

# Telemedicine in the opinion of primary health care physicians

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## Abstract

**Aim:** The aim of the study was to get the opinion of primary care physicians on the use of telemedicine solutions in their clinics.

**Material and methods:** A review of the literature of peer-reviewed journals available in PubMed, Medline, Embase, Google Scholar and Internet sources. The survey used an own questionnaire on the use of telemedicine solutions, addressed to doctors employed in primary health care units (PHCUs). The stochastic independence test  $\chi^2$  was used to compare opinions on telemedicine and teleconsultation between PHCUs located in cities and those located in villages, and the F test of analysis of variance to compare the number of patients declared to clinics between their different opinions on telemedicine and teleconsultation.

## Key words:

telemedicine,  
teleconsylium,  
teleconsultation,  
primary health care

**Results:** 2/3 of respondents indicated interest in teleconsultations/teleconsultations with other specialist doctors using telemedicine tools. The largest number of respondents (38%) indicated the need for teleconsultation with a cardiologist. Respondents' opinions differed significantly between PHCUs located in cities and those in villages, and also depended significantly on the size of PHCU, measured by the number of declared patients ( $p < 0.05$ ).

**Conclusions:** Primary care physicians are aware of the benefits of telemedicine and teleconsultation in the form of improved access to specialist doctors, improved quality of medical care and patient's safety.

## Introduction

Telemedicine is a form of providing medical and healthcare services, the development of which is progressing very quickly, it combines elements of medicine, telecommunications and information technology. Among the latest methods of telemedicine, you can distinguish digital diagnostic tools for patients, digital stethoscopes, thermometers, scales, high resolution cameras and teleconferencing technologies. There are more and more places, where a patient is consulting remotely with a doctor using modern technologies, like supermarkets, pharmacies or his workplaces [1,2]. In the United States, over 70% of hospitals and over 50% of groups of doctors use modern telemedicine programs. Employees also benefit, as research shows that over 70% of large employers offer telemedicine to employees as part of healthcare programs [3]. Thanks to its methods, remote contact is possible in the form of consultations between doctors, between this professional group and other health professionals, as well as between doctors and patients. These methods also allow for self-care of the patient [4]. Its development is conditioned by the development of new technologies, their quality and efficiency [5], as well as social and economic needs [6]. In Poland, telemedicine is supported by the Ministry of Health, which with the help of the National Health Fund promotes pro-quality activities and organizational solutions throughout the healthcare system, facilitating access to high-quality services provided, including in basic health care thanks to telemedicine. An incentive for PHCUs when joining the program is to receive support for: Disease Management Program, balance tests, physiotherapy, IT development

as part of the technological supplement and employment of a coordinator. Telemedicine enables the provision of medical services by professional medical personnel at a distance in the scope of consultations, medical examinations, diagnosis, treatment and prophylaxis. It allows you to perform, among others teleconsultations of cardiology and geriatrics, and their financing.

The aim of the study was to get the opinion of primary care physicians on the use of telemedicine solutions in their clinics.

## Methodology

### Selection of the sample

The research was carried out in the first quarter of 2016. The population of interest was all of the counseling/practice of primary care physicians located in Poland. Due to financial and organizational possibilities, a sample of 10% was selected from this population. The selection of the sample for the study was random. A systematic sample selection was carried out. The sampling frame was a list of all outpatient clinics/practices of the primary care doctors in the country, posted on the National Health Fund website and covering a total of about 5.4 thousand of such counseling/practices. Every tenth counseling / practice was drawn from this list. Then, questionnaires were sent to the randomly selected outpatient clinics/practices, asking them to be filled in by one of the primary health care doctor working there and sent back by post. Among the obtained questionnaires, those that were largely incomplete and/or incorrectly

completed were rejected. A total of 261 correctly completed surveys were included in the study. The response rate obtained was 48.33%.

## Description of the questionnaire used

The questionnaire included questions about respondents' opinions on teleconsultation and teleconsyliums in their PHCUs, and a question about the doctors' specialty on which there is a need for teleconsultation. Specific question was asked about the location of PHCU (city or village) and the number of patients declared for a given PHCU.

