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The Roles of Innovative Nurses in the COVID-19 during the Pandemic and Difficulties They Experience

Abstract

Background: This study aimed to include the work of innovative nurses in the coronavirus disease 2019 pandemic period, their roles, and the difficulties they experienced.

Methods: The data were obtained from messages sent to the Innovative Nursing Association's e-mail and the participants who participated in the manual and online survey of the association. The study sample consisted of 150 nurses and midwives among the members of the Innovative Nursing Association who agreed to participate in the study. Frequency distribution was used with the SSPS package program for statistical evaluation of the obtained data.

Results: It was determined that the awareness of the participants about the innovation process is sufficient; they have been actively involved in innovation studies before; and trainings, role modeling, and consultancy are provided by the Innovative Nursing Association for the promotion of innovation among our colleagues. It was determined that, during the pandemic period, the studies performed to activate the innovation process were interrupted, difficulties were caused by the disruption of collaborations in the production process of innovative products, and the products developed were generally directed toward protective products.

Conclusion: Regular training, role modeling, and scientific activities that introduce the innovation process make the process more interesting, and guide nurses are crucial for activating the innovation process in nursing.

Keywords: COVID-19, nursing, innovation, pandemic

Yeliz Doğan Merih

Turkey Institutes of Health Presidency, Health Sciences University Hamidiye Faculty of Nursing, Innovative Nursing Association, Turkey

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Corresponding Author: Yeliz Doğan Merih
E-mail: yelizmrh@gmail.com

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Introduction

Innovation, which has become the symbol of transition to the economy of creativity in the age of information, is the development process of novel approaches, technologies, and working styles. It is the entirety of creative processes that transform information into a usable form. As a process, innovation means "transforming an idea into a marketable product or service, new or improved manufacturing or distribution system or a new social service."[1]

Among the main institutions of the health sector, hospitals are supposed to be innovative with the idea of achieving sustainability and competitive power and better responding to the needs of patients, healthcare personnel, and other stakeholders.[2-4] In light of all developments, nurses who have a significant place among healthcare professionals have also taken active roles in the innovation process over time.[5,6] Considering the changing healthcare necessities, the profession of nursing needs creative and inquisitive members who can access, create, and use information.[4-7] Advancements in technology, prolonged life expectancy, health problems, and changes in the health system have increased the need for nurses who are experts in their field to develop novel and innovative projects.[8-11] Many studies on nursing have focused on innovative behaviors in health services. These studies emphasized that developing innovative behaviors in nurses is possible.[12] For example, Knol and Linge[13] pointed out that institutions need to prepare the required conditions for empowering nurses in the innovative behavior process. Weng et al.[14] stated that innovation in nursing is a summary of nurses' creation of information, display of innovation behaviors, and spreading of innovation during the process of care. They found the information creation level of nurses to be the highest and the innovation spreading rate to be the lowest.[14]

In all fields of nursing, innovation and innovative practices are highly important. Organization has a large place especially in starting, organizing, and pioneering comprehensive work in this field. The Innovative Nursing Association was established on May 18, 2016 with its center in Istanbul with the purpose of providing counseling for nurses to achieve effective and desirable outcomes in provision of care, adapt to constant change, and integrate the innovation process into their services; supporting health in nursing practices; preventing diseases; defining and preventing risk factors; increasing health-improving behaviors; and being able to provide more qualified care and treatment. Since the day it was established, the Association has provided Innovative Thinking Training for nursing and midwifery students at many schools and for nurses and midwives at hospitals and carried out education and workshop work regarding the innovation process for thousands of nurses and midwives in several symposia and conferences. As a result of the comprehensive work that has been conducted, 100 individuals among the members of our association have received patent or utility model certification, and the certification process of

others is ongoing. Within the scope of the Competition for Innovation in Nursing that is organized by our association every year, more than 512 projects have been realized. Our association supports nurses and midwives in terms of new innovations to be made in the field of health with the trainings it provides and continues to provide counseling services for its members in the process of protection and documentation of products.

