 program. The χ^2 test of independence was used to examine whether the variables measured at the nominal level or higher in the comparison groups differ from each other. Research was carried out in two formats, electronic and paper, which may have led to issues with the representativeness of the sample. The paper version may primarily have reached those who preferred traditional methods, which may have influenced the participant group and may not have fully reflected the diversity of preferences and experiences. In the case of telephone and face-to-face interviews, those individuals more willing to participate in the study may differ from those who did not respond or declined to participate, potentially affecting the results and data interpretation. Participants may have provided answers that aligned with the researchers' expectations or social norms rather than their genuine opinions. This applies to both questionnaires and interviews. In the case of face-to-face interviews, the direct presence of the researcher may also have influenced the way respondents formulated their answers. Neither the time or the financial resources allocated for the study affected the scope and quality of the data collected. Ensuring the confidentiality and anonymity of the participants is crucial, but it can be challenging to fully guarantee during in-depth interviews.

Table 1. Study group.

Category	Number (*n*)	Percentage (%)	Additional Information
Gender			
Women	188	62.7%	
Men	112	37.3%	
Age			Average age: 44.73 ± 11.47 years
≤30 years	44	14.7%	
31–40 years	64	21.3%	
41–50 years	98	32.%	Largest group
51–60 years	70	23.3%	
>60 years	24	8.0%	
Work experience in diagnostic imaging			Average experience: 14.45 ± 10.04 years
1–10 years	113	37.7%	
11–20 years	105	35.0%	
21–30 years	60	20.0%	
>30 years	22	7.3%	
Position			
Nurses	90	30.0%	
Technicians	113	37.7%	
Radiologists	97	32.2%	
Type of employment contract			
Civil law contract	204	68.0%	
Employment contract	96	32.0%	

Source: own study.

4. Results

4.1. Survey Results

The decision-making role of the manager was considered the most important for the proper functioning of the studio (*n* = 217, i.e., 72.3%). The second place was taken by the interpersonal role (*n* = 158, i.e., 52.7%), and the third place was taken by the organizational role (*n* = 146, i.e., 48.7%). The respondents attributed the least importance to the creative role of the manager (*n* = 76, i.e., 25.3%) (Figure 1 and Table 2).

Technicians more often than others (35.4%; $p = 0.0077$) indicated the key creative role of the manager managing the facility. People between 41 and 50 more often claimed that the manager managing the facility plays an interpersonal role (62.2%; $p = 0.0174$). People working based on an employment contract more often (34.4%) indicated the creative role of the facility manager than people working based on a civil law contract (21.1%)—$p = 0.0135$. Gender and seniority did not significantly affect the assessment of the role of the manager managing the facility.

According to the surveyed employees, a good manager should take care of good work organization (*n* = 236, i.e., 78.7%) and safe working conditions (*n* = 186, i.e., 62.0%). According to them, they should have the ability to communicate effectively with employees (*n* = 153, i.e., 51.0%). The respondents attributed less importance to leading teams and the ability to solve conflicts within them (*n* = 127, i.e., 42.3%), as well as the ability to solve technical and equipment problems was not significant (*n* = 89, i.e., 29.7%). According to 19.3% (*n* = 58) of the respondents, a good manager is one who is focused on the client and the safety of performed medical procedures, while for 8.0% (*n* = 24) the manager should be oriented towards the goals of the facility and, thus, the organization (Figure 2 and Table 3).