## Statistical analysis

The analysis of collected data was performed in the statistical computer package STATISTICA (StatSoft, Poland). The absolute numbers (n) and percentages (%) were estimated for the categorical variables. Arithmetic mean (M), reflecting the average level, and standard deviation (SD), measuring the degree of dispersion around the arithmetic mean, were estimated for continuous variables. The following statistical tests were used:

- stochastic independence test  $\chi^2$  to compare opinions on telemedicine and teleconsultation between PHCUs located in cities and those located in villages;
- F test of variance analysis to compare the number of patients declared to PHCUs between PHCUs with 3 different opinions on telemedicine and teleconsultation: yes, no, I have no opinion.

The significance level of 0.05 was assumed.

## Characteristics of the tested PHCUs

Most of the surveyed PHCUs (216, ie 82.76% of the sample) were in cities, and 45, ie 17.24% in the villages. The number of patients declared for the examined PHCUs varied from 1.5 thousand up to 17,000, on average it was  $4.9 \pm 3.7$  thousands. Most PHCUs had under the care of 2 to 4 thousands patients (34%).

## Results

The respondents' opinions on teleconsultations and teleconsyliums in the surveyed PHCUs are illustrated in Figure 1. 2/3 of respondents indicated interest in teleconsultations/teleconsyliums with other specialist doctors using telemedicine tools. 65.5% of respondents thought that internet consultations (online) with other specialists are desirable to improve the safety of patients in primary care. According to 59% of respondents, teleconsultations/teleconsyliums are a solution that can improve access to specialist doctors. 62% of respondents said that there are patients in their PHCUs who would benefit from teleconsultation advice. 56% of respondents said they were prepared for such a solution technically. 57% of respondents thought that such a solution would help in the work of PHCUs.

The highest number of respondents (38%) indicated a need for teleconsultation with a cardiologist, 7% – with a gastrologist, a pulmonologist and a psychiatrist, 6% – with an orthopedist and endocrinologist, 5% – with an allergologist, dermatologist and diabetologist. The remaining specialties were indicated by less than 5% of respondents (Table I).

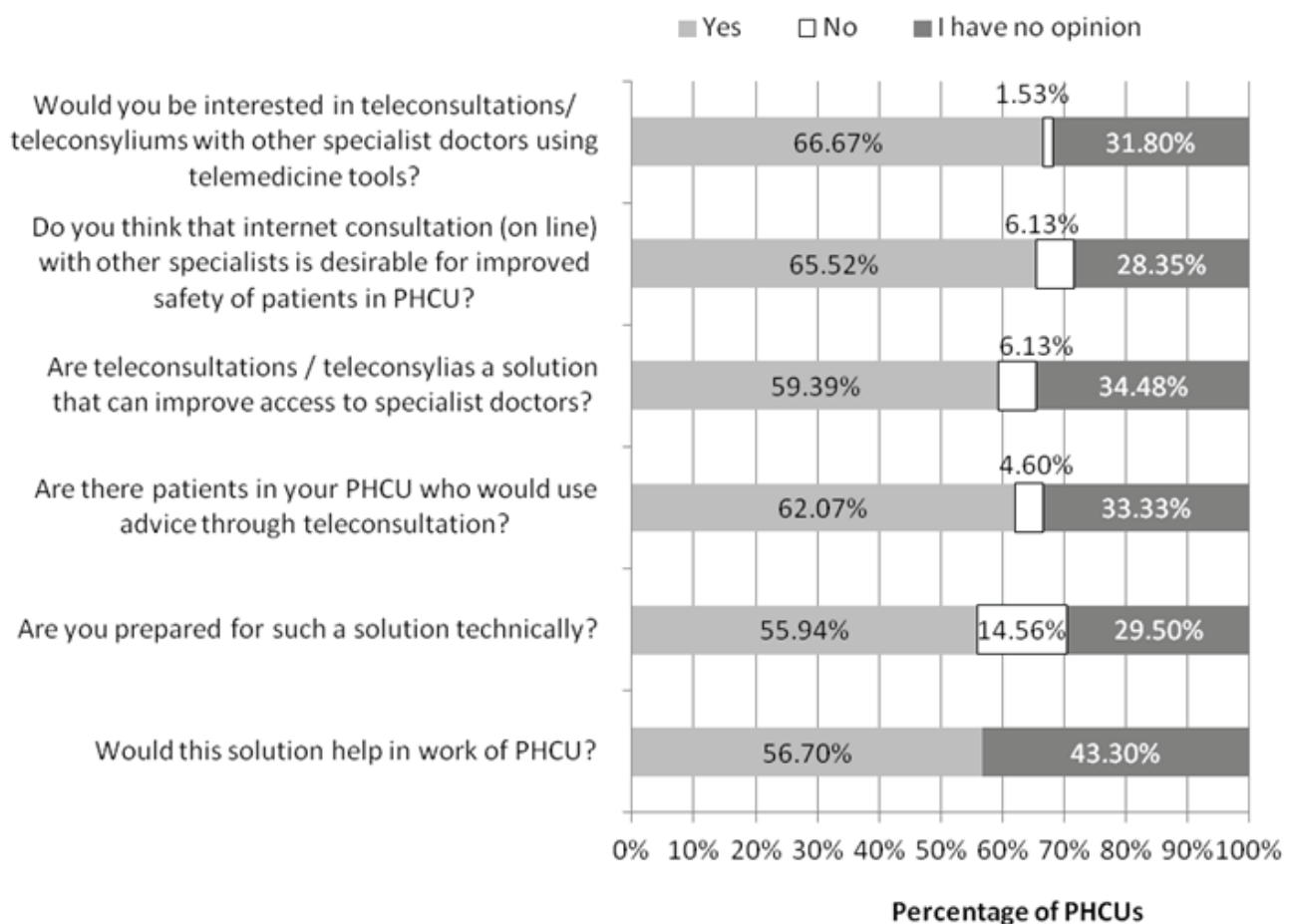
Next, it was examined whether the respondents' opinions on teleconsultations and teleconsyling depended on the location of PHCU (Figure 2) and on the number of patients declared to PHCU (Figure 3).

