

Iranian Clinical Nurses' and Midwives' Attitudes and Awareness Towards Telenursing and Telehealth

A cross-sectional study

*Hossein Ranjbar,^{1,2} Mahmoud Bakhshi,³ Faezeh Mahdizadeh,⁴ Wojciech Glinkowski⁵

مواقف ووعي الممرضات والقابلات السريريات الإيرانيات تجاه التمريض والرعاية الصحية عن بعد

دراسة مقطعية

حسين رنجبر، محمود بخشي، فائزة مهدي زاده، ووجيچ كلينكوسكي

ABSTRACT: Objectives: This study aimed to examine the attitudes and awareness of Iranian clinical nurses and midwives towards telenursing and telehealth also referred to as e-health. **Methods:** The cross-sectional study was conducted from February to August 2019 in Iran. Nurses and midwives were randomly recruited from hospitals affiliated with Mashhad University of Medical Sciences in Mashhad, Iran using a stratified cluster random sampling method. Data were collected using a reliable and valid Persian-language questionnaire consisting of 32 close-ended survey items to examine Internet/computer access, daily Internet use and awareness of and general attitude towards telehealth and telenursing; statistical analyses were performed. **Results:** A total of 523 nurses and midwives were included in this study (response rate: 94.4%). The mean age and duration of clinical practice were 33.36 ± 7.46 and 8.88 ± 6.73 years, respectively. The majority of participants recognised the definition of telenursing (66.7%) and telehealth (80.1%). A positive attitude towards telenursing and telehealth was reported by 73.0% of the participants. Clinical nurses and midwives with a master's degree were more aware of the definition of telehealth compared to those with undergraduate bachelor degrees ($P = 0.03$). Additionally, midwives significantly more frequently presented a positive attitude towards telehealth and telenursing compared to nurses (86.2% versus 71.2%; $P = 0.01$). **Conclusion:** The positive attitude of the current participants was an important factor in the promotion of telenursing and telehealth. The implementation of educational and infrastructure developmental programs can help speed up executional processes in these fields.

Keywords: Telenursing; Telemedicine; Nurses; Midwives; Attitude; Awareness; Iran.

المخلص: الهدف: هدفت هذه الدراسة إلى فحص مواقف ووعي الممرضات والقابلات السريريات الإيرانيات تجاه التمريض والرعاية الصحية عن بعد والتي يشار إليها أيضاً باسم الصحة الإلكترونية. **الطريقة:** أجريت الدراسة المقطعية من فبراير إلى أغسطس 2019 في إيران. تم اختيار الممرضات والقابلات بشكل عشوائي من المستشفيات التابعة لجامعة مشهد للعلوم الطبية في مشهد، إيران باستخدام طريقة أخذ العينات العشوائية العنقودية الطبقيّة. تم جمع البيانات باستخدام استبيان مُحكم وموثوق باللغة الفارسية يحتوي على 23 من بنود الدراسة الاستقصائية المغلقة لبحث فرص الوصول إلى شبكة المعلومات/الكمبيوتر والاستخدام اليومي لشبكة المعلومات والوعي والموقف العام تجاه الرعاية الصحية والتمريض عن بعد وتم إجراء التحليلات الإحصائية. **النتائج:** شملت هذه الدراسة ما مجموعه 523 ممرضة وقابلة (معدل الاستجابة: 94.4%). كان متوسط العمر ومدة الممارسة السريرية هو 33.36 ± 7.46 و 8.88 ± 6.73 سنة على التوالي. أقرت غالبية المشاركين بتعريف التمريض عن بعد (66.7%) والرعاية الصحية عن بعد (80.1%). تم الإفصاح عن موقف إيجابي تجاه التمريض والرعاية الصحية عن بعد من قبل 73.0% من المشاركين. كانت الممرضات والقابلات السريريات الحاصلات على درجة الماجستير أكثر وعياً بتعريف الرعاية الصحية عن بعد مقارنةً بأولئك الحاصلات على درجات البكالوريوس الجامعية. ($P = 0.03$) بالإضافة إلى ذلك، أظهرت القابلات بشكل ملحوظ ومتكرر موقفاً إيجابياً تجاه الرعاية الصحية والتمريض عن بعد مقارنةً بالممرضات ($P = 0.01$; 86.2% مقابل 71.2%). **الخلاصة:** كان الموقف الإيجابي للمشاركين عاملاً مهماً في تعزيز التمريض والرعاية الصحية عن بعد. يمكن أن يساعد تنفيذ البرامج التعليمية وتطوير البنية التحتية في تسريع العمليات التنفيذية في هذه المجالات.

