医学と生物学 (Medicine and Biology) Vol. 165 (4): i4_Oe01, 2025

[原著]

Personal factors influencing outpatient nurses' care environment in online medical treatment:
A cross-sectional survey of hospitals with 200 or more beds

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Summary

This study aimed to clarify the characteristics of personal factors related to outpatient nurses' care environment in online medical treatment. The survey was administered to 225 outpatient nurses working in hospitals with 200 or more beds. The primary outcomes were knowledge, attitude, and practice. Additionally, the relationships between personal factors were examined. A $\chi 2$ test of independence was conducted for each item to compare classified personal factors between attributes. In total, 135 nurses were included in the analysis. Regarding "knowledge" about online medical treatment, 88 respondents (65.2%) knew about "online medical treatment," while more than half did not know about "telemedicine," "Recommendation for online medical examination," or "online medical treatment supporter". In the ideal "practice" setting, the availability of visual information through ICT resulted in more than half (50–70%) of the respondents choosing "with visual information" in response to the question. In "attitude" while using communication techniques via ICT, a significant difference was found in the percentage of the response "less than 3 years" of "years of experience in handling telephone consultations in outpatient departments" and many were unaware of it, indicating challenges to safe communication. To promote safe online medical treatment in the future, it is important for outpatient nurses in all medical institutions to understand the advantages of online medical treatment and expand education on "attitude" including "knowledge" about both online medical treatment and communication skills via ICT.

Keywords: Online medical treatment, Outpatient nurses, Recommendation for online medical examination, Telemedicine

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2025 年 1 月 30 日受付
2025 年 8 月 2 日受理

1. Introduction

1.1 Research background

Telemedicine is a general term for actions related to health promotion and medical care that utilize information and communication technologies (ICT) (Ministry of Health, Labour and Welfare of Japan 2018a). Within telemedicine, online medical treatment refers to the practice where a physician examines and diagnoses a patient using ICT, and performs medical actions such as communicating diagnostic results and prescriptions in real-time (Ministry of Health, Labour and Welfare of Japan 2018a). Furthermore, online medical consultation involves real-time recommendation to a medical institution, such as selecting an appropriate department based on the collection of symptom complaints and medical interviews (Ministry of Health, Labour and Welfare of Japan 2018a). In addition, improving access to online medical treatment and patient satisfaction requires timely responses to patient inquiries (Darley et al. 2022). Therefore, for online medical treatment, where physicians evaluate patients, developing multidisciplinary collaboration is critical to safely proceed with online medical treatment.

Similar to face-to-face care, there are two types of care environments for outpatient nurses in online medical treatment: regular medical assistance and consultations via telephone without waiting for a regular consultation. Mainly, outpatient nurses and other medical staff are connected to outpatients in the system, and physicians conduct both routine and online medical treatment. On the other hand, if there is a change in the patient outside of the scheduled visit, the physician proposes an online consultation and performs it at the patient's request, including a status check (Ministry of Health, Labour and Welfare of Japan 2023; Ministry of Health, Labour and Welfare of Japan 2024).

According to previous studies, it has been reported that the use of ICT facilitates eye contact and provides the same interaction as face-to-face communication, although the amount of information is not as large as in face-to-face communication (Randine et al. 2022). The advantages include an improved sense of security for caregivers and patients, reducing unnecessary visits to medical institutions, and the ability to support self-decision making (Bohannon et al. 2013). It has also been reported that the characteristics of involvement using ICTs include less use of empathic, supportive, and facilitative statements (Liu et al. 2007), less information exchange, and fewer presenting problems (Hammersley et al. 2019) compared to face-to-face encounters. Improvements needed for telemedicine services include an understanding of the challenges of communication technology and strategies to build better relationships between caregivers and health care providers.

Based on the above, in the outpatient nurses' care environment of online medical treatment, outpatient nurses are not only connected to the system but also provide important care by reducing the anxiety of patients, determining the level of care, and reporting to physicians. Therefore, outpatient nurses need to understand telemedicine using ICT. It is necessary to support self-determination for caregivers and patients who choose online medical treatment. In the future, the demand for online medical services in combination with face-to-face medical services is expected to increase further.