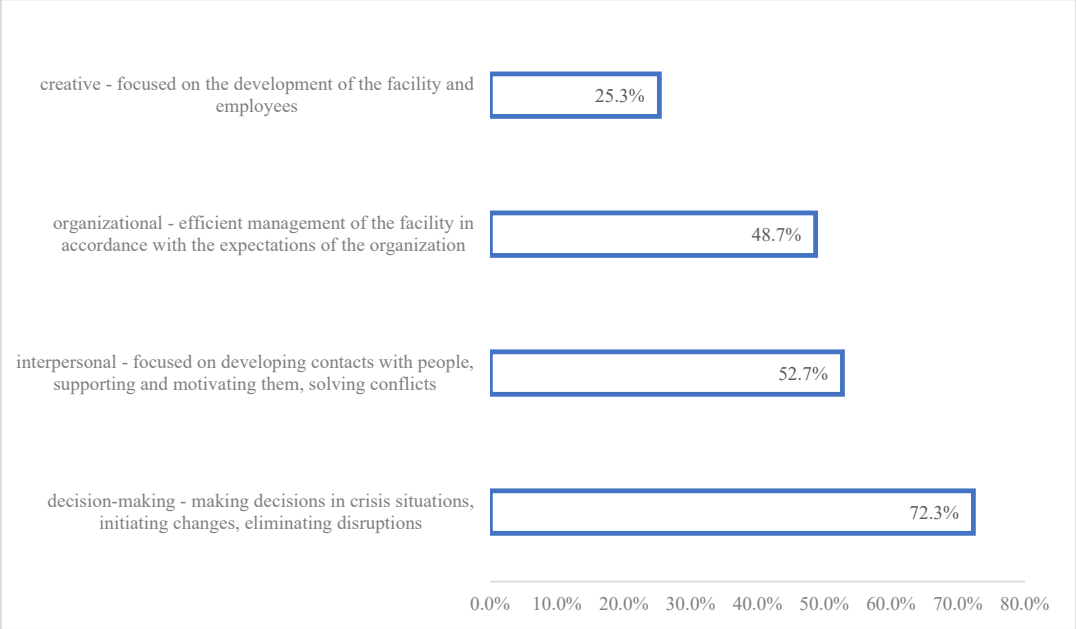

Figure 1. Roles of the manager managing the facility, crucial for the proper functioning of the facility (results do not add up to 100% because respondents could indicate more than one answer). Source: own study.

Table 2. The roles of the manager managing the facility that are crucial for the proper functioning of the facility.

Role of the Manager	Number of Respondents (N)	Percentage (%)
Decision-making role	217	72.3%
Interpersonal role	158	52.7%
Organizational role	146	48.7%
Creative role	76	25.3%

Source: own study.

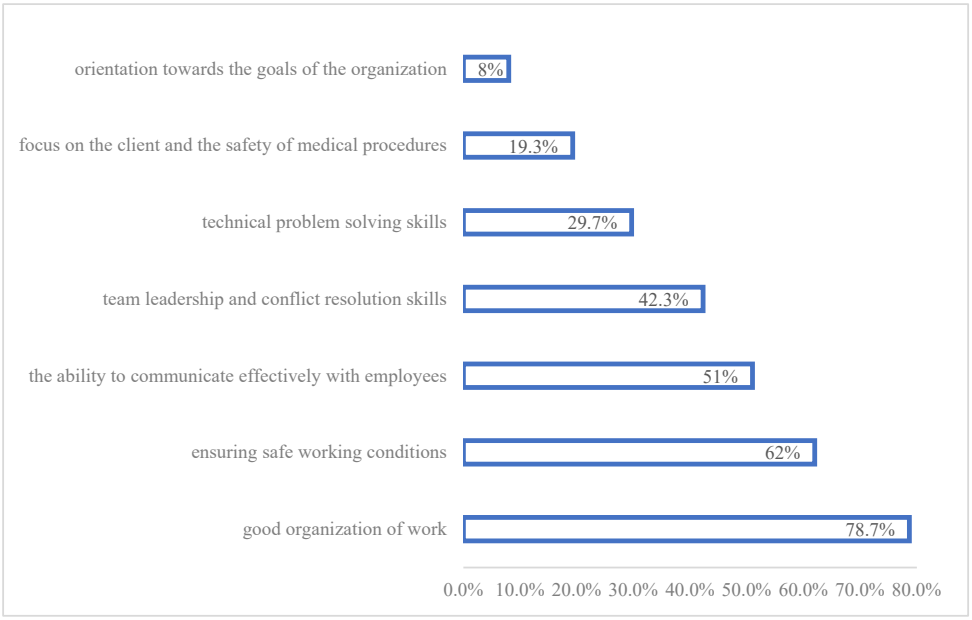

Figure 2. Competencies that a good DI facility manager should possess (results do not add up to 100% because respondents could indicate more than one answer). Source: own study.

Table 3. Competencies that a good DI facility manager should possess.

Category	Number of Respondents (N)	Percentage (%)
Good work organization	236	78.8%
Safe working conditions	186	62.0%
Effective communication with employees	153	51.0%
Leading teams and conflict resolution	127	42.3%
Solving technical and equipment problems	89	29.7%
Focus on client and safety	58	19.3%
Orientation towards facility goals	24	8.0%

Source: own study.