The health innovation system was formed as a result of an interactive process covering hospitals, universities where health and medical sciences are taught, drug companies, and firms producing medical products. It was created by interaction and collaboration among these agencies by using science and technology for the identification, diagnosis, treatment, and prevention of fatal and contagious diseases.[15,16] Innovation has been an approach that we have needed in many processes from the past to the present that becomes more prominent in terms of the solution of problems, especially in cases of crisis periods. Today, in the coronavirus disease 2019 (COVID-19) pandemic period, we are also very much in need of innovative processes for the solution of problems.[17] The novel coronavirus has been one of the most dangerous viruses threatening the world, after the Spanish flu that spread to the entire world in a short time with the effects of the negative conditions created by World War I. The fast spread of COVID-19 has shown us the importance of forming resilience and flexibility to face various threats from pandemic diseases to violence, climate change, and rapid technological transformation and to achieve adaptation against change.[18,19] The greatest helpers in the fight against the pandemic are without a doubt technology and innovation. Scientists started to work on new products and technologies in terms of finding new diagnosis and treatment methods in this period. In Turkey especially, "technoparks," which have become the center of innovation, continue to develop different medical products and technologies against the pandemic with the firms under them.[20] Additionally, healthcare workers in the field and at the center of the crises are also developing many innovative services and products for the purpose of improving their service processes and finding solutions to problems in this pandemic period. It is observed by everybody that these comprehensive innovation efforts have allowed everyone to experience the heavy and difficult effects of the pandemic in a more comfortable manner.

In the COVID-19 pandemic period, it is inevitable to see increases and changes in types of disease, identify and solve crisis processes that are experienced, reveal new necessities in the health system, and integrate significant changes into service in line with these necessities.[20,21] The most significant healthcare workers who apply these changes to the individual or family and society for whom they provide services and carry innovations to the society are nurses. In this process that is defined as innovation, it is highly crucial to provide new services, establish the necessary organizational structure, and include nurses with an innovative mindset.

In the scope of this article, the aim was to include the work of innovative nurses in the COVID-19 pandemic process, roles they take on, and difficulties they experience in the pandemic period. Furthermore, recommendations of the Innovative Nursing Association for improving innovative efforts in the pandemic process were included.

Material and Methods

Type and Location of the Study

This study was conducted as a descriptive study among members of the Innovative Nursing Association in May 2020.

Population and Sample

Among the members of the Innovative Nursing Association (n = 496), nurses and midwives who met the participation criteria (membership period exceeded 1 year) and agreed to participate in the study were included. When the power analysis was done, the sample size was calculated to be at least 103 participants with 5% bias level, 95% confidence interval at bilateral significance level, and 80% power. A total of 150 nurses and midwives participated in the study voluntarily.

Data Collection Instruments

The data were collected with a questionnaire form consisting of 15 questions on the demographic and occupational characteristics of innovative nurses, as well as their work in the pandemic process and difficulties they experienced.

Ethical Aspect

For the study, the necessary permissions were obtained from the Management Board of the Innovative Nursing Association, and this study was also evaluated and approved by the SBU Zeynep Kamil Maternal and Pediatric Research and Training Hospital's Ethics Committee (decision dated January 20, 2021 and numbered 25). It was explained in writing that the identities of the participants would be kept confidential, and their information would be used only for this study.

Statistical Analysis

The evaluation of the knowledge of the nurses participating in the study regarding their demographic, professional, and innovation processes was performed using the Statistical Packages for the Social Sciences (SPSS) for Windows, Version 21.0. (IBM Corp.; Armonk, NY, USA) in statistical calculation. In evaluating the data, number, percentage distributions, and average values are calculated.

Results

Among the participants, 35.3% were in the age group of 26-31 years, 91.4% had received undergraduate or higher degrees, 45.4% had a professional experience of 6-10 years, 77.3% were nurses, and 32.7% were working at services (Table 1).

The participants' involvement in the innovation process and their views are presented in Table 2. Among the participants, 96.7% defined innovation, 86.7% had developed an innovative idea before, 100% saw innovation necessary, 96.7% received education about innovation, 86.7% had previously participated in innovation competitions, and 97.3% thought that the role modeling and counseling provided by the Association was useful in participation in work of innovation in nursing.

The problems experienced by the participants in their service provision processes in the pandemic period included being away from family in the first place (36.6%), followed by working under risky and difficult conditions (21.3%). Among problems regarding the innovation process, they identified the postponement of their education and conferences in the first place (46%) and that mostly one-dimensional innovations were made toward personal protective equipment in the second place; they considered the innovative approaches made by their colleagues toward problems in this period to be adequate (56.7%); they considered it a good thing for their colleagues to produce innovative solutions even in difficult processes such as the pandemic period (38.7%); and among their recommendations to their colleagues for better service quality, they stated that it would be useful for them to continue producing and developing innovative approaches even in all difficult conditions (38.7%) (Table 3).