The role of the outpatient nurse is to support patient care and safety (Ministry of Health, Labour and Welfare of Japan 2024) in online medical treatment as well as face-to-face care. Hereafter, the development of human resources capable of taking on role-playing actions is a prominent issue, and each needs to increase his or her proficiency as a professional. Hence, we considered it important to understand key information for selecting strategies to strengthen individual role behavior and focused on the three key phases: (1) acquiring accurate knowledge of the role, (2) demonstrating a positive attitude and acceptance of role behavior, and (3) executing role-related actions. On the other hand, there are no reports that fully investigate the knowledge of outpatient nurses working in medical institutions regarding online medical treatment, their attitude toward ICT, and specific practices using ICT. Therefore, the purpose of this study was to clarify the characteristics of personal factors related to the care environment of outpatient nurses in online medical treatment. This will provide insights needed to create an environment that allows medical staff to adapt to online medical treatment.

1.2. Definition of terms

In this study, knowledge, attitude, and practice were defined with specific operational definitions. Knowledge was defined as understanding of the medical treatment, systems, and terminology associated with online medical treatment, as well as the ability to judge known facts with and without awareness. Attitude toward online medical treatment was defined as the impression of mindfulness and approach through the screen, as expressed in the table. Practice was defined as the act of care provided to the subject.

2. Materials and Methods

2.1. Study design

This observational cross-sectional study was conducted using an anonymous, self-administered questionnaire at a specific point in time.

2.2. Participants

The participants were outpatient nurses responsible for handling telephone consultations from hospital outpatients (excluding single emergency/ psychiatry hospitals) with 200 or more beds, including both general beds and long-term care beds. The emergency department and psychiatry were excluded because of their limited scope of involvement.

2.3. Research method

2.3.1. Recruitment and data collection

The survey was conducted between November 2022 and December 2022. The purpose of the survey was explained to the hospital director and the office of the director of nursing at each medical institution eligible for participation, and their cooperation in the survey was requested. The respondents were asked to reply whether they would be willing to cooperate in the survey, via postcard. Questionnaires were distributed to 225 outpatient nurses through the hospital administrators of the participating facilities and were collected by the retention method. Consent for the research was obtained by confirming a mark in the consent column on the questionnaire. To return the questionnaire, participants were asked to place the completed questionnaire, answered anonymously, in the enclosed envelope, place it in a collection bag, and return it.

A search of medical institutions was

conducted using the list of members in each prefecture registered with the Japan Hospital Association (as of May 20, 2022). Out of the 1,173 facilities nationwide, 800 facilities were randomly selected. The functions COUNTA, RANDBETWEEN, and INDEX were used in Microsoft Excel to distribute the number of facilities proportionally to the number of facilities in each of the seven regional health bureaus and to randomly select the number of facilities by prefecture, by number of beds, and by order, according to the ratio of each stratum: Hokkaido 40 (5.0%), Tohoku 54 (6.8%), Kanto Shinetsu 276 (34.5%), Tokai-Hokuriku 109 (13.6%), Kinki 147 (18.4%), Chugoku-Shikoku 77 (9.6%), and Kyushu 97 (12.1%). We requested cooperation from 800 facilities, and consent was obtained from 29 facilities (3.6%).

2.3.2. Survey contents

(1) Basic attributes

Based on the previous study (Yokoi and Sato 2021), organizational attributes included 12 items such as local health department classification, regional characteristics, hospital type, number of beds, telephone response time, the introduction of online medical services, and training on online medical services. Individual attributes of outpatient nurses included 9 items such as employment type, gender, age, years of clinical experience, license (nurse / assistant nurse), basic education curriculum, years of experience in handling telephone consultation in outpatient department, whether they hold a position (chief nursing officer/ deputy chief nursing officer), whether they completed a course at an educational institution after license acquisition (educational institution for certification of nurses/graduate school (including specialization)).

(2) Characteristics of the care environment for outpatient nurses in online medical treatment.

1) “Knowledge” of online medical treatments:

The questionnaire on “knowledge” surveyed a total of five items regarding typical terminologies, including “telemedicine,” “online medical treatment,” “recommendation for online medical examination,” and “online medical treatment supporter,” based on the “Guidelines for Appropriate Implementation of Online Medical Treatment” (Ministry of Health, Labour and Welfare of Japan 2018b). There were two answers (I know/I do not know).