Technicians claimed that a good manager should have the ability to focus on the client and the safety of medical procedures less often than nurses and doctors (12.4%; p = 0.0438). People under 40 more often claimed that a good manager should have the ability to communicate effectively with employees (61.1%; p = 0.0285). People over 40 more often indicated the need for the manager to have the ability to solve technical and equipment problems (p = 0.0196) or care for safe working conditions (p = 0.0152). People performing their work based on an employment contract more often included the ability to communicate effectively with employees among the competencies that a good manager of a DI facility should have (64.6%; p = 0.0012). People employed under a civil law contract more often indicated the ability to focus on the client and the safety of medical procedures (22.5%; p = 0.0398) and attention to good work organization (82.8%; p = 0.0101) as being important. Gender and seniority did not significantly affect the answers.

The competencies that the respondents appreciated in the person managing the facility were the ability to react in difficult and crisis situations (n = 163, i.e., 54.3%), as well as professionalism in the performance of duties (n = 156, i.e., 52.0%). Interpersonal qualities as well as building and maintaining a good atmosphere in the team are also important (n = 146, i.e., 48.7%). Less important is the manager's knowledge and professional achievements (n = 94, i.e., 31.3%). Few respondents (n = 23, i.e., 7.7%) did not feel any special appreciation towards the person managing the facility (Figure 3 and Table 4).

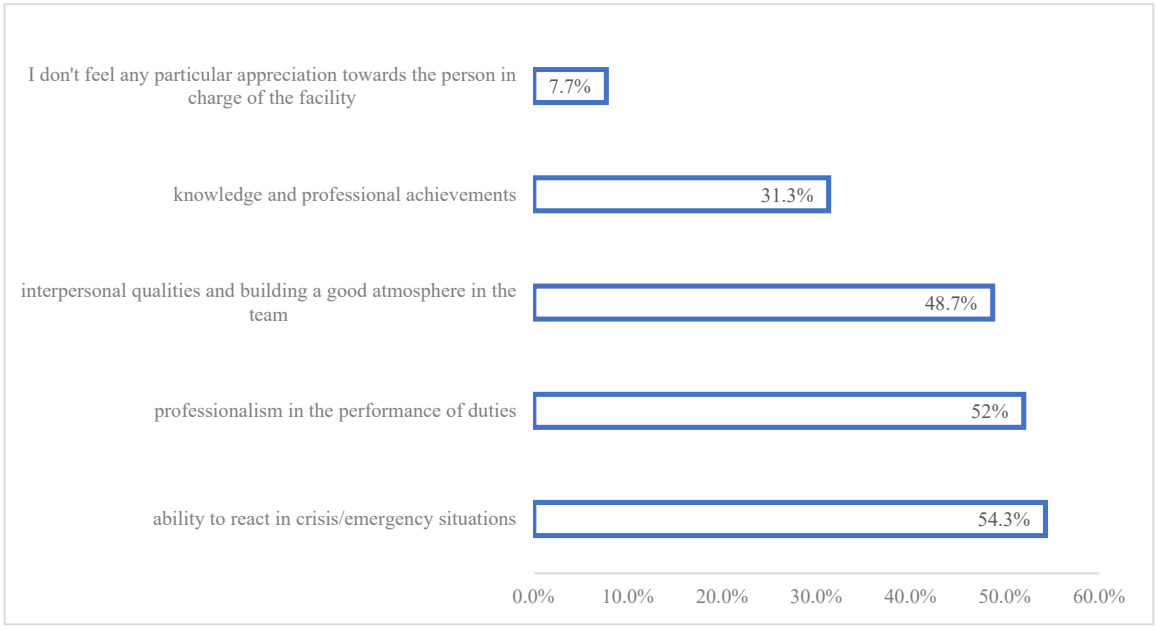

Figure 3. Factors that arouse appreciation in the person managing the facility (results do not add up to 100% because respondents could indicate more than one answer). Source: own study.

Table 4. Factors that arouse appreciation in the person managing the facility.

Competence	Number of Respondents (N)	Percentage (%)
Ability to react in difficult and crisis situations	163	54.3%
Professionalism in the performance of duties	156	52.0%
Interpersonal qualities and team atmosphere	146	48.7%
Manager's knowledge and professional achievements	94	31.3%
No special appreciation for the manager	23	7.7%

Source: own study.

Neither the position/profession held, length of service, form of employment, gender, nor age of the respondents had a significant impact on the factors indicated by the respondents, which led to their appreciation of the person managing the institution.