Table 1. Distribution of the Participants by Demographic and Occupational Characteristics

Criteria		Frequency	%
Age distribution	20–25 years	30	20.0
	26–31 years	53	35.3
	32–37 years	26	17.4
	38–43 years	22	14.6
	44 years and over	19	12.7
Educational status	High school	5	3.3
	Undergraduate	8	5.3
	License	90	60.0
	Graduate and above	47	31.4
Professional experience	1–2 years	21	14.0
	3–5 years	32	21.3
	6–10 years	68	45.4
	10 years and over	29	19.3
Squad status	Nurse	116	77.3
	Midwife	34	22.7
Part of study	Urgent	20	13.3
	Policlinic	19	12.7
	Service	49	32.7
	Intensive care	35	23.3
	Delivery room	10	6.7
	Operating room	17	11.3
Total		150	100.0

Table 2. Innovation Process Participation Statuses and Views of Participants

Criteria		Frequency	%
Knowing and defining innovation	Yes	145	96.7
	No	5	3.3
Has previously developed an innovative idea	Yes	130	86.7
	No	20	13.3
Is innovation necessary in nursing?	Necessary	150	100.0
	Not Necessary	0	0.0
Has received education on the innovation process	Yes	145	96.7
	No	5	3.3
Has participated in innovation in nursing competitions	Yes	130	86.7
	No	20	13.3
Do you think the role modeling and counseling provided by the association were useful in participation in innovation work in nursing?	Yes	146	97.3
	No	4	2.7
Total		150	100.0

Considering the distribution of the innovative product ideas of the participants developed in the pandemic period, it was determined that the first place belonged to facemasks (46.7%), which were followed by face shield products (16%) and care products (14.7%) (Table 4).

Discussion

We are going through a difficult period because of COVID-19. In the world in general, the eyes of all industries and the business world are on precautions taken in relation to the pandemic. In addition to this, concerns about the spread of the virus are disrupting our routine working methods every day in different ways. In this global problem, no other industry is more central than the health sector. In addition to concerns encountered by every industry, the health industry is encountering unique difficulties while trying to prevent the spread of the disease and provide those who are affected with healthcare services.[18,21,22] Regarding these difficulties, the health sector is looking for ways of utilizing the rapid technological transformation in the world to a higher extent. In uninterrupted continuation of services in the pandemic process, developments in the field of big data, digital health applications, and artificial intelligence bring about benefits such as low costs, development in preventive medicine, and the rapid prevalence of early diagnosis and customized treatment methods. Therefore, innovation has become compulsory for the health sector.[17,21,23] Many new products, such as prosthetics, masks, and face shields produced in three-dimensional printers; digital technologies that allow patient information and radiography images to be transferred to surgeons in a few minutes; robots that not only increase the success rate of surgeries but also shorten their duration; COVID-19 diagnosis kits; storage and transportation robots; digital health applications; smart voice recognition systems; and smart image reading systems have become indispensable elements of healthcare services in the pandemic period. Digital innovations toward preventing, monitoring, and treating diseases allow for not only accessing more positive outcomes but also reducing costs.[1,23-25]

During the prevention and control of the pandemic, there is a need for a multidisciplinary approach. The purpose of the multidisciplinary approach is to provide individual treatment and care. Nurses are at the center of COVID-19 prevention and intervention efforts.[26,27] For nurses to be effective in this process, they need to be aware of the symptoms of the disease, provide suitable education, obtain the necessary tools and equipment for achieving and maintaining infection control precautions, have the authority to apply these precautions, and guarantee the family and the individual that the best care will be provided.[28] In this context, nurses who work in close contact with patients 24 hours a day for 7 days a week at all institutions and organizations providing healthcare services provide suspected or confirmed COVID-19 cases, healthy or ill individuals, families, and groups with nursing services.[28,29] As in Turkey, our colleagues in the entire world are working on the frontlines to provide society with holistic and innovative health services that are qualified, safe, and useful for solving problems.