2) “Attitude” using communication techniques via ICT:

Ten representative questions were developed by referring to “Communication Techniques for Telenursing” (Telenursing Guidelines of JAHC 2021) and making some modifications so as not to spoil the original context. Because the telenursing guidelines are aimed at facilitating the relationship between the user and communication, it is possible to survey nurses at medical institutions, and it is unlikely that the care environment sought by outpatient nurses will differ depending on the location of delivery. Four medical researchers who frequently use online conferencing discussed the communication needs of nurses when they are connected to outpatients on the telemedicine system in terms of the following aspects.

f) Greetings, self-introductions, and

identification:

First, the outpatient care nurse must greet the other party and introduce themselves to set them at ease. Then they must explain how the telephone consultation will proceed and confirm whether the person in front of the screen is the individual seeking consultation through their insurance card.

g) Speaking slowly, clearly, and plainly:

Nurses must ask questions and speak slowly and in clear and plain language; with the elderly, the lowest tones possible must be maintained. Important matters must be confirmed by repeating them several times.

h) Noting the overlap of conversation:

When both parties talk at the same time, conversation often overlaps, and the audio is not transmitted. Therefore, it is necessary to wait for one's turn and talk only after the other party has finished talking.

i) Progressing general questions and then transitioning to focused questions:

Nurses must ask general questions followed by focused questions. Based on the initial information vocalized by the individual seeking consultation, nurses must identify the real issue by digging deeper, while considering what the individual has not said yet.

j) Maintaining an empathetic attitude:

Empathy is the ability to listen, accept, and share emotions and feelings. It is necessary to maintain an empathetic attitude during the interactions so that patients feel that their existence is recognized.

k) Using delay techniques:

To ensure that the patient can think for oneself, it is important to give them time to make judgments or decisions slowly, rather than hastily. This technique must be employed according to the situation.

l) Utilizing nonverbal communication:

Nurses must utilize nonverbal communication by incorporating gestures, facial expressions, and nods, while encouraging verbal communication.

m) Making slow and large movements:

Slow and large movements are necessary because small movements, gestures, and nods make it difficult to fully convey the message to the other party through the screen.

n) Observing conversation, facial expressions, behavior, and actions:

In addition to verbal communication, nonverbal information, such as facial expressions, emotions, and movements over the screen should be observed.

o) Preparing for communication failure:

Assuming that the audio may be cut out suddenly, nurses must consider means to achieve minimal communication, such as "yes/no" and "○/×".

The survey participants were asked to respond by selecting one of the following options: always aware, somewhat aware, not very aware, or not at all aware. To evaluate the presence or absence of awareness, the responses were classified into two values. The responses that selected either "always aware" or

"somewhat aware" were classified as "aware" = 1, and those that selected "not very aware" or "not aware at all" were classified as "not aware" = 0.

3) Ideal "practice":

The vignette survey (Rossi et al. 1974) examines the respondents' attitudes, opinions, and normative judgments toward specific persons or situations. It also assesses the conscious and behavioral responses of outpatient nurses when encountering a hypothetical scenario depicted in an illustration called a vignette. The fictitious characters and situations in the vignettes were described in four scenes simulating a telephone consultation. It has been reported that the telephone can be a useful tool in outpatient settings when the patient is receiving ongoing treatment, such as consultation and guidance for patients and their families, management of medical supplies at home, and where confirmation regarding treatment is needed after the consultation (Yokoi and Sato 2021). In some cases, depending on technical, patient-wise, or clinical factors, being prepared to switch from telephone to online medical treatment or face-to-face consultations is also necessary. Therefore, we presented vignettes of situations in which "visual information" was needed that could not be obtained over the phone, such as "Confirmation of how medical supplies should be managed at home," "Situations in which symptoms could not be understood over the phone based on the information provided by family members," and "Situations in which symptoms are expressed in different ways." For all four scenes (Scenes 1–4), each vignette was shown at home and at the time of hospital visit to facilitate recall by the survey participants. It has been standardized in all situations where online medical treatment is feasible. Additionally, I confirmed that it is not included in the list of "Symptoms unsuitable for initial online medical treatment" for patients and reservation receptionists (Japanese Medical Science Federation 2022). Conventionally, the only option would be to encourage outpatient treatment and direct them to the after-hours emergency room.

In the case of "with visual information," the survey participants were asked to choose their response from the following four options: recommend emergency room visit, ask the patient to come to the hospital for confirmation because he/she is not seen directly, confirmed by an outpatient nurse from visual information using ICT (and then reporting to the physician), and report the urgent information to the doctor and the doctor confirms the information based on visual information using ICT. To evaluate the situation using visual information from ICT, the situation was classified into two values. The answers for either "1. Recommend emergency room visit" or "2. Ask the patient to come to the hospital for confirmation because he/she is not seen directly" were "no visual information" = 0, while the answers to either "3. Confirmed by an outpatient nurse from visual information using ICT (and then reporting to the physician)" or "4. Confirmed by a physician from visual information using ICT after the outpatient nurse reports information on perceived urgency" were "with visual information" using ICT = 1.