4.2. In-Depth Interview Results

All managers believed that the decision-making role was the most important factor in their work (Table 5). According to the respondents, an effective manager must be able to make particularly difficult decisions. The most frequently mentioned desirable features in the position of a DI manager indicated the ability to adapt to changing conditions (8 out of 10 respondents), and 8 respondents additionally indicated the importance of the interpersonal role. Managers believe that empathy is important, but it usually works in smaller teams. In turn, a manager's focus on goals reduces the focus on employees, so both approaches are actually needed. According to nine managers, the most important psychological and social competence, fundamental for the development of the facility and organization, is the ability to communicate and resolve conflicts. Managers unanimously decided that the most important thing was to ensure the safety of both patients using the tests and staff during medical procedures. The respondents considered leadership of employees and the ability to resolve conflicts in teams to be very important (6 out of 10 respondents). Managers indicated that when solving problems, one cannot focus on finding the culprits, but on solving specific problems (7 out of 10 respondents). Managers believe that they will appreciate a culture of learning from mistakes (7 out of 10 managers). Six out of ten managers say they gain trust when making difficult decisions. Seven out of ten managers say it is important to be able to admit when you are wrong or that you do not know something. According to them, this is what increases the credibility of the boss in the team and builds respect. A good manager is, in the opinion of the respondents, a decision-making person (10 out of 10 managers) who is competent (10 out of 10 managers), with the characteristics of a leader (6 out of 10 managers).

Table 5. Interview results.

Category	Details	Percentage (%)
Most important role of a manager	Decision-making role	100%
Ability to adapt to changing conditions	Desirable feature of a DI manager	80%
Importance of the interpersonal role	Indicated by respondents	80%
Most important psychological and social competence	Ability to communicate and resolve conflicts	90%
Safety assurance	Safety of patients and staff	100%
Leadership and conflict resolution	Considered very important	60%
Focus on problem solving	Solve specific problems, not find culprits	70%
Culture of learning from mistakes	Appreciated by managers	70%
Gaining trust in difficult decisions	Trust gained by managers	60%

Table 5. *Cont.*

Category	Details	Percentage (%)
Admitting mistakes	Important for credibility and respect	70%
Good manager characteristics	Decision-making, competence, leadership	100% (decision making, competence), 60% (leadership)

Source: own study.

5. Discussion

The effectiveness of health managers' activities is the subject of interest in numerous studies and documents from international organizations, including the WHO. For example, one of the strategies of this institution entitled "The new European policy for health—Health 2020" emphasizes the need to strengthen leadership within healthcare systems, with a particular emphasis on the level of healthcare units, which directly translates into improving the quality of health services offered [16,30,34,40]. The ability of health managers to establish and implement cooperation with other entities or institutions to improve the effectiveness of the health system. This thesis is included in the official WHO document "Strengthening public health capacities and services in Europe: a framework for action" [41].

It is very difficult to build an appropriate competency model, especially when it should refer to managerial competencies. A significant complication arises when the target place of their use is the area of healthcare. For example, one of the fundamental dilemmas will be deciding on the desired profession of a manager. This person may practice as a doctor, nurse, or economist. Arguments in favor of the latter may include the need to ensure effective operation, e.g., in the field of contracting benefits, meeting the competition posed by private entities. At the same time, proficiency in cost accounting, which is intensively emphasized when choosing alternative treatment options for difficult medical cases, suggests an increase in the importance of management skills and knowledge [42].

In the Polish healthcare system, useful managerial skills include decisiveness, decision-making, knowledge of the legal and financial conditions of the functioning of healthcare facilities, ease in establishing interpersonal contacts, and even knowledge of techniques used during negotiations. In general, expectations for a Polish manager coincide with the requirements set by the Healthcare Leadership Alliance (HLA) [43].

As part of the management of healthcare units, human resource management is in a special place. Motivating medical staff, consisting of professionals, such as doctors, nurses, paramedics, diagnosticians, or pharmacists, to implement the adopted strategy and meet the needs reported by patients requires the ability to cooperate with these teams [21,44]. Other models of managing managerial competencies in healthcare entities include the following [43]:

1. The Global Consortium for Healthcare Management Professionalization (a consortium created by The International Hospital Federation)—developed the Competency Directory Model indicating five important domains, i.e., "leadership, communication and relationship management, professional and social responsibility, health and healthcare environment and skills business".
2. National Center for Healthcare Leadership (NCHL) [2005], based on research conducted by the Hay Group with the participation of managers of healthcare organizations. The NCHL competency model contains three domains, as follows:
    a "transformation—achievement orientation, analytical thinking, social orientation, strategic orientation, innovative thinking,
    b implementation—responsibility, cooperation, communication, initiative, organizational awareness,
    c people—human resources management, professionalism, relationship building, self-development, and talent development, team leadership".