الكلمات المفتاحية: تمريض عن بعد؛ تطبيب عن بعد؛ ممرضات؛ قابلات؛ موقف؛ وعي؛ إيران.

ADVANCES IN KNOWLEDGE

- This study's results suggests that awareness of and attitudes towards telenursing and telehealth among clinical nurses and midwives in Iran are relatively high.

¹Department of Nursing, School of Nursing & Midwifery and ²The Collaboration Center of Meta-Analysis Research, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran; ³Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Mashhad, Iran; ⁴Student Research Committee, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran; ⁵Center of Excellence "TeleOrto" for Teliagnosis and Treatment of Disorders and Injuries of the Locomotor System, Department of Medical Informatics and Telemedicine, Medical University of Warsaw, Warsaw, Poland

*Corresponding Author's e-mail: ranjbarh1@thums.ac.ir

- *The current research will support the design of future quantitative studies in telenursing and telehealth in addition to the identification of related factors.*

APPLICATION TO PATIENT CARE

- *A heightened awareness of and a fairly positive attitude towards telenursing and telehealth will accelerate the development and utilisation of this technology in treatment and patient care.*
- *Telenursing and telehealth increase the range of healthcare services by meeting patients' health needs from a distance.*

MOST COUNTRIES FACE NUMEROUS HEALTH challenges including a growing elderly population, the need for home-care and a lack of nursing staff for direct patient care services at home.¹ In addition to these challenges, rapid technological progress and healthcare spending has led nursing staff to use information and communication technologies (ICT) in their work to respond appropriately to patients.²

Based on available evidence, ICT can improve healthcare outcomes and reduce associated costs.³⁻⁵ The growing use of ICT, through telenursing and telehealth, is a promising advance in the provision of health services that minimise health concerns.⁶ Telehealth or e-health, is the general use of ICT to provide health-related services to patients from a distance.⁷ Telenursing, as a branch of telehealth, is the use of ICT for providing nursing care at a distance. It may be delivered simply by sending nursing documents digitally or by providing more complex care to patients at home through the Internet and online tools.

Fujino and Kawamoto reported that the non-use or misuse of telenursing technologies can have adverse effects on the professional performance of health staff.⁸ Hence, clinical nurses and midwives need to learn ICT and telenursing to achieve professional progress.⁹

As an innovative approach, telenursing should be introduced into nursing and midwifery curricula to help these professionals develop appropriate strategies for implementing this technology.^{9,10} It is essential that clinical nurses and midwives develop a positive attitude towards telenursing and telehealth to better use them in clinical practice.⁷

Despite the importance of telehealth, previous studies in Ethiopia and Ghana showed that health sciences students lacked sufficient knowledge of ICT and were unable to use this type of technology in their clinical practice.^{11,12} Another study in Iran confirmed that medical staff knowledge of and attitude towards health-related ICT was insufficient.¹³ In another study on the awareness, attitudes and readiness of Iranian clinical staff in the field of telemedicine, researchers found that although physicians' and laboratory and radiological technicians' knowledge of telemedicine was low, their attitudes towards it were positive.¹⁴

Several studies following experimental designs have indicated the effectiveness of telenursing in Iran and other countries.¹⁵⁻²³ However, little is known about Iranian nurses and midwives' attitudes toward telehealth. Descriptive studies are typically done when there is little known about a research subject; this kind of study provides a sound foundation for designing empirical investigations to develop higher levels of knowledge than can be achieved through correlational and experimental designs.²⁴

Telehealth is becoming more necessary for better performance in nurses' and midwives' professional practice. To the best of the authors' knowledge, it has not been clearly identified whether Iranian nurses and midwives have sufficient knowledge and attitudes towards telenursing and telehealth to implement this approach to their patient care. To fill this information gap, this study aimed to examine Iranian clinical nurses' and midwives' attitudes towards and awareness of telenursing and telehealth.

