

The use of telemedicine Technologies in the Work of Nurses from the Perspective of Doctors in the Czech Republic

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Original Article

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Source: *Clinical Social Work and Health Intervention*
Pages: 19 – 26

Volume: 15
Cited references: 15

Issue: 2

Reviewers:

Selvaraj Subramanian
SAAaRMM, Kuala Lumpur, MY
Tadeusz Bak
Institute of Economics and Management PWSTE Jaroslaw, PL

Keywords:

COVID-19 Pandemic. Telemedicine Technologies. Doctors. Nurses. Telemedicine. Telenursing.

Publisher:

International Society of Applied Preventive Medicine i-gap

CSWHI 2024; 15(2): 19 – 26; DOI: 10.22359/cswhi_15_2_04 © Clinical Social Work and Health Intervention

Abstract:

Aim: To assess the expectations of Czech doctors during the COVID-19 pandemic relative to the ability of nurses to use telemedicine technologies.

Design: descriptive and cross-sectional

Participants: 1,203 physicians were included in the study. The sample is representative in terms of gender, age, and region.

Methods: A representative sociological survey was conducted. A non-standardized questionnaire was used to collect data. The field survey was conducted using standardized face-to-face interviews.

Results: Most physicians agree that nurses can learn how to use telemedicine technologies and can use these technologies to collaborate with physicians in the care of patients. Most respondents (80.7%) believe that doctors support the active involvement of nurses in educating patients with chronic diseases.

Conclusion: Respondents agree that nurses can use e-technologies to acquire further information, participate in online courses, and collaborate with physicians to provide patients with recommendations.

Introduction

In recent years, we have witnessed a revolution in digital health, or e-health, i.e., bringing the benefits of telemedicine technologies to health care and health maintenance. The health sector is undergoing profound changes and moving towards decentralizing services and increased support for outpatient services. The provision of medical care with the help of innovative technologies has an increasingly significant impact on the management and organization of health care. This new scenario highlights the need for highly skilled nurses capable of adapting to modern technologies and methods and the challenges associated with the rapid progress of the digital health revolution [1]. The transition toward e-health was accelerated by the COVID-19 pandemic, which highlighted many problems linked to limited resources in terms of medical staff, medical equipment, and technological tools. The pandemic also pushed healthcare facilities to transform service delivery, patient travel management, and telemedicine [2]. The COVID-19 pandemic led to an exponential increase in the use of telemedicine, which led to radical changes in the organization of healthcare systems and the role of healthcare professionals. Nurses are (and increasingly will be) the cornerstone of communication and coordination between different professional stakeholders (e.g., general practitioners, specialists), patients, and other caregivers [3]. The role of nurses has changed significantly in recent decades, especially during the COVID era. Even the post-COVID era has placed new demands on healthcare workers. One of these requirements is the need to use information and communication skills in a targeted manner to address psychosocial problems (e.g., vaccination hesitancy and fears) and people with chronic physical illness [4]. Digital health pro-

vides inexpensive, quality, and fast health care and plays a crucial role in maintaining patients' physical and mental health. This was especially true during the COVID pandemic when patients were advised to stay home and avoid unnecessary visits to general practitioners [5]. The goal of telenursing, under the umbrella of telemedicine/e-health, is to improve the quality of patient care and safety and speed up access to nursing care by overcoming geographical barriers [6]. In countries where telenursing (especially with mobile phones) is widely available, there is solid and convincing evidence for its effectiveness and benefits [7]. However, as Rutledge and Gustin [8] noted, the increasing need for telenursing will require increased efforts to incorporate this skill set into the curriculum of nursing programs so that nurses are well-prepared to provide this type of care.

This research aimed to assess the expectations of doctors in the Czech Republic (during the COVID pandemic (2019–2022)) relative to the ability of nurses to use telemedicine technologies in their work, how they perceived the work of nurses with medical information, and whether they expected nurses to show a keen interest in adopting digital health/e-health technologies and methods.

Methods

The design of this research was descriptive and cross-sectional. A non-standardized questionnaire was used to collect data, the main aim of which was to find out the opinions of physicians on the role of the nurse and nursing care during a pandemic in the Czech Republic, based on their knowledge of the course of the COVID-19 pandemic in 2019–2022. The questionnaire contained a total of 15 questions. Content and construct validity were confirmed

through a preliminary survey conducted on a sample of 127 respondents (physicians). Not only were the wording and clarity of the questions assessed, but also the coverage of areas of nurses' work and life that could be affected by the COVID-19 pandemic and their relevance. Construct validity was also tested using a test of concurrent comparison of data obtained from the pre-questionnaire to determine expected correlations between selected variables.