Innovation in nursing practices plays a significant role in maintaining and improving health, determining and identifying risk factors, preventing diseases, and using new information for providing higher-quality nursing care.[30,31] This study was conducted to determine the work carried out by our colleagues taking part in the innovation process in the pandemic period and the difficulties they experienced.

Table 3. Participation in Innovation Work in the COVID-19 Period and Views on Difficulties Experienced

Criteria		Frequency	%
Problems of your colleagues in the process of service provision in the COVID-19 pandemic period	Being away from family in the pandemic	55	36.6
	Working in risky and difficult conditions	32	21.3
	Working for long times with personal protective equipment	16	10.7
	Lack of healthcare personnel	22	14.7
	Being stationed at different institutions	8	5.4
	Risk of getting or carrying infection	17	11.3
Problems of your colleagues in the process of innovation in the COVID-19 pandemic period	I was not able to participate because trainings and conferences on the innovation process were postponed	69	46.0
	The innovation process in the pandemic period was mostly on personal protective equipment	47	31.3
	Different processes we experienced in the pandemic process negatively affected my innovation work	24	16.0
	I had to take a break from my work in the innovation process because our priorities changed in the pandemic period	10	6.7
How did you find the services carried out by nurses in the clinical area or in the field in relation to innovation?	Adequate	85	56.7
	Undecided	25	16,7
	Inadequate	40	26.6
Were there disrupted aspects in the innovation process services?	Yes	97	64.7
	No	53	35.3
If your answer is yes, what were these?	Postponement of trainings and meetings	45	46.3
	Disruption of innovation process work in the pandemic process	26	26.8
	Interruption of the production process of products	5	5.2
	Reduction of time and cost allocated for innovation because of changing priorities	21	21.7
What do you think are the services performed well by our colleagues regarding innovation in the pandemic process?	They developed several needed products and services	19	12.7
	They developed innovative solutions to problems in this difficult process	58	38.7
	They took roles in innovative processes in determination and solution of several problems in the pandemic process	33	22.0
	While they were performing their profession at their best in this difficult process, they also took roles in innovative work	40	26.6
What are your recommendations for your colleagues for better service quality?	They should continue producing and developing innovative approaches in even all difficult processes	58	38.7
	They should add value to their profession and themselves by taking part in the innovation process	46	30.7
	They should continue to constantly produce by making innovation a lifestyle	31	20.6
	They should take part in innovation processes to carry their profession into the future	15	10.0
Total		150	100.0

COVID-19, coronavirus disease 2019.

In this study, it was determined that 35.3% of the participants were in the age group of 26–31 years, 91.4% had undergraduate or higher degrees, and 45.4% had professional experience of 6–10 years (Table 1). It was found that the participants were generally knowledgeable about the innovation process, they had previously developed innovative ideas (86.7%), all of them considered innovation to the necessary, most had received education about innovation and participated in innovation competitions before, and 97.3% thought that the role model-

Table 4. Distribution of Innovative Product Ideas Developed by Participants During the Pandemic Period		
Criteria	Frequency	%
Mask (surgical and N95 mask)	35	46.7
Face shield	12	16.0
Apron and protective gear	9	12.0
Care products	11	14.7
Treatment tools	8	10.6
Total	75	100.0

ing and counseling provided by the Association in their participation in innovation efforts in nursing were useful.

The main steps in starting the innovation process in nursing consist of achieving awareness, creating opportunity, providing motivation, supporting guiding processes, and designing models that will make the process attractive. By increasing the participation of nurses in the innovation process, these steps will achieve their integration into a cost-effective healthcare system whose aims have been determined and that has high quality.[7,15] In support of the results in the literature, in our study, it was thought that the holistic, supportive, opportunity-creating and continuous education-oriented role model support provided by our association and the work of innovative mentor nurses had a positive effect in the active participation of nurses in innovation work.

In this study, the problems experienced by the participants in their service provision processes in the pandemic period included being away from family in the first place (36.6%), followed by working under risky and difficult conditions (21.3%). Among problems regarding the innovation process, they identified the postponement of their education and conferences in the first place (46%), they considered the innovative approaches made by their colleagues toward problems in this period to be adequate (56.7%), they considered it a good thing for their colleagues to produce innovative solutions even in difficult processes such as the pandemic period (38.7%), and they stated that it would be useful for their colleagues to continue producing and developing innovative approaches even in difficult conditions (38.7%) (Table 3). Considering the distribution of the innovative product ideas of the participants developed in the pandemic period, it was determined that the first place belonged to face masks (46.7%), which were followed by face shield products (16%) and care products (14.7%) (Table 4).