Methods

This cross-sectional study was conducted from February to August 2019 in hospitals affiliated with Mashhad University of Medical Sciences in Mashhad, Iran. Participants were selected by a stratified and cluster random sampling method. A total of 13 hospitals affiliated with Mashhad University of Medical Sciences were assigned into two categories, based on their size, (large and small). Within the large category were Ghaem and Emam Reza Hospitals, while within the small category were Omid, Hasheminejad, Om-ol-Banin and Khatam-Al-Anbia Hospitals. These institutions were randomly chosen as the target hospitals.

The inclusion criteria consisted of those who were willing to participate, had a Bachelor of Science (BS) or Master of Science (MS) in nursing or midwifery and had completed at least one year of clinical work. All individuals who had not completed the questionnaire were excluded from the study. Two members of the research team held a BS in health information technologies and were oriented by the research team and directed to the hospitals to collect

data. Data were collected using a demographic form and a research survey. The demographic form consisted questions pertaining to personal data such as age, gender, primary degree, academic degree, professional position and duration of clinical practice. A list of all participants who were appropriate for inclusion was developed. These individuals were then visited by the research team members. Individuals who were willing to participate in the study completed the study's survey.

A 32-item, close-ended, questionnaire designed by Glinkowski *et al.* was used in this study.²⁵ The tool was designed to investigate Internet/computer access, daily Internet use and general attitude toward telehealth and telenursing as well as the level of awareness of the same. The rating scale of attitude was based on a five-point Likert scale, with five indicating strongly agree, four indicating agree, three indicating difficult to say, two indicating disagree and one indicating strongly disagree. Participants who answered strongly agree or agree to the attitude questions were identified as participants with a positive attitude towards telenursing and telehealth. Higher scores on attitude items also indicated a more definite attitude towards telenursing and telehealth. The questionnaire also contained two multiple-choice questions comprising information on the definition of telenursing and telehealth. A correct response garnered a score of one and an incorrect response was assigned a zero. The original English questionnaire was translated into Persian following a forward-backward process once permission have been secured by the questionnaire's original author via correspondence.

Content validity was assessed by a group of experts including three nursing experts and two specialists in ICT. The reliability of this questionnaire was also assessed by the Cronbach's alpha coefficient ($\alpha = 0.77$).

The investigation was first piloted on 30 nurses and midwives to determine the final sample size based on a level of confidence at 1.96. The minimum sample size was determined to be 478 but the sample size was increased to 550 to allow for a 15% attrition rate with the view of improving the validity of the data.

The data were analysed using Mann-Whitney U, Chi-square tests and Spearman's rank correlation coefficient with Statistical Package for the Social Sciences (SPSS), Version 16.0 IBM, Corp., Chicago, Illinois, USA). The significance level was set at $P < 0.05$.

The Ethics Committee of Torbat Heidariyeh University of Medical Sciences (IR.THUMS.REC.1396.28) approved the study. All participants were given information about the purpose, aim and methodology of the research. They were also assured that contribution to the research was voluntary and confidentiality of

the data and anonymity of the participants would be strictly maintained. The research team obtained verbal consent for participation and the final response to the questionnaire items was agreed upon to be equivalent to a final consent signature.

Results

A total of 554 questionnaires were submitted, of which 31 were incomplete; therefore, the final sample size was 523 (response rate: 94.4%). The mean \pm standard deviation (SD) of age and the duration of clinical practice of the included participants was 33.36 ± 7.46 and 8.88 ± 6.73 years, respectively [Table 1].

Among the 523 participants, 519 (99.2%) had access to a computer and the Internet. However, less than half ($n = 246$; 47.0%) of the participants indicated using the Internet for 2–3 hours/day and 164 (31.4%) participants used the Internet for less than one hour each day. A total of 108 (20.7%) participants indicated more than three hours of Internet use daily and only five (1.0%) participants did not use the Internet at all.

Most participants knew the definition of telenursing ($n = 349$; 66.7%) and telehealth ($n = 419$; 80.1%) and the majority ($n = 382$; 73.0%) had a positive attitude towards telenursing and telehealth. Only 159 (30.4%) participants believed that the use of telenursing in undergraduate studies would benefit future healthcare workers. However, answering this item was difficult for 235 (44.9%) participants. Approximately

Table 1: Demographic characteristics of Iranian clinical nurses and midwives (N = 523)

Characteristic	n (%)
Gender	
Male	90 (17.2)
Female	433 (82.8)
Academic degree in nursing or midwifery	
BS	500 (95.6)
MS	23 (4.4)
Specialty	
Nursing	458 (87.6)
Midwifery	65 (12.4)
Professional position	
Supervisor	16 (3.1)
Head nurse	37 (7.1)
Nurse	405 (77.4)
Midwife	65 (12.4)

BS = Bachelor of Science; MS = Master of Science.