Content and construct validity were also confirmed through a preliminary survey conducted on a sample of 127 respondents (doctors), in which not only the formulation and comprehensibility of the questions were assessed but also the coverage and relevance of how the COVID-19 pandemic impacted the work and life of nurses, as well as how it affected them. Construct validity was also evaluated using a parallel comparison test of data from the preliminary questionnaire to determine the expected correlations between selected variables.

As part of the field survey, 1,410 randomly selected interviewers approached doctors with a request for an interview on the issue of nurses' work during the pandemic. Most doctors (1,203 (85.3%)) agreed to the discussion, while 207 (14.7%) doctors refused. The final analysis was based on data from 1,203 physicians.

Doctors were selected from all regions of the Czech Republic. Their composition in terms of individual socio-demographic characteristics was chosen to be representative of doctors in the Czech Republic. The sample parameters were constructed based on data from the National Register of Healthcare Workers, valid as of 19 August 2021.

The questionnaire consists of socio-demographic questions and questions on the impact of the pandemic on nurses' work and life from the doctors' perspectives—this part of the questionnaire used separately closed, semi-open, and open questions to examine critical areas. Most were completed projective questions in the form of statements on individual topics, where the respondent expressed their agreement with the information. A specific area of the questionnaire was devoted to the following: *the readiness of nurses to work during the pandemic, *the course of the pandemic – how nurses experienced the pandemic, *the impact of the pandemic on nurs-

es, *the prestige of the nursing profession, *the future of nursing, and several questions assessing nurses using telemedicine technologies in communication with patients.

Each battery of questions was analyzed by calculating the average values for each sub-question in the storm and then comparing them, calculating the overall score for each battery, and then analyzing their relationships with the selected characters in the questionnaire.

Reliability measurements for each battery of questions were made using the Cronbach alpha test. Results of the Cronbach alpha showed that the internal consistency values for each battery of questions ranged from 0.731 to 0.873, which indicates a high level of internal consistency.

Our field survey used standardized face-to-face interviews with respondents; it took place throughout the Czech Republic from 12/11/2022 to 24/11/2022. Interviews were conducted by 210 professional interviewers from INRES-SONES, v.o.s.

The physicians (1,203) were selected by quota selection from all over the Czech Republic. Their composition in terms of individual socio-demographic characteristics was chosen to be representative of doctors in the Czech Republic based on parameters from the National Register of Healthcare Workers (valid as of 19 August 2021).

Statistical data processing was performed using SASD 1.5.8 (Statistical Analysis of Social Data) and SPSS 28.0.

Outcomes

In terms of gender, 513 (42.6%) men and 690 (57.4%) women were included in the sample. Compared to the population, the deviation from the sample was 0.2%. The results of the research are representative of doctors in the Czech Republic in terms of gender.

The age structure of our sample corresponds well to the parameters of the Czech population; the deviation did not exceed 0.3%. This means that the research results represent doctors in the Czech Republic in terms of age.

Another monitored feature was the region of the Czech Republic where the doctors worked; the reference material was the administrative divisions that have been valid since 1 January 2001. As part of the research, doctors from all

regions of the Czech Republic were approached, and their representation was intended to correspond to the distribution of doctors in the Czech Republic. The deviation in our sample did not exceed 0.1%. Overall, our sample is representative of doctors in the Czech Republic in terms of gender, age, and work region.

Dentists were not included in our research due to the specificity of their specialization. However, the sample did include three groups of physicians, i.e., (1) general practitioners for adults, (2) general practitioners for children and adolescents, and (3) doctors of other disciplines (specialist doctors).

The research also monitored the doctors' length of practice. Doctors with 11 years or more of experience were the best represented.

Unlike age, gender, and region of employment, medical field and length of practice were not factors assessed for representativeness.

In terms of medical care facilities linked to employment, almost one-half (49.3%) of physicians worked in primary outpatient care facilities, 13.9% of respondents worked in specialized outpatient care facilities, and the remaining 36.8% worked in inpatient care facilities. This feature was not assessed for representativeness.

Physicians' views on nurses' ability to use telemedicine technologies in their work were surveyed through a battery of projective questions. Doctors were presented with six basic theses, to which they commented using a standardized scale of four answers to express their degree of agreement with the presented thesis.

The distribution of relative frequencies of individual responses can be seen in Table 1.