The use of three-dimensional cameras in measurement of pressure ulcers is an important innovation.[32] It was proven that clothes that are produced as smart trousers are effective in reducing pressure ulcers.[33] Moreover, Debra Keith provided online education via television to women waiting their turn for examination in waiting areas at the beginning of the 2000s. The effect of Keith's innovative work is great on the mother-infant education carried out routinely today.[34]

All aforementioned innovations emerged as a result of nurses perceiving needs in the clinical field by using good observation and their creativity roles. They have improved their professional capacities and values with innovative processes and developed new products that would increase their care quality. In the scope of our study, it was determined that participants also displayed similar roles and developed the products needed by the field and their patients based on necessities in the pandemic process.

In this period where COVID-19 has personally affected all of us and forced us to change our daily lives and preferences, it would not be wrong to argue that health sectors and healthcare workers who are at the very center have been abundantly affected by this situation. Not only the society but also all sectors need to adapt to the new normal. It was determined that the participants stated they experienced difficulties especially because of interruption of innovative education during the pandemic process work, interruption of the collaboration of firms in the production processes of products, and the fact that innovations were mostly on personal protective equipment. In this pandemic where societies and the government systems of countries have been caught unprepared, most of the time, healthcare personnel also feel inadequate and unprotected. This feeling of inadequacy and being unprotected originates from the lack of sufficient scientific knowledge about the disease, lack of sufficient protective materials required by healthcare personnel, the risk of healthcare personnel being infected with the disease and/or carrying the disease to others, and their perception as a threat by others in relation to carrying and transmitting the disease.[19,21,35] It was thought that the reason for participants to complain about not being able to apply their previous gains in the innovation process in the pandemic period was that they were in the adaptation process for all the unexpected changes and considered the innovation process as a part of their lives.

Conclusion and Recommendations

To exist in the changing and developing world order, the profession of nursing should keep all of its channels open, gather with its entire presence, get stronger with continuous professional trainings, and increase the quality of its existence by keeping its knowledge base open for all members of the profession. Nurses are at the center of COVID-19 prevention and intervention efforts. Nurses should ensure that all patients receive individualized, high-quality care; be prepared for the increased demand for nursing and the health system with COVID-19; and determine needs and develop and implement innovative approaches to increase the quality of care.

As a result of the study,

a. It was determined that the awareness levels of the participants regarding the innovation process were adequate; they had previously participated actively in innovation work; and the trainings, role modeling, and counseling provided by the Innovative Nursing Association were useful in making innovation prevalent.

b. In the pandemic period, the participants had the most difficulty regarding being away from their families and working in difficult and risky conditions.

c. It was found that the participants took a break from innovation work in the pandemic period in comparison to before the pandemic, and they attributed this to their changing priorities in the process, whereas those who participated in the innovation process generally focused on developing personal protective equipment.

d. The participants were observed to experience difficulty regarding interruptions of trainings and conferences toward activating the innovation process in the pandemic period and disruptions in collaborations in the production process of innovative products.

e. It was determined that, even in a difficult process like the pandemic period, our colleagues identified necessities and developed innovative products, which mainly involved personal protective equipment.

Our Recommendations:

a. Various activities and online training programs should be organized to increase the awareness of our colleagues on the topic of determining effective precautions and strategies for the pandemic.

b. Comprehensive work should be carried out at institutions in difficult processes such as pandemic periods, including work organizations, personal protective equipment planning, labor planning, work on service improvement based on the views and recommendations of patients and employees, in-hospital pandemic plans, and formation of workflow schemas.

c. To achieve the desired participation of nurses in innovation activities, innovation culture needs to be increased in positive working environments, where innovative ideas that support being ready for change can be discussed and should be developed.

d. Easy access to information, resources, and opportunities should be provided for nurses and other healthcare workers for them to be able to develop innovation.

e. Regarding the innovation process, online competitions and activities that provide motivation in line with the new normalization process should be organized.

f. Work should be started to provide online trainings on innovation, creative thinking, patenting process, prototype development, and the process of putting an idea into practice.

g. Online support processes should be activated in the process of transforming the ideas developed by nurses and midwives into reality.

h. Sectoral collaborations should be reactivated in new process conditions in realization of innovative products.

i. A national policy with systemic integrity and continuity should be created by integrating innovative developments in the fields of science, technology, and industry with the field of science.

j. Success stories should be shared to introduce nurses to individuals who pioneer innovation in nursing and become role models.