Table 2: Selected questionnaire statements and showing participants' attitudes, on a five-point Likert scale, towards telenursing and telehealth (N = 523)

Statement	n (%)				
	Strongly disagree	Disagree	Difficult to say	Agree	Strongly agree
Telenursing in undergraduate studies would benefit future healthcare workers	37 (7.1)	92 (17.6)	235 (44.9)	131 (25.0)	28 (5.4)
Telenursing would be as a complementary method of patient care	19 (3.6)	86 (16.4)	191 (36.5)	192 (36.7)	35 (6.7)
Telenursing might decrease direct contact between healthcare workers and patients	23(4.4)	107(20.5)	161(30.8)	140(26.8)	92(17.6)
Telenursing might be widely used in environmental nursing	35(6.6)	118(22.6)	112(21.4)	219(41.9)	39(7.5)
Telenursing can increase the efficacy of clinical staff.	44 (8.4)	96 (18.4)	190 (36.3)	144 (27.5)	49 (9.4)
Telenursing can increase the cost of patient care.	160 (30.6)	226 (43.2)	107 (20.5)	23 (4.4)	7 (1.3)
Telenursing can facilitate the direct contact of clinical staff with patients.	19 (3.6)	86 (16.4)	191 (36.5)	192 (36.7)	35 (6.7)
Telenursing may be widely used in community health nursing.	17 (3.3)	74 (14.1)	149 (28.5)	219 (41.9)	64 (12.2)
Telenursing may be widely used in diabetes nursing.	5 (1.0)	24 (4.6)	120 (22.9)	210 (40.2)	164 (31.4)
Telenursing may be widely used in long-term nursing.	4 (0.8)	32 (6.1)	139 (26.6)	216 (41.3)	132 (25.2)

Table 3: Mean participant scores on awareness of the definition of telenursing and telehealth according to gender, academic degree and specialty (N = 523)

Variable	Telenursing	P and Z value*	Telehealth	P and Z value*
	Mean ± SD		Mean ± SD	
Gender				
Male	0.75 ± 0.43	Z = -1.95*	0.88 ± 0.33	Z = -2.29*
Female	0.64 ± 0.47	P = 0.05	0.78 ± 0.01	P = 0.02
Academic degree in nursing or midwifery				
BS	0.65 ± 0.47	Z = -2.10*	0.79 ± 0.40	Z = -0.84*
MS	0.86 ± 0.34	P = 0.03	0.86 ± 0.34	P = 0.40
Specialty				
Nursing	0.67 ± 0.47	Z = -0.38*	0.77 ± 0.41	Z = -3.62*
Midwifery	0.64 ± 0.48	P = 0.69	0.96 ± 0.17	P <0.001

SD = standard deviation; BS = Bachelor of Science; MS = Master of Science. *Z value calculated using Mann-Whitney U test.

Table 4: Mean participant scores on attitude towards telenursing and telehealth by academic degree and specialty (N = 523)

Variable	Mean ± SD	P and Z value*
Academic degree in nursing or midwifery		
BS	85.20 ± 11.04	Z = -2.36
MS	90.65 ± 9.64	P = 0.01
Specialty		
Nursing	84.97 ± 11.19	Z = -2.55
Midwifery	88.70 ± 9.26	P = 0.01

SD = standard deviation; BS = Bachelor of Science; MS = Master of Science *Z value calculated using Mann-Whitney U test.

one-third (n = 192; 36.7%) of the participants agreed that using telenursing as a complementary method of patient care in their future work had value; 193 (36.9%) participants agreed or strongly agreed that telenursing could improve the nursing staff's effectiveness. The answer to this statement was difficult for 190 (36.3%) participants. Most of the participants (n = 386; 73.8%) disagreed that telenursing can increase the cost of patient care. Approximately one-quarter of participants (n = 140; 26.8%) agreed that telenursing might decrease direct contact between healthcare workers and patients but 107 (20.5%) did not. It was difficult for 161 (30.8%) participants to answer that

question. Some of the participants ($n = 219$; 41.9%) believed that telenursing might be widely used in environmental nursing [Table 2]. Most participants indicated that they understood requirements related to Internet service ($n = 420$; 80.3%), landline-based phones ($n = 280$; 53.5%) or mobile phones ($n = 377$; 72.1%) to carry out telenursing activities.