Scene 1: "Confirmation of how medical

supplies should be managed at home"

Home: A man receiving chemotherapy as an outpatient went home with a post-treatment infusion using an infuser pump. Not knowing whether it was still dripping or had stopped, he decided to call the outpatient nurse for advice.

Visit to the hospital: The infusion was dripping slowly. No pain or swelling was seen at the IV point.

Scene 2: "Confirmation of how medical supplies should be managed at home"

Home: An elderly man was sent home after inserting an indwelling bladder catheter. His wife called the outpatient nurse for advice about the blood in his urine. The outpatient nurse determined that it was hematuria and told him to come to the outpatient department.

Visit to the hospital: No gross hematuria was observed from the urine bag. However, there was blood on the inserted catheter.

Scene 3: "Situations in which symptoms could not be explained clearly by family members over the phone"

Home: The call was made by the wife of a man who had a history of cholecystitis according to his medical records from his family hospital. The outpatient nurse asked about appetite and fever, and the wife responds that he has no fever and his appetite is normal. The patient is sleeping and skin yellowing appears.

Emergency room after-hours: The man was seen after hours at night and admitted to the hospital. Jaundice was present.

Scene 4: "Situations in which symptoms are expressed in different ways"

Home: A mother called the outpatient burse because her one-year-old child had a fever. The child was more limp than usual but seemed to be crying cheerfully. The mother requested to be seen at her family hospital, and the physician approved her request because he could see the child if he had a vacant examination room.

Visit to the hospital: All examination rooms were in use upon arrival.

2.3.3. Analysis methods

Descriptive statistics were calculated for facility status and subject attributes. Descriptive statistics for each question were calculated to determine the actual care environment in the participants' online medical practice. A priori sample size calculations were made using G*power 3.1.9.7 (Faul et al. 2007). To obtain 80% power (1-beta) and a 5% significance level (alpha) and to detect a medium effect size (d) 0.3 (Cohen 1988), the minimum participant size was 108, and this calculation was based on the χ^2 test of independence for a 3×2 cross table, assuming a two-tailed test. Cross-tables were created to examine the relationship between each item and personal factors. After tabulation, the strength of the association between the variables in the two and three groups was tested using the Phi coefficient and Cramer's V, respectively. When cells with an expected frequency of less than 5 were present in more than 20% of all cells in the contingency table, Fisher's exact test and Bonferroni methods were used. In addition, when significant differences were found, a residual analysis was performed to determine which cells were different. Residual analysis results were considered significant at the 5% level if the absolute value of the adjusted residuals is greater than or equal to the 5% standard normal deviation value of 1.96. In this study, we decided to focus on cells with an absolute value of adjusted residuals greater than 1.96. Data analysis was performed using

Table 1. Overview of participating facilities and participants

		Facilities (n=29)		Outpatient nurse (n=135)	
		n	%	n	%
Regional Bureau of Health and Welfare classification (jurisdictional area)	Hokkaido	1	3.4	7	5.2
	Tohoku	3	10.3	8	5.9
	Kanto-Shinetsu	4	13.8	14	10.4
	Tokai-Hokuriku	9	31.0	41	30.4
	Kinki	3	10.3	11	8.1
	Chugoku-Shikoku	4	13.8	27	20.0
	Kyushu (Okinawa)	5	17.2	27	20.0
Regional characteristics	Plain (including basins)	10	34.5	38	28.1
	Remote island area	2	6.9	12	8.9
	Mountainous area (including mountains)	3	10.3	27	20
	Urban area	12	41.4	43	31.9
	Coastal area (including coasts and islands connected by bridges)	2	6.9	15	11.1
Hospital type	Advanced treatment hospital	1	3.4	2	1.5
	Regional medical care support hospital	19	65.5	70	51.9
	Acute general hospital	7	24.1	51	37.8
	Social medical corporation	2	6.9	12	8.9
Number of hospital beds	200–299 beds	5	17.2	42	31.1
	300–400 beds	12	41.4	53	39.3
	400–500 beds	3	10.3	11	8.1
	500 beds or more	9	31.0	29	21.5
Presence or absence of announcement of telephone support in outpatient departments	Main telephone	23	79.3	128	94.8
	Main telephone and direct line to the department	6	20.7	1	0.7
	Direct line to the department	0	0.0	6	4.4
Occupation of the first staff transferring the main telephone	Telephone operator	27	93.1	121	89.6
	Administrative staff other than telephone operator	2	6.9	13	9.6
	Department clerk	0	0.0	1	0.7
Qualification requirements of outpatient nurses handling telephone calls	No qualification set	27	93.1	129	95.6
	Years of experience (years or more)	0	0.0	4	3
	Certified nurse	0	0.0	1	0.7
	With position	0	0.0	1	0.7
	Others (positions held in various departments, certified nurse, years of experience in each department)	2	6.9	0	0.0
Telephone support hours	both morning and afternoon / day	28	96.6	129	95.6
	only fixed hours in the morning/afternoon / day	1	3.4	6	4.4
Presence or absence of medical record electronicization	Yes	29	100	135	100
	No	0	0.0	0	0.0
Introduction of online medical treatment	Yes (COVID-19-positive patient response†, epilepsy center, Second opinion)	9	31.0	20	14.8
	No	20	69.0	115	85.2
Introduction of recommendation for online medical examination	Yes (ICD implantation)	4	13.8	8	5.9
	No	25	86.2	127	94.1
Training experience regarding online medical treatment	Yes (COVID-19-positive patient response, iPad)	2	6.8	3	2.2
	No	27	93.2	132	97.8