The answers "I completely agree" and "tend to agree" were grouped to indicate general agreement with the ability of nurses to use telemedicine technologies in the given areas. In all areas studied, most (80.95%) physicians expressed full or partial agreement with the ability of nurses to use telemedicine technologies. It can be noted that most physicians expressed full or partial agreement with the ability of nurses to obtain new information through the online environment, including online courses (85.2%) and, in cooperation with physicians, to create recommendations for patients with chronic diseases (84.6%). Most (82.5%) physicians agreed in whole or in part that nurses can collaborate with physicians to use telemedicine technologies to make recommendations for infectious disease patients, and 81.3% of physicians agreed that nurses can use telemedicine technologies to communicate with patients (e.g., online counseling). While still a majority of doctors, general agreement on the ability of nurses to educate chronically ill patients using telemedicine in accordance with the competencies of a general nurse (76.4%) and their ability to monitor chronically ill patients online in accordance with the competencies of a general nurse (75.7%) was slightly less than the other abilities.

More precisely, the opinion of doctors on the ability of nurses to use telemedicine technologies in their work can be expressed through a measure of mean values. Their comparison is made

Table 1 Doctors' views on the ability of nurses to use telemedicine technologies in their work

Doctors' opinions on nurses' ability to use telemedicine technologies	I completely agree	I tend to agree	I tend to disagree	I completely disagree
In communication with patients	24,8	56,5	16,1	2,6
In the acquisition of new information	27,6	57,6	12,9	1,9
In the formation of recommendations for patients with chronic diseases	26,9	57,7	13,5	1,9
In the formation of recommendations for patients with infectious diseases	25,9	56,6	14,3	3,2
In online education of chronically ill patients	20,7	55,7	19,1	4,5
Online monitoring of chronically ill patients	21,8	53,9	19,0	5,3

possible by the fact that a standard four-level scale of responses with the grades “I completely agree,” “tend to agree,” “tend to disagree,” and “completely disagree” was used to assess the level of perceived changes. We have chosen the arithmetic mean as the key mean, where the smaller its size, the greater the degree of agreement with the thesis. The size of the measured mean values can be seen in the following table (Table 2).

A comparison of median values shows that most physicians agree with nurses’ ability to use telemedicine technologies, including online courses, to learn new information and, in collaboration with physicians, to make recommendations for patients with chronic diseases using telemedicine technologies. On the other hand, doctors were a bit less sure about the ability of nurses to use telemedicine technologies to educate chronic patients in accordance with general nursing competencies and the ability of nurses to use telehealth technologies to monitor chronically ill patients in accordance with general nursing competencies. The variance and standard deviation indicate that the opinion of physicians regarding the use of telemedicine for online monitoring of chronically ill patients was the most diverse.

Most physicians agreed that nurses can learn new information online to create recommendations (in cooperation with doctors) for patients with chronic and infectious diseases.

The questionnaire also investigated the interest of physicians in having nurses involved with the education of patients with chronic and acute diseases using electronic systems (Table 3).

Based on the summation of the answers “I completely agree” and “tend to agree”, expressing the degree of interest of doctors in the involvement of nurses in the education of patients using electronic tools, the vast majority of doctors expressed interest in the involvement of nurses in both areas of education (i.e., acutely and chronically ill patients), with a slight tendency to prefer the involvement of nurses in the education of chronically ill patients (80.7% vs. 77.1%). In both cases, however, the interest of physicians in the active involvement of nurses in the education of patients using telemedicine technologies far outweighs the lack of interest (78.9% vs. 21.1%).

Most physicians expect to see more and more interest from physicians in the active involvement of nurses in the education of patients with chronic and acute diseases using telemedicine technologies.

Table 2 Doctors’ views on nurses’ ability to use telemedicine technologies in their work – comparison of mean values

Doctors’ opinions on nurses’ ability to use telemedicine technologies	N	Mo	Me	Average	s ²	s
In communication with patients	1203	2	2	1.965	0.511	0.715
In the acquisition of new information	1203	2	2	1.898	0.469	0.685
In the formation of recommendations for patients with chronic diseases	1203	2	2	1.904	0.471	0.686
In the formation of recommendations for patients with infectious diseases	1203	2	2	1.947	0.526	0.725
In online education of chronically ill patients	1203	2	2	2.074	0.572	0.756
In online monitoring of chronically ill patients	1203	2	2	2.079	0.615	0.784

Mo = mode; Me = median; s² = variance; s = standard deviation

Discussion

A comparison of median values shows that most physicians agree with nurses' ability to use telemedicine technologies, including online courses, for learning new information and, in collaboration with physicians, to make recommendations for patients with chronic diseases; this is also true regarding infectious diseases. Most physicians (80.7%) are of the opinion that physicians will be increasingly interested in the active involvement of nurses in the education of patients with chronic diseases (using various telemedicine technologies). Telemedicine technologies in the twenty-first century offer a patient-centered approach and protect patients and healthcare professionals in the event of another pandemic [9].