The overall mean \pm SD awareness score for telenursing and telehealth was 0.80 ± 0.39 and 0.66 ± 0.47 , respectively. A significant difference was identified in the level of awareness of the definition of telehealth between genders, with males showing higher mean scores compared to females (0.88 ± 0.33 versus 0.78 ± 0.01 ; $P = 0.02$). Participants with a MS degree also had a higher mean score in the field of telehealth definition compared to those holding a BS degree (0.86 ± 0.34 versus 0.65 ± 0.47 ; $P = 0.03$). Clinical midwives were significantly more aware of the meaning of telehealth compared to clinical nurses (0.96 ± 0.17 versus 0.77 ± 0.41 ; $P < 0.001$) [Table 3].

Significant differences in the attitudes towards telenursing and telehealth based on academic degrees were identified; those with a MS had a higher mean attitude score compared to those with a BS (90.65 ± 9.64 versus 85.20 ± 11.04 ; $P = 0.01$). Clinical midwives also had more positive attitudes towards telenursing and telehealth compared to clinical nurses (88.70 ± 9.26 versus 84.97 ± 11.19 ; $P = 0.01$) [Table 4].

A weak inverse relationship was identified between attitude and age of participants in relation to telenursing and telehealth ($r_s = -0.10$; $P = 0.01$). A weak inverse relationship was also identified between attitude and job experience in relation to telenursing and telehealth ($r_s = -0.10$; $P = 0.02$).

Discussion

The current study aimed to investigate Iranian clinical nurses' and midwives' attitudes towards telenursing and telehealth. The study found that most participants knew the definition of telenursing and telehealth; in previous studies, students of nursing were also familiar with these terms' meanings.^{25,26}

Most participants in the current study believed that telenursing might decrease direct contact between healthcare workers and patients. Hence, clinical nurses and midwives need to develop ICT skills and telenursing approaches to achieve professional connection.⁹ Most participants thought that telenursing might be a complementary method of patient care in their work. A national survey of e-health in Australia found that 52% of participants agreed that e-health can improve nursing practices, while less than half (48%) assumed

that e-health competencies could be developed as a way to enhance the healthcare services given to patients.¹⁰ In another study, more than 50% of medical practitioners believed that telemedicine would elevate their clinical performance, and 66% of participants thought that telemedicine might boost healthcare quality.²⁷ Hicks *et al.* found that approximately one-third of the surveyed health professionals agreed that technological applications in the healthcare system have a large effect on their work.²⁸

In the current study, 193 (36.9%) participants believed that telenursing could enhance staff efficacy in the health system and 386 (73.8%) participants believed that telenursing could reduce nursing care costs. Glinkowski *et al.* also indicated that telenursing could decrease healthcare expenditures, facilitate contact with patients and enhance medical staff productivity.²⁵ Meher *et al.* concluded that more than half of the studied medical practitioners presumed that telemedicine reduces time wasting as well as the cost of visiting patients in healthcare centres.²⁹

According to the results of the current study, most participants had access to the Internet via a computer or tablet. Access to a personal computer (PC) and the Internet is essential for the successful launch of telemedicine. Computer access and literacy are a cornerstone of technological advances and training for health professionals because most information communication and transactions requires Internet access.³⁰ Few participants in the current study indicated having insufficient PC and Internet access to achieve virtual connections with patients. Such connectivity is essential and all nursing and midwifery staff should have easy access to a PC and the Internet, especially at work, to maximise telehealth and telenursing capacity.