A similar percentage of respondents from urban PHCUs (67%), as well as from rural PHCUs (64%), indicated interest in teleconsultations / teleconsyliums with other specialist doctors using telemedicine tools ( $p = 0.573$ ). On the other hand, the answers to the next three questions differed significantly between respondents from urban and those from rural PHCUs ( $p < 0.001$ ). 64% of respondents from urban PHCUs and 71% from rural PHCUs thought that internet consultations (online) with other specialists are desirable to improve the safety of patients in PHCUs. However, the opposite opinion was given by 4% of respondents from urban PHCUs and 18% from rural PHCUs, and 32% of respondents from urban PHCUs and 11% from rural PHCUs had no opinion on this topic. A much larger percentage of respondents from urban PHCUs (65%) than from rural

**Table 1.**

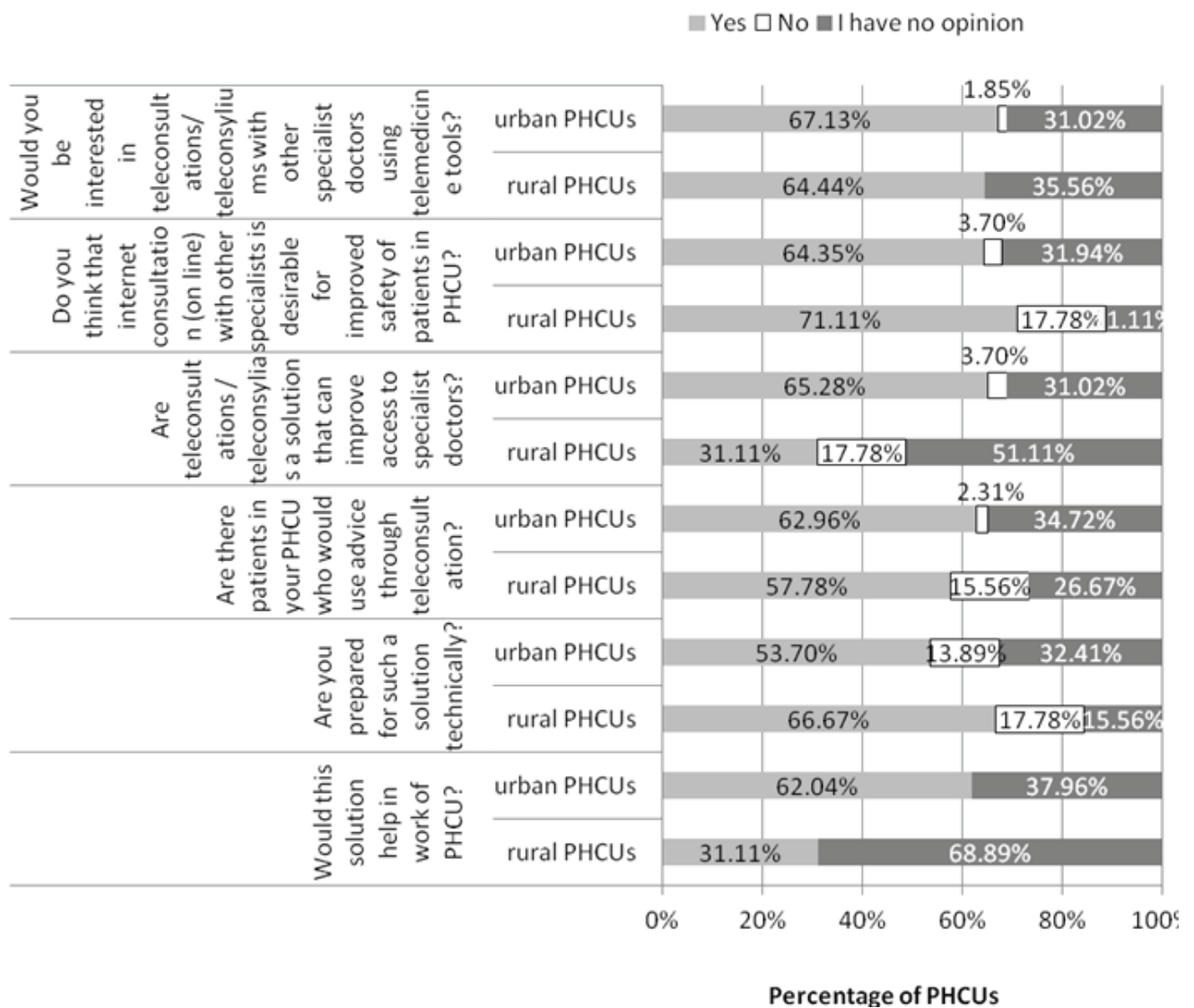
Demand for teleconsultations according to the specialty of physicians in the examined PHCUs (N = 261)