Indicating the competencies of managers of diagnostic imaging (DI) units in Poland, analyses of the above-mentioned models of managerial competencies in healthcare units

were used, comparing them with the results of the study. The key existing studies on defining the competencies of healthcare managers are presented in Table 6.

Table 6. Key existing studies on defining the competencies of healthcare managers.

Article	Type of Research	Research Results
Burak A., Mućka J., Ferenc A. (2015), Specyfika zachowań przywódczych kadry kierowniczej współczesnej ochrony zdrowia (The specificity of leadership behaviors of the management staff of modern healthcare—own translation) [29]	A survey among hospital managers	According to respondents, maintaining the quality of services at the highest possible level was considered the most important attribute
Striker M. (2016), Zmiany w postrzeganiu ról zawodowych menedżerów medycznych w publicznym szpitalu (Changes in the perception of professional roles of medical managers in a public hospital—own translation) [42]	A survey among medical staff of two hospital departments	A difference in the perspective on management competencies between nurses and doctors was demonstrated, although the most important competencies were combining management and medical functions to be an efficient manager
Wysocka, M. and Lewandowski, R. (2017). Key competences of a health care manager [44]	A survey among study participants and healthcare workers	Professional competence in the field of organization and management dominates; these competencies were also diagnosed as those with the greatest deficiencies, hindering effective work
Bebel D. (2019), Ocena kompetencji menedżerskich kadry zarządzającej podmiotami leczniczymi (Assessment of managerial competences of management staff of healthcare entities—own translation) [35]	A survey among medical and administrative staff in hospitals	The importance of soft skills and their insufficient level among managers were pointed out
Manuszek M. (2019). Profile kompetencyjne menedżerów sektora publicznego (Competency profiles of public sector managers—own translation) [44]	Based on the competency profiles, the most important competencies were identified	The need for further, diverse research was indicated, and the development of ethical and moral values was considered very important, as well as the significance of the manager having formal and informal authority
Krawczyk-Sołtys A. (2019), Kompetencje menedżerskie w kształtowaniu kompetencji organizacyjnych jednostek ratownictwa medycznego w świetle badań (Managerial competences in shaping the organizational competences of emergency medical services units in the light of research—own translation) [43]	A survey among medical personnel of emergency medical units	The greatest importance was given to business, professional and social competencies
Sexton J.B., Adair K.C., Profit J. et al. (2021). Safety Culture and Workforce Well-Being Associations with Positive Leadership WalkRounds [45]	A survey among medical and non-medical academic staff	The importance of patient safety, willingness to engage in quality improvement activities, good accessibility of leaders, and their constructive feedback were appreciated
Bairros da Silva L., Sousa M.H.O. and Iniguez-Rueda L. (2022), Managers' Views on Professional Competencies for Primary Health Care [46]	Qualitative study—semi-structured interviews among primary healthcare employees	The following competencies were distinguished: emotional preparation, leadership, active attitude, empathetic availability and professional self-fulfillment, and responsibility

Source: own study.

The aim of the publication was to define the role and competencies of the manager managing the DI facility. The decision-making role of the manager was considered the most important by the respondents (72.3% of the respondents), and more than half of the respondents (52.7%) pointed to the interpersonal role of the manager, focused on developing contacts with employees, motivating them, and supporting them in activities. Research conducted since 2018 in hospitals among medical employees has shown that as many as 58.97% of respondents believe that facility managers do not unleash the potential of their employees or their initiative. However, 41.03% of the employees surveyed confirmed the existence of motivational techniques [35].

This shows how much progress there is to be made in this area. The results of the research on the competence and role of DI managers in light of the research conducted among hospital employees in Poland have higher results. In the study carried out in hospitals, no specific competence comes to the fore, and the share of each is about 7%. Thus, it follows that a manager should be competent in each of the listed criteria [47]. Among hospital employees, a large percentage of people taking part in the study indicated a lack of involvement of management staff in helping to develop the competencies of their employees (74.36%) [35]. DI managers decided, similarly to employees, that their decision-making role was the most important. According to managers, their flexibility in action, i.e., the ability to adapt to changing working conditions, is also very valuable. The staff, in turn, pointed to the interpersonal role. The differences result from the position, responsibility, the need to make decisions, and the search for solutions by managers. The staff, in turn, receive ready-made solutions. However, another important aspect for managers was their interpersonal role.