Hokkaido Regional Bureau of Health and Welfare: Hokkaido.
Tohoku Regional Bureau of Health and Welfare: Aomori Prefecture, Iwate Prefecture, Akita Prefecture, Yamagata Prefecture, Miyagi Prefecture, Fukushima Prefecture.
Kanto-Shinetsu Regional Bureau of Health and Welfare: Ibaraki Prefecture, Tochigi Prefecture, Gunma Prefecture, Saitama Prefecture, Chiba Prefecture, Nagano Prefecture, Tokyo Metropolitan, Kanagawa Prefecture, Niigata Prefecture, Yamanashi Prefecture,
Tokai-Hokuriku Regional Bureau of Health and Welfare: Toyama Prefecture, Ishikawa Prefecture, Gifu Prefecture, Shizuoka Prefecture, Aichi Prefecture, Mie Prefecture.
Kinki Regional Bureau of Health and Welfare: Fukui Prefecture, Shiga Prefecture, Kyoto Prefecture, Osaka Prefecture, Hyogo Prefecture, Nara Prefecture, Wakayama Prefecture.
Chugoku-Shikoku Regional Bureau of Health and Welfare: Tottori Prefecture, Shimane Prefecture, Okayama Prefecture, Hiroshima Prefecture, Yamaguchi Prefecture, Tokushima Prefecture, Kagawa Prefecture, Ehime Prefecture, Kochi Prefecture.
†: Line, FaceTime, iPad

IBM SPSS Statistics for Windows, version 29.0.2.0: IBM Corp, with a statistical significance level set at $p < 0.05$.

2.4. Ethical considerations

The study was conducted following the review and approval of the Ethics Review Committee for Medical Research at Gifu University Graduate School of Medicine and with the permission of the research institutions (2022-088).

3. Results

Of the 178 copies collected (79.1% collection rate), 135 copies that received valid responses were included in the analysis (75.8% valid response rate).

3.1. Overview of target audience

Many of the participating facilities did not have a dedicated telephone number for telephone consultation but instead used the facility's representative telephone number as the contact person. The first person answering the phone was often a telephone operator, and other responders included clerical workers other than telephone operators. Often, no set qualifications were required for outpatient nurses who responded to telephone inquiries via the telephone operator (93.1%), followed by years of experience, positions held in various departments, and certified nurses (Table 1).

Nine facilities (31.0%) have introduced online medical treatment, including the treatment of coronavirus-positive patients using tablet-type information terminals, epilepsy centers, and second opinions. Four facilities (13.8%) introduced recommendations for online medical examinations for patients with ICD implants. Three outpatient nurses (2.2%) from two facilities (6.8%) had training experience in online medical treatment, indicating that most had not received training in online medical treatment. This was due to the use of tablet-type information terminals when dealing with coronavirus-positive patients (Table 1).

Regarding the participants' employment status, most of them were full-time. The most common age group was 40 years or above, and 122 patients (90.4%) had 11 years or more of clinical experience. Twenty-three (17.1%) had more than 11 years of experience in handling telephone consultations in the outpatient setting, 62 (45.9%) held a position, and 20 (14.8%) were ambulatory nurses from accredited nursing educational institutions or graduate schools (including specialty) (Table 2).