Specialties	Number of respondents	Percentage of respondents
cardiologist	100	38.31
gastroenterologist	27	7.48
pulmonologist	19	7.28
psychiatrist	17	6.51
orthopedist	16	6.13
endocrinologist	15	5.75
allergist	14	5.36
dermatologist	14	5.36
diabetologist	13	4.98
rheumatologist	12	4.60
nephrologist	12	4.60
hematologist	11	4.21
laryngologist	11	4.21
geriatrician	10	3.83
neurologist	8	3.07
urologist	8	3.07



**Fig. 1.**

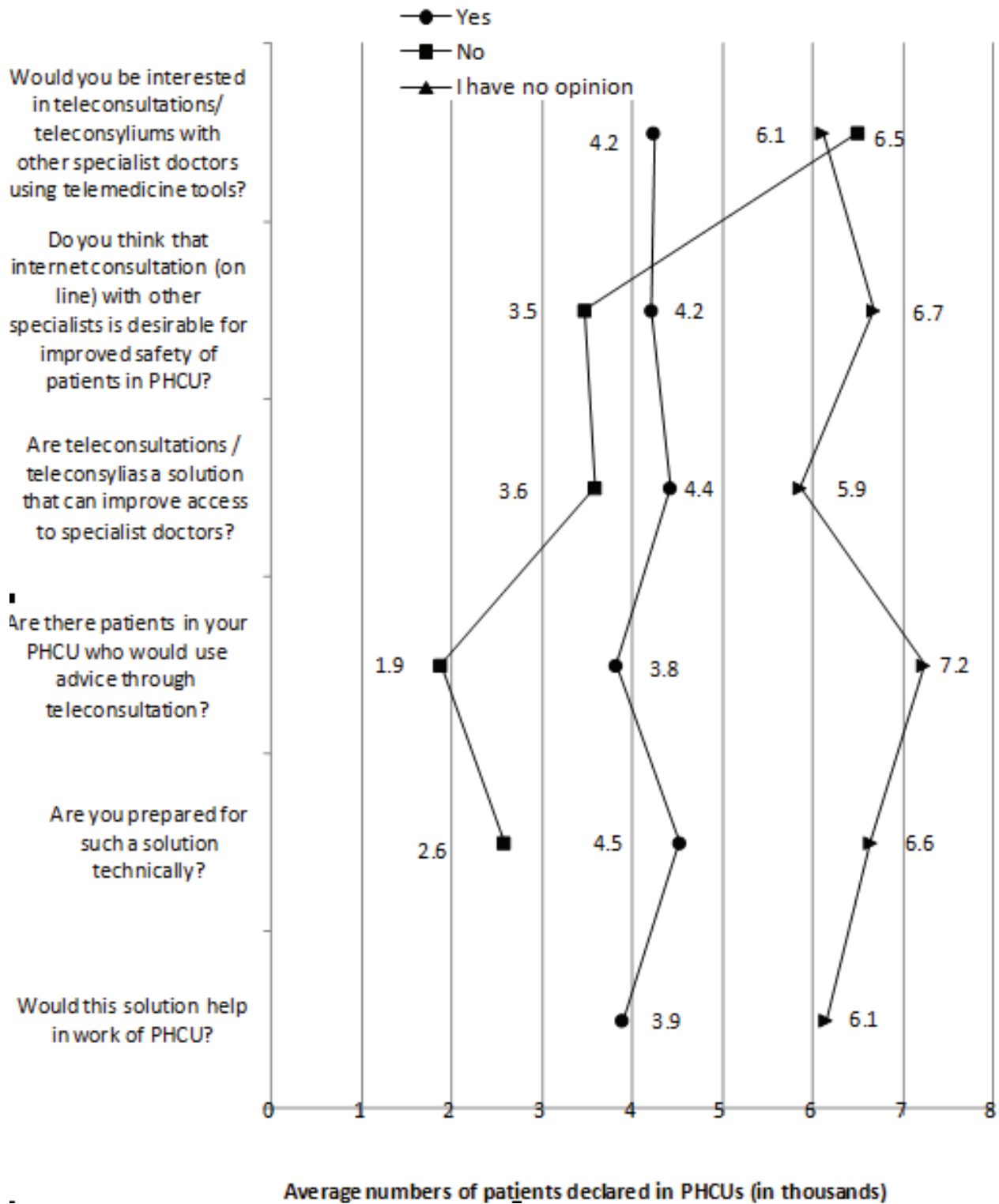
Opinions on teleconsultations and teleconsyliums in the surveyed PHCUs (total sample)



**Fig. 2.** Opinions on teleconsultations and teleconsyliums according to the location of the surveyed PHCUs

ones (31%) believed that teleconsultations/teleconsyliums are a solution that can improve access to specialist doctors. A similar percentage of respondents from urban (64%) and rural (58%) PHCUs said that there were patients in their PHCUs who would benefit from teleconsultation advice, but 16% of respondents from rural PHCUs have the opposite opinion and only 2% from urban PHCUs. When asked about technical preparation for teleconsultation, respondents from urban and rural PHCUs answered similarly ( $p = 0.078$ ). On the other hand, a much larger percentage of respondents from urban PHCUs (62%) than from rural ones (31%) believed that teleconsultations would help in the work of PHCUs ( $p < 0.001$ ).

All respondents' opinions on teleconsultation and teleconsyliums considered depended significantly on the size of PHCU, measured by the number of patients declared to it ( $p < 0.05$ ). The interest in teleconsultations / teleconsyliums with other specialist doctors using telemedicine tools was indicated by respondents from significantly smaller PHCUs. On the other hand, respondents from the significantly largest PHCUs did not have an opinion on the five remaining questions. Those who gave negative answers to the above-mentioned questions came from the smallest PHCUs. However, those respondents who gave positive answers to these questions came from medium-sized PHCUs. They therefore believed that



**Fig. 3.**

Average numbers of patients declared in the surveyed PHCUs according to their physicians' opinion on teleconsultations and teleconsyliums

internet consultations (online) with other specialists are desirable to improve the safety of patients in primary care; that teleconsultations / teleconsultations are a solution that can improve access to specialist doctors; that there are patients in their PHCUs who would benefit from teleconsultation advice; that they are prepared for such a solution technically and that such a solution would help in the work of PHCUs.