According to the respondents, a good manager should ensure safe working conditions (62% of the respondents) and good organization of work (78.7%). Furthermore, 51% of the respondents considered that effective communication with employees is important. The respect of staff is aroused by the ability of managers to react skillfully in crisis situations (54.3%) and their professionalism in performing their duties (52% of respondents). The importance of interpersonal skills and building a good atmosphere in the team was indicated by a significant number of respondents (48.7%). A similar opinion was expressed by managers participating in a study conducted by another author, the subject of which was leadership behavior. The ability to respond appropriately in crisis situations and solve problems in a team was indicated by 58% of respondents, professionalism and competence in action were indicated by 62%) and the importance of building relationships was indicated by 53%. The ability to cooperate was appreciated by 71% of respondents [29]. In the study by Bebel D., 55.13% of the respondents indicated the importance of managerial communication, and 44.87% of the respondents indicated the main problems as being in this area. 57.69% of the respondents considered the quick response of managers in situations of a changing environment to be important [35]. The results of the conducted research are similar to those carried out in previous years. In 2015, thanks to world leaders representing the healthcare sector, a catalog of basic competencies required for the position of a healthcare manager was created, regardless of the country or environment. They focused on the most important areas of leadership, communication and relationship management, professional and social responsibility, health, and the healthcare environment [36,48]. Thus, we can see that the expected competencies that a manager should have in the world are identical to the results obtained in the above studies. Magdalena Wysocka in the publication "Key competences of a health care manager" addressed the topic of competence by conducting research among healthcare managers. The obtained results indicate that professional knowledge and skills, i.e., managerial professionalism and knowledge in the field of human resources management, are of key importance. Managers also pointed to the ability to delegate tasks and negotiation skills. According to managers, in Wysocka's research, it was important to know the entity that is being managed, which facilitates building a strategy [49].

The condition for the survival and development of any organization operating in the medical services market is the possession of strong professional competencies by the

managers employed. Frequent changes in the legal environment of healthcare entities and the general instability of the medical services market force changes in management. It is assumed that managers should have a clear vision of what shapes economic, medical, and social processes. The manager of a medical entity should be able to function in stressful or crisis situations. Its role is to effectively manage the resources entrusted to it, both human and material or financial [50]. Different requirements are formulated for managers managing public entities that cannot provide fully paid services. Persons managing medical entities, which are commercial law companies, are obliged to recruit patients who have expressed their willingness to receive treatment outside the health insurance system. Patients are required to pay for the medical service in accordance with the official price list. Diagnostic imaging departments mostly represent private healthcare entities. The manager of the diagnostics image entity should have knowledge in the field of marketing, allowing for:

- Supervising the offer preparation process;
- Selection of customer groups to which the message will be addressed;
- Selection of the most effective and correlated with budget possibilities and forms of communication.

The achievement of the assumed goals depends largely on the ability to integrate employees and teams based on the adopted assumptions. In this area, psychosocial skills are becoming increasingly important, especially those that enable effective communication with employees. This issue was also pointed out by the respondents in the study [51]. Currently, managers working in the healthcare sector cannot function based on previously proven scenarios. The changes taking place in the legal environment are very dynamic and require exceptional flexibility and openness in acquiring new knowledge [18,23]. Shortages of medical staff, growing financial expectations, and growing expectations from patients are among the most current challenges for managers. In this situation, the key role of managers boils down to leading changes, designing new solutions, motivating, and mobilizing by setting a good example. It is also necessary to monitor the change process to make the appropriate adjustments [18,23,52–54]. Organizations need creative people who not only understand the changes taking place in the company's operating conditions but who also can manage them effectively. A creative manager in healthcare should be convinced of the key importance of employees, who are the most important intellectual capital of the entity and, therefore, the driving factor of its development. The manager in charge of the medical entity should create conditions for the comprehensive development of the employee team. The role of a manager is, therefore, constantly evolving, but the social aspects remain the focus [55–57]. The importance of the issue of competencies in the management of healthcare organizations is widely described in the literature on the subject [58]. The relationship between personal competencies (including managerial ones) and organizational competencies in healthcare is also emphasized [59,60]. Although logistical operations may go unnoticed by patients, they have a direct impact on the quality of procedures and the subjective perception of medical care [5,61–63]. Therefore, they constitute a significant area of interest for medical entities. The primary objective of the healthcare logistics principles is to focus on providing patients with adequate care. By directing efforts to meet the needs of patients and implementing logistical tasks aimed at ensuring high-quality and effective treatment, it is possible to achieve the main goal. These tasks are crucial for efficient functioning and require effective time management as well as the organization and coordination of tasks [64–66]. To achieve these goals, it is important to implement coherent and well-organized solutions that will apply across all market sectors. This makes it possible to increase patient safety, improve the efficiency of healthcare facilities, and increase visibility [9,67].