3.2. Characteristics of outpatient nurse care environment in online medical treatment

3.2.1. "Knowledge" of online medical treatments (Table 2)

The outpatient nurses surveyed in this study were gave responses indicating their awareness of "online medical treatment" among the typical terms (65.2%). More than half of the outpatient nurses reported not knowing about "telemedicine," what is "recommendation for online medical examination," regarding "recommendation for online medical examination," and "online medical treatment supporter".

After tabulating the number of respondents for each item and attributes, the results of the χ^2 test showed significant differences between "telemedicine" and "age," "years of experience in handling outpatient telephone consultations," and "job position" ($\chi^2(1) = 4.699$, $^*p < 0.05$, $\varphi = -0.187$; $\chi^2(2) = 6.016$, $^*p < 0.05$, $V = 0.211$; and $\chi^2(1) = 7.798$, $^{**}p < 0.01$, $\varphi = -0.240$, respectively). In particular, "online medical treatment" and "age" were significantly different ($\chi^2(1) = 9.970$, ** $p < 0.01$, $\varphi = -0.272$). In other words, more respondents in the "40 years or above" age group knew about "telemedicine" and "online medical treatment," while fewer respondents in the "20–39 years" age group knew about these aspects. To examine which cell contributed to this advantage in "years of experience in handling outpatient telephone consultations," a residual analysis was conducted, and a significant difference was found in the responses of the "less than 3 years" group (adjusted residue: dij = *2.3*), indicating that more respondents did not know about "telemedicine." The "with job position" group was more likely to know about "telemedicine."

3.2.2. "Attitude" using communication techniques via ICT (Table 3)

More than 90% of the outpatient nurses who participated in this study responded that they were aware of the four items "Progressing general questions and then transitioning to focused questions," "Maintaining an empathetic attitude," "Using delay techniques," and "Observing conversation, facial expressions, behaviors, and actions." The least recorded response was "Preparing for communication failure" (74.8%).

The χ^2 test of the number of

Table 2. Related to basic attributes of participants and "knowledge" of online medical treatment **n=135**

			What is "telemedicine", (a)			What is "online medical treatment", (b)			What is "Recommendation for online medical examination", (c)			Regarding "Recommendation for online medical examination", (d)			What is "online medical treatment supporter", (e)		
			I know	I do not know	p	I know	I do not know	p	I know	I do not know	p	I know	I do not know	p	I know	I do not know	p
	n	%	n	n		n	n		n	n		n	n		n	n	
Total	135	100	63	72 (53.3%)		88	47 (34.8%)		48	87 (64.4%)		42	93 (68.9%)		29	106 (78.5%)	
Employment type †																	
Full-time	126	93.3	61	65	n.s.	84	42	n.s.	44	82	n.s.	39	87	n.s.	28	98	n.s.
Part-time	9	6.7	2	7		4	5		4	5		3	6		1	8	
Gender †																	
Male	7	5.2	1	6	n.s.	3	4	n.s.	3	4	n.s.	2	5	n.s.	28	98	n.s.
Female	128	94.8	28	100		85	43		60	68		40	88		1	8	
Age †																	
20–39 years	33	24.4	10	23	*	14	19	**	8	25	n.s.	7	26	n.s.	5	28	n.s.
40 years or above	102	75.6	53	49		74	28		40	62		35	67		24	78	
Years of clinical experience †																	
Less than 10 years	13	9.6	5	8	n.s.	7	6	n.s.	4	9	n.s.	3	10	n.s.	4	9	n.s.
11 years or more	122	90.4	58	64		81	41		44	78		39	83		25	97	
License †																	
Nurse	134	99.3	62	72	n.s.	87	47	n.s.	47	87	n.s.	41	93	n.s.	28	106	n.s.
Assistant nurse	1	0.7	1	0		1	0		1	0		1	0		1	0	
Basic education curriculum †																	
Vocational school	112	83.0	50	62	n.s.	73	39	n.s.	43	69	n.s.	38	74	n.s.	27	85	n.s.
Junior college / 4-year college	23	17.0	13	10		15	8		5	18		4	19		2	21	
Years of experience in handling telephone consultations in outpatient departments ‡																	
Less than 3 years	41	30.4	13	28		21	20		12	29		10	31		7	34	
3–10 years	71	52.6	36	35	*	51	20	n.s.	25	46	n.s.	22	49	n.s.	15	56	n.s.
11 years or more	23	17.0	14	9		16	7		11	12		10	13		7	16	
Position †																	
Yes	62	45.9	37	25	**	45	17	n.s.	24	38	n.s.	23	39	n.s.	16	46	n.s.
No	73	54.1	26	47		43	30		24	49		19	54		13	60	
Educational institution completed after license acquisition †																	
Educational institution for certification of nurses /graduate school (including specialization)	20	14.8	10	10	n.s.	16	4	n.s.	8	12	n.s.	7	13	n.s.	4	16	n.s.
No	115	85.2	53	62		72	43		40	75		35	80		25	90	