The development of these technologies is in line with the Regional digital health action plan for the WHO European Region 2023–2030 [10]. The World Health Organization (WHO) defines telemedicine as “the provision of telehealth services by all health professionals using information and communication technologies to exchange information on diagnosis, treatment, and prevention of diseases and injuries, research and evaluation, and in the further training of health professionals, all in order to improve the health status of populations, individuals and communities” [11]. Certain shortcomings in the preparedness of the health system in the context of the demands of care during the pandemic are also highlighted in the WHO report [12], which mentions the need for clearly defined emergency mechanisms. However, it also repeatedly emphasizes the management of non-infectious dis-

eases and preventing risky behaviors (such as alcohol abuse and tobacco use). Furthermore, this report highlights the impact of COVID-19 on people's mental health and health inequalities.

In light of the WHO action plan, we were interested in the opinions of doctors on the use of telemedicine by nurses since doctors in the Czech Republic already had considerable experience with telemedicine during the COVID period. Physicians in our study indicated that nurses can use telemedicine technologies, including online courses, to learn new information and, in collaboration with physicians, make recommendations for patients with chronic and infectious diseases using telemedicine.

However, further increasing the readiness of nurses to adopt telemedicine requires an integrated approach, including a combination of technical knowledge, management skills, and communication skills [3]. Specific subjects need to be added to nursing curriculums to promote adopting new communication and technological skills that enable health professionals to use telemedicine technologies effectively.

Telehealth technology brings numerous benefits, especially in non-acute/routine care and in cases where services do not require direct patient-provider interaction, e.g., the provision of psychological services [13]. Remote care reduces resource consumption in health centers and improves access to care while minimizing the risk of direct human-to-human transmission of infectious agents [14].

Most physicians agree that nurses can learn new information online to make recommendations (in cooperation with physicians) for pa-

Table 3 The interest of physicians in involving nurses in educating chronic and acute patients using telemedicine technologies.

Physicians' interest in the use of telemedicine technologies by nurses	I completely agree	I tend to agree	I tend to disagree	I completely disagree
Greater interest of physicians in the involvement of nurses in the education of chronically ill patients	22.9	57.8	15.3	4.0
Greater interest of doctors in involving nurses in the education of sick acute patients	21.6	55.5	19.0	3.83

tients with chronic and infectious diseases. Our physician survey indicates that we can expect increasing interest from physicians regarding the active involvement of nurses in the education of patients with chronic and acute diseases using telemedicine and e-health systems.

Telemedicine has significant benefits, e.g., reducing patient costs, improving the efficiency of health systems by reducing overcrowding in secondary and tertiary facilities, and reducing the risk of transmission of COVID-19. However, more research is needed to assess the long-term outcomes of telemedicine, e.g., provider and patient satisfaction and financial sustainability [15].

Our research sought the opinions of physicians regarding the ability of nurses to contribute to the creation of virtual educational materials for patients of general practitioners in outpatient clinics for adults and to verify the potential use of virtual environments for counseling. These services would be delivered by nurses as an acute health care tool for providing education when discharging patients to the home environment and as motivation for better cooperation between patients and nurses regarding primary care. Since telenursing is still a new method in the Czech Republic, intensive research in this field is still needed to prove its effectiveness and how it can be best used. To this end, the opinions of doctors on the issue are essential.

Conclusion

Telenursing is still a relatively new method for nurses in the Czech Republic, so knowing physicians' opinions on this issue is necessary. Physicians agree with the ability of nurses to acquire further information, use the electronic environment, including online courses, and make recommendations for patients with chronic and infectious diseases in collaboration with physicians in the electronic environment. Nurses would play essential roles in these virtual environments. These telemedicine concepts aim to improve health delivery during epidemics/pandemics, improve health care for the chronically ill, and offer counseling and education for lifestyle diseases.

Conflicts of Interests

The authors declare that no conflicts of interest exist.

Funding

The study was supported by the Ministry of Health of the Czech Republic, Grant No. NU 21-09-00300.

Ethical approval

The research was conducted per ethical principles and was approved by the relevant ethics committee on 15. 6. 2020.

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