As the Innovative Nursing Association, we determined that in the comprehensive work we have conducted toward activation of the innovation process in nursing, regular trainings; conducting scientific activities that will introduce the process, make it attractive, and be guiding; development of constant support approaches; creation of an environment of trust; ensuring the continuity of work; and being role models are greatly important issues. We have observed that this work and support processes that were carried out were even more important in crisis periods such as the COVID-19 pandemic. For our colleagues to make the necessary improvements in both service and product processes in these difficult conditions, we have continued to provide training and counseling processes and partnerships for product sharing and collaboration. Especially in this pandemic period where domestic production and nationalization are important in general in Turkey, our greatest goal is to see nurses be able to say "we also exist, and we also have a say" with their exemplary work. In spreading the light of innovation through nursing in Turkey, we believe implementation of the exemplary model we developed may be effective in nurses' development of innovation approaches.

Ethics Committee Approval: *Necessary permissions were obtained from the Board of Directors of the Innovative Nursing Association for the study, and the study was evaluated and approved by the Ethics Committee of the SBU Zeynep Kamil Women and Child Diseases Training and Research Hospital (decision no 25 dated 20.01.2021).*

Informed Consent: *Written consent was obtained from the nurses participating in the study.*

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References

1. Şengün H. Sağlık hizmetleri sunumunda inovasyon. *Med Bull Haseki* 2016;54:194-198. [Crossref]
2. Feldman LB, Ruthes RM, Cunha IC. Creativity and innovation: competences on nursing management. *Rev Bras Enferm.* 2008;61(2):239-242. [Crossref]
3. Khorshid L. Hemşirelikte yaratıcılık ve yenilik. 1. Temel Hemşirelik Bakım Kongresi Kitabı. İzmir;2010.
4. Dil S, Uzun M, Aykanat B. Hemşirelik eğitiminde inovasyon. *Int J Hum Sci.* 2012;9(2):1217-1228.
5. Herdman AE, Yazıcı KÖ. Hemşirelik ve yenilikçilik. *HEAD.* 2009;(6):2-4.
6. Clement O-Brien K, Polit FD, Fitzpatrick JJ. Innovativeness of nurse leaders. *J Nurs Manag.* 2011;19:431-438. [Crossref]
7. Doğan Merih Y, Alioğulları A, Yaşar Kocabey M, Gülşen Ç, Sezer A. Hemşirelikte inovasyon kültürü oluşturma; bir başarı öyküsü, *Zeynep Kâmil Tıp Bülteni.* 2019;50(3):175-181. [Crossref]
8. Güngör İ, Rathfisch G, Kızılkaya Beji N. Kadın sağlığı hemşirelerinin rol yetki ve sorumluluklarının uluslararası düzeyde irdelenmesi. *Florence Nightingale J Nurs.* 2013;21(1):49-56.h
9. Curran, L. The women's health nurse practitioner evolution of a powerful role. *AWHONN Lifelines*. 2002;6(4):332-337. [Crossref]
10. Arslan Özkan H, Özbek Ş, Bursa AG, Küreselleşen sağlık ve kadın sağlığı hemşireliği. *KASHED.* 2015;2(2):46-57.
11. Tulum YD, Memiş S. Hemşirelik eğitiminde yaratıcılığı geliştirme. *Ege Üniversitesi Hemşirelik Yüksekokulu Dergisi.* 2006;22:245-252.
12. Asurakkody TA, Shin SY. Innovative behavior in nursing context: a concept analysis. *Asian Nurs Res.* 2018;12:237-244. [Crossref]
13. Knol J, Van Linge R. Innovative behavior: the effect of structural and psychological empowerment on nurses. *J Adv Nurs.* 2009;65(2):359-70. [Crossref]
14. Weng RH, Huang CY, Lin TE. Exploring the cross-level impact of market orientation on nursing innovation in hospitals. *Health Care Manag Rev.* 2013;38(2):125-136. [Crossref]
15. Doğan Merih Y. İnovatif Hemşirelerin Yol Haritası, Nobel Tıp Kitabevleri. İstanbul:2018.
16. Erdil E, Pamukçu M, Akçomak İ, Erden Y. Değişen üniversite-sanayi iş birliğinde üniversite örgütlenmesi. *Ankara Üniversitesi SBF Dergisi*. 2013;68(2):95-127. [Crossref]
17. Mart'ta Coronavirüse Rağmen İhracat Pazarları Büyüdü, Türkiye İhracatçılar Meclisi (TİM), 02 Nisan 2020. https://tim.org.tr/tr/haberler-martta-coronaviruse-ragmen-ihracat-pazarlari-buyudu
18. COVID-19 (Sars-Cov-2 Enfeksiyonu) Rehberi, Bilim Kurulu Çalışması, T.C. Sağlık Bakanlığı 13 Nisan 2020 https://COVID19 bilgi.saglik. gov.tr/depo/rehberler/COVID-19_Rehberi.pdf
19. TÜBA COVID-19 Pandemi Değerlendirme Raporu, 17 Nisan 2020, Ankara http://www.tuba.gov.tr/files/images/2020/kovidraporu/COVID-19%20Raporu-Final+.pdf
20. T.C. Cumhurbaşkanlığı Dijital Dönüşüm Ofisi, 18 Mart 2021, Koronavirüs COVID-19 Dünya Haritası: https://corona. cbddo.gov.tr/
21. Küresel COVID-19 Salgınının Türkiye'de Farklı Kategorilere Etkileri, 20 Mart 2021, Deloitte Türkiye, Nisan 2020. https://www2.deloitte.com/tr/tr/pages/ consulting/articles/kuresel-COVID-19-salgininturkiyede-farkli-kategorilere-etkileri.html