Between-group comparison: χ^2 test of independence was conducted. † Fisher's exact test, ‡ Bonferroni methods. ***p < 0.001, **p < 0.01, *p < 0.05, n.s.: not significant

(a) the "acts related to health promotion and medical care utilizing information and communication devices".

(b) "A part of telemedicine involving a doctor-patient setting where a doctor examines and diagnoses a patient, communicates diagnostic results, and prescribes treatment in real time through information and communication devices"

(c) "A part of telemedicine involving a doctor-patient setting where a doctor examines the patient and recommends medical attention in real time through information and communication devices"

(d) "Recommendation of medical consultation with the minimum medical judgement necessary for the individual patient's physical and mental condition, based on the collection of relevant information from patients such as complaints of symptoms and medical interviews, to determine the suspected disease, list the names of the diseases, select the appropriate department to be consulted, etc."

(e) "Those who assist in smooth communication in the doctor-patient setting, including explaining how to do so, if the patient is not accustomed to using information and communication devices"

Table 3. Related to basic attributes of participants and "attitude" using communication techniques via ICT n=135

			f) Greetings, self-introductions, and identification:			g) Speaking slowly, clearly and plainly:			h) Noting the overlap of conversation:			i) Progressing general questions and then transitioning to focused questions:			j) Maintaining an empathetic attitude:			k) Using delay techniques:			l) Utilizing nonverbal communication:			m) Making slow and large movements:			n) Observing conversation, facial expressions, behavior, and actions:			o) Preparing for communication failures:		
			unaware	aware	p	unaware	aware	p	unaware	aware	p	unaware	aware	p	unaware	aware	p	unaware	aware	p	unaware	aware	p	unaware	aware	p	unaware	aware	p	unaware	aware	p
	n	%	n	n		n	n		n	n		n	n		n	n		n	n		n	n		n	n		n	n		n	n	
Total	135	100	16	119 (88.1%)		15	120 (86.9%)		16	119 (88.1%)		13	122 (90.4%)		8	127 (94.1%)		18	117 (94.1%)		15	120 (88.9%)		26	109 (80.7%)		13	122 (90.4%)		34	101 (74.8%)	
Employment type †																																	
Full-time	126	93	16	110	n.s.	14	112	n.s.	16	110	n.s.	13	113	n.s.	7	119	n.s.	17	109	n.s.	14	112	n.s.	25	101	n.s.	12	114	n.s.	33	93	n.s.
Part-time	9	6.7	0	9		1	8		0	9		0	9		1	8		1	8		1	8		1	8		1	8		1	8	
Gender †																																	
Male	7	5.2	0	7	n.s.	0	7	n.s.	0	7	n.s.	0	7	n.s.	0	7	n.s.	2	5	n.s.	0	7	n.s.	2	5	n.s.	1	6	n.s.	1	6	n.s.
Female	128	95	16	112		15	113		16	112		13	115		8	120		16	112		15	113		24	104		12	116		33	95	
Age †																																	
20–39 years	33	24.4	7	26	n.s.	7	26	n.s.	5	28	n.s.	5	28	n.s.	2	31	n.s.	6	27	n.s.	6	27	n.s.	7	26	n.s.	4	29	n.s.	11	22	n.s.
40 years or above	102	75.6	9	93		8	94		11	91		8	94		6	96		12	90		9	93		19	83		9	93		23	79	
Years of clinical experience †																																	
Less than 10 years	13	9.6	4	9	*	2	11	n.s.	2	11	n.s.	1	12	n.s.	0	13	n.s.	0	13	n.s.	1	12	n.s.	1	12	n.s.	1	12	n.s.	2	11	n.s.
11 years or more	122	90.4	12	110		13	109		14	108		12	110		8	114		18	104		14	108		25	97		12	110		32	90	
License †																																	
Nurse	134	99.3	16	118	n.s.	15	119	n.s.	16	118	n.s.	13	121	n.s.	8	126	n.s.	18	116	n.s.	15	119	n.s.	26	108	n.s.	13	121	n.s.	34	100	n.s.
Assistant nurse	1	0.7	0	1		0	1		0	1		0	1		0	1		0	1		0	1		0	1		0	1		0	1	
Basic education curriculum †																																	
Vocational school	112	83.0	12	100	n.s.	13	99	n.s.	14	98	n.s.	10	102	n.s.	6	106	n.s.	14	98	n.s.	11	101	n.s.	18	94	n.s.	9	103	n.s.	26	86	n.s.
Junior college / 4-year college	23	17.0	4	19		2	21		2	21		3	20		2	21		4	19		4	19		8	15		4	19		8	15	
Years of experience in handling telephone consultations in outpatient departments ‡																																	
Less than 3 years	41	30.4	7	34		10	31		10	31		7	34		4	37		9	32		6	35		13	28		8	33		19	22	
3–10 years	71	52.6	8	63	n.s.	5	66	**	6	65	**	6	65	n.s.	4	67	n.s.	8	63	n.s.	7	64	n.s.	12	59	*	5	66	*	13	58	***
11 years or more	23	17.0	1	22		0	23		0	23		0	23		0	23		1	22		2	21		1	22		0	23		2	21	
Position †																																	
Yes	62	45.9	6	56	n.s.	5	57	n.s.	7	55	n.s.	3	59	n.s.	2	60	n.s.	6	56	n.s.	7	55	n.s.	11	51	n.s.	5	57	n.s.	14	48	n.s.
No	73	54.1	10	63		10	63		9	64		10	63		6	67		12	61		8	65		15	58		8	65		20	53	
Educational institution completed after license acquisition †																																	
Educational institution for certification of nurses /graduate school (including specialization)	20	14.8	1	19	n.s.	3	17	n.s.	2	18	n.s.	2	18	n.s.	1	19	n.s.	1	19	n.s.	2	18	n.s.	4	16	n.s.	3	17	n.s.	7	13	n.s.
No	115	85.2	15	100		12	103		14	101		11	104		7	108		17	98		13	102		22	93		10	105		27	88	