The novelty or innovativeness of the conducted research lies in the comprehensive approach to the analysis of the management competencies of healthcare managers, combining two different research methods: a questionnaire addressed to employees and in-depth interviews with managers managing DI facilities. This resulted in a multidimensional

picture of the functioning of such facilities from the perspective of both employees and managers. This research is unique because it not only analyzes the competencies of managers in theory but also assesses how these competencies are perceived and applied in practice. This combination of methodologies allows for the identification of key challenges and competency gaps, which is rarely seen in scientific literature, where either one research approach or theoretical analysis dominates. This research brings a new perspective on the effectiveness of management in healthcare, considering the real experiences and opinions of various groups involved in the functioning of medical facilities, as well as the increasing use of artificial intelligence [68–70].

It will be desirable to conduct further empirical and literature research in this area, which will expand the current scientific knowledge, rationalize the research methodology, but also make it possible to create further recommendations for practice, both at the general level of healthcare units, but also in specific healthcare entities, including image diagnosis.

6. Conclusions

Healthcare facility management is a key area of activity that has a significant impact on the quality of healthcare and, ultimately, the lives of patients. The competencies of managers in this sector can have a direct impact on the efficiency and effectiveness of the healthcare system.

The most important role of the DI manager is the decision-making role. Quick recognition of changes and an appropriate response are crucial, which is why the managerial flexibility of the DI manager is essential. Leadership behavior, professionalism, the ability to react in crisis situations, the ability to ensure safe working conditions, and good organization of the facility become key in managing the facility.

Effective communication with employees and the building of a good atmosphere in the team are the most important soft skills which are desirable for the position of DI manager. The interpersonal role, focus on employees, development of their competencies, and support in activities become necessary to achieve the success of the facility and organization.

This survey of the managers and staff of diagnostic imaging facilities allows us to draw important conclusions about the key competencies and roles of managers in these units. The most important role of a manager is the ability to make decisions, especially in crisis situations, which is essential to ensure the smooth operation of the facilities. The flexibility to adapt to changing conditions and the ability to anticipate and respond quickly to problems are key characteristics of effective management.

In addition, interpersonal and organizational management play an important role in the success of diagnostic imaging facilities. Managers should not only be leaders who can motivate the team but should also ensure work safety and good organization of processes. The ability to communicate, resolve conflicts, and build a positive team atmosphere is essential to achieve organizational goals.

One of the main limitations of the survey is its geographic scope, which covers only a few establishments in Poland, which may limit the ability to generalize the results to other regions or countries. Furthermore, the survey was based on subjective opinions, which can affect the interpretation of the results. The use of only qualitative methods, such as in-depth interviews and surveys, can also limit a full understanding of the phenomena and challenges facing managers in diagnostic imaging.

The results of this study can become a starting point for further research on competency management in various contexts of healthcare facilities. It can inspire the comparison of results with other healthcare sectors and international comparative studies. The current state of research is rich in theory, but there is still a lack of effective examples of practical implementation of this knowledge and its application in the daily work of healthcare managers. It is, therefore, worth making further efforts to verify whether the desired managerial competencies identified in the study and the correct management efficiency in imaging diagnostics facilities can, in practice lead, to a better organization of logistics and management of imaging diagnostics facilities and whether this will translate into better

health outcomes for patients and increased employee satisfaction. It is worth repeating the research also due to the dynamically changing environment in healthcare and the evolution of employee attitudes, resulting, for example, from the entry of young representatives of Generation Z into the labor market. Further research could expand the analysis to include quantitative methods and to consider a variety of cultural and organizational contexts.

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