The mean age of participants in this study was 33 years, with an average of nine years of previous clinical work. A weak inverse relationship between the age of participants and recognition of the definition of telenursing was found, with younger and less-experienced participants being more aware of telenursing. In general, younger participants were also more familiar with ICT-related facilities such as computers and telemedicine than older health professionals; this result is in line with Boringi *et al.*'s finding.³¹ Another study showed that younger doctors were more willing to use telemedicine and e-health care.²⁹ This finding could be due to the fact that telemedicine is a relatively new concept and requires ICT tools such as smartphones and online media that are mainly used by younger generations who have increased exposure of technology.^{31,32}

Health professionals are dealing with many challenges and obstacles in their path to executing telemedicine successfully.²⁵ The studied literature highlighted that a lack of short-term courses and training was a significant hindrance to the adoption of e-health technology. In addition, the other main barriers to adopting e-health included lack of time, guidance and incentives on the part of organisations as well as a lack of access to appropriate technology.^{10,30} On the other hand, inadequate information about technology-based infrastructure such as the Internet and telephones have made it challenging to implement telemedicine in both developing and developed countries. Therefore, governments and hospitals, are recommended to provide Internet facilities to eliminate such problems.^{30,32}

Another key finding of the current study was that the midwives were more aware of the definition of telehealth than nurses. Midwives also had more positive attitudes toward telenursing and telehealth than nurses. Telehealth awareness may increase if all healthcare students are obliged to pass one academic unit of ICT within their educational programmes. However, these issues require further investigation in the Iranian context.

The current study also found a significant difference in attitude scores based on academic degrees attained, with MS-holding participants also achieving a higher average telehealth score than those with BS degrees. The observed difference may have resulted from an additional unit, ICT, in the academic curricula of both nurses and midwives studying at this level.

Experts have not thoroughly implemented telenursing in the healthcare field; however, according to the findings of the current study, telenursing skills are seen as desirable as reflected in the positive attitudes of nurses and midwives. The integration of innovative technologies in nursing, which is a complex and rapidly-changing profession even without the addition of technology to care provision, appears to be a fundamental challenge.¹⁰ Several factors should be considered when implementing telenursing practices including the introduction of telenursing and telemedicine in educational coursework as a new approach to healthcare as well as ongoing professional training to this end.²⁵ In fact, a lack of systematic e-health training has been reported by earlier studies.^{10,13,25}

It appears irrational to expect e-health nursing practice to be viewed as routine unless participants become acquainted before entering the profession with its various fundamental concepts, principles and applications through academic training courses.¹⁰ Medical universities, therefore, should implement a comprehensive, knowledge-improvement programme

focused on telenursing and telemedicine. Making this change would support clinical applications and practices of e-health and provide nursing and midwifery students with sufficient facilities to increase their knowledge on health-based ICT by strengthening educational infrastructure.¹³ Earlier studies have shown that the majority of students have a positive attitude towards the role of telenursing in their future practice and achievement in clinical nursing; 70% of student surveyed indicated a need to include telenursing in academic courses.²⁵ According to Grady and Schlachta-Fairchild, 89% of participants agreed that telenursing should be part of primary nursing education.³³

The limitation of the present study was that the research sites were restricted to hospitals affiliated to only Mashhad University of Medical Sciences. Therefore, the findings may not be generalisable to other health centres and hospitals. Moreover, a small number of clinical nurses and midwives with postgraduate degrees participated, which decreases the reliability of the findings in the evaluation of knowledge of and attitudes towards telenursing.

Although most of the current participants had a positive attitude towards telenursing and telehealth and knew the definition of these concepts, it is vital for all healthcare workers to have a positive attitude towards and improve their knowledge of integrating ICT in healthcare. Educational planners, health centre managers and academic instructors can use such research results to expand the use of ICT for patient care. Finally, more research based on the findings of the current study should be undertaken in other health centres and hospitals and with more participants with postgraduate degrees in order to determine why differences in findings exist.

Conclusion

Based on the findings of the current study, most Iranian nurses and midwives are aware of the definition of telenursing and telehealth. Most participants indicated a belief that telenursing might be a complementary method of patient care in their work. There was a weak inverse relationship in participants' ages in relation to knowing the meaning of telenursing; midwives were more aware of the meaning of telehealth than nurses. Midwives also presented more positive attitudes toward telenursing and telehealth than nurses. Participants with a MS also had a higher mean attitude score compared to those with a BS. Positive attitudes of the participants are important in promoting telenursing and telehealth. The implementation of educational and infrastructure development programmes can help speed up executional processes in these fields.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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