## Discussion

The European Commission Report (2013) shows that in the ranking of 31 European countries, Poland has an medium position in the field of telemedicine. It is worrying that at that time only 2% of family doctors had the possibility of remote monitoring of patients [6]. The research shows that there is a need in the PHCUs for new methods in the field of telemedicine. It would appear that it will grow. This is evidenced by the fact that since 2015 the implementation of selected methods - teleconsultation of cardiology and geriatrics, is financed by the National Health Fund in Poland. This solution has an increasing impact on the better availability of specific methods of telemedicine in urban and rural areas. However, the research carried out shows that the tendency to use methods in the form of teleconsultation and teleconsultations by primary care physicians is not the same in all PHCUs. In rural areas, the tendency is lower by half than the urban. This may indicate a lack of trust in the use of certain methods, with less knowledge about the usability of telemedicine and available methods, as well as from the reluctance of physicians to use the solutions offered by telemedicine [7].

In publications on the subject of telemedicine, it is indicated that the application of its specific methods is more common in small centers that have fewer specialist doctors [8]. Proprietary research confirmed this: interest in teleconsultations / teleconsultations with other specialist doctors using telemedicine tools was indicated by respondents from significantly smaller PHCUs. Teleconsultations can reduce staffing shortage and other inconveniences provided that there is remote access to medical test results and medical records. Doubts about the effectiveness of

remote diagnostics arise from the approach of some patients in whom electronic devices cannot replace direct contact with a doctor [9].

Progress in the field of telemedicine enforces changes in the behavior of both PHCUs' doctors and patients. Eurobarometer 460 "Attitudes towards the impact of digitization and automation on daily life" from 2017 [9] shows that half of respondents (patients) would like to use the Internet for access to medical and health records, and seven out of ten (70%) would be willing to share their details with their doctor or healthcare provider. It is therefore important to examine both the needs of doctors and patients in the field of telemedicine in parallel.

In addition to the benefits of telemedicine, attention is paid to the costs of this modern solution, although these should not be a criterion determining whether or not its methods are used [10]. The use of telemedicine methods is not always associated with obtaining the intended benefits for patients. Discussions are ongoing whether direct contact with the patient is better or modern technologies can replace it [11]. These benefits include: shortening the time from reporting the patient to the doctor to perform the necessary tests until the final diagnosis, no additional costs for patients eg due to transport, no exposure to additional stress [11].

Expenditures incurred on the implementation of recognized data processing and retention/storage technologies for the support of IT infrastructure are high. Therefore, the literature emphasizes the need for constant research into the safety and efficacy of telemedicine, as well as its cost-effectiveness [12,13,14,15,16,17]. Studies have confirmed that this security is improving.

The literature indicates positive results of patient satisfaction measurement measurements using the available methods that this field offers [18,19,20,8]. Thanks to telemedicine, the range of healthcare is extended and the services of this care are integrated with patients and various organizations in the health care sector. The widespread implementation of telemedical solutions solves the problems of the health care sector resulting from an aging population and an insufficient number of medical personnel. Telemedicine is seen as improving the work of PHCU, which

was indicated by over 60% of respondents located in cities. It is also expected to improve patient safety (over 64% of respondents in cities and over 71% of respondents in rural areas). Telemedicine gives a chance for a more effective allocation of resources, mainly financial resources, and the opportunity to improve the effectiveness of treatment [21].

Supporting new communication technologies in the process of providing services in healthcare is an important determinant of quality, which all participants in this process are seeking for. This is favored by technological progress that has led to the transformation of traditional methods of offering health care, making diagnoses and the relationship between the medical services provider and the patient, into modern ones. These changes still bring about positive changes in the form of better treatment effects for populations inhabiting developing countries, rural regions or those regions, such as urban ones, which have limited health care capabilities [22,23,24,10]. The results of our own research confirm the research of foreign authors. Approx. 69% of respondents located in the countryside had no opinion on whether teleconsultations and teleconsultations would help in the work of PHCU. However, the doctors surveyed indicated that there is similar, good technical preparation for teleconsultation both in the countryside and in the city [21].

The effects of using telemedicine can be considered in relation to the patient himself, but also in relation to government expectations. It links the development of telemedicine with the high acceptance of technologies in health care, with a decrease in overall mortality, reduced hospitalization and better outcomes in the treatment of patients at lower costs [25,26,27,28].

## Conclusions

1. There is a great demand for teleconsultation and teleconsultations with other specialist doctors using telemedicine methods in primary health care clinics in Poland.
2. There is definitely the greatest demand for teleconsulting with cardiologists.

3. The location and size of primary health care unit varied the respondents' opinions on teleconsultation/teleconsultations.
4. Primary care physicians are aware of the benefits of this kind of support in the form of improved access to specialist physicians, improved quality of health care and patient safety.

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