22. Handbook of COVID-19 Prevention and Treatment (2020). Zhejiang University School of Medicine
23. Deloitte 2022 Yaşam Bilimleri ve Sağlık Hizmetleri Sektör Tahminleri Raporu, Kasım 2017 https://www2.deloitte.com/tr/tr/pages/about-deloitte/articles/ sagligin-gelecegi-veriye-odaklaniyor.html
24. MÜSİAD Araştırma Raporları. (2012). Küresel Rekabet İçin Ar-ge ve İnovasyon. İstanbul: MÜSİAD.
25. Yavuz A, Albeni M, Göze Kaya D. Ulusal inovasyon politikaları ve kamu harcamaları: çeşitli ülkeler üzerine bir karşılaştırma. *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*. 2009;14(3):65-90.
26. Jiang Y, Wang H, Chen Y, He J, Chen L, Liu Y, Zou H. Clinical Data on Hospital Environmental Hygiene Monitoring and Medical Staff Protection during the Coronavirus Disease 2019 Outbreak. medRxiv.
27. Pan L, Wang L, Huang X. How toface the novel coronavirus infection during the 2019–2020 epidemic: the experience of Sichuan Provincial People's Hospital. *Intensive Care Med.* 2020;46(4):573-575. [Crossref]
28. Goldrick BA. 21st-century emerging and reemerging ınfections. *Am J Nurs.* 2004;104(1):67-70. [Crossref]
29. Aktaş YY, Koraş K, Karabulut N. Yoğun bakım hemşirelerinin teknolojiye ilişkin tutumları. *Hacettepe Üniversitesi Hemşirelik Fakültesi Dergisi.* 2017;4(2):36-48.
30. Bradshaw MJ. Fuszard's ınnovative teaching strategies ın nursing. In: effective learning: what teachers need to know, 3rd ed. USA, Aspen Publishers; 2001.
31. International Council of Nurses. Delivering quality, serving communities: nurses leading care innovations. 2009.
32. Nauta J, Bosch L Van den, Hesselman C, et al. Guiding people with early dementia home with the talkmehome service. Fourth Int Conf Health, Telemedicine, Soc Med eTELEMED. 2012;(12):12-17.
33. Overview T. Smart-e-Pants for the Prevention of Pressure Injuries in the Spinal Cord Injury Population. Horizon Scanning Brief. 2014.
34. Hendrich BANN. Nurses lead quality ımprovement and ınnovation. *Health Progress*. 2016;47-51.
35. Çelebi C. COVID-19 tanılı hastalarda hemşirelik bakımı. *Ege Klin Tıp Derg.* 2020;58(1):35-40. [Crossref]