Between-group comparison: χ^2 test of independence was conducted. † Fisher's exact test, ‡ Bonferroni methods. ***p < 0.001, **p < 0.01, *p < 0.05, n.s.: not significant

The responses consisted of four choices: always aware, somewhat aware, not very aware, and not aware at all.

Responses "always aware" and "somewhat aware" are classified as "aware" = 1, and responses "not very aware" and "not aware at all" are classified as "unaware" = 0.

Table 4. Related to basic attributes of participants and ideal practice "attitude" n=135

			Ideal practice											
			Scene 1			Scene 2			Scene 3			Scene 4		
			Visual information			Visual information			Visual information			Visual information		
			Without	With	p	Without	With	p	Without	With	p	Without	With	p
	n	%	n	n		n	n		n	n		n	n	
Total	135	100	29	106 (78.5%)		46	89 (65.9%)		66	69 (51.1%)		58	77 (57.0%)	
Employment type †														
Full-time	126	93	29	97	n.s.	43	83	n.s.	62	64	n.s.	53	73	n.s.
Part-time	9	6.7	0	9		3	6		4	5		5	4	
Gender †														
Male	7	5.2	2	5	n.s.	2	5	n.s.	4	3	n.s.	3	4	n.s.
Female	128	95	27	101		44	84		62	66		55	73	
Age †														
20–39 years	33	24.4	10	23	n.s.	14	19	n.s.	21	12	n.s.	15	18	n.s.
40 years or above	102	75.6	19	83		32	70		45	57		43	59	
Years of clinical experience †														
Less than 10 years	13	9.6	2	11	n.s.	6	7	n.s.	9	4	n.s.	5	8	n.s.
11 years or more	122	90.4	27	95		40	82		57	65		53	69	
License †														
Nurse	134	99.3	29	105	n.s.	45	89	n.s.	65	69	n.s.	58	76	n.s.
Assistant nurse	1	0.7	0	1		1	0		1	0		0	1	
Basic education curriculum †														
Vocational school	112	83.0	24	88	n.s.	37	75	n.s.	54	58	n.s.	48	64	n.s.
Junior college / 4-year college	23	17.0	5	18		9	14		12	11		10	13	
Years of experience in handling telephone consultations in outpatient departments ‡														
Less than 3 years	41	30.4	7	34		14	27		22	19		16	25	
3–10 years	71	52.6	19	52	n.s.	25	46	n.s.	35	36	n.s.	31	40	n.s.
11 years or more	23	17.0	3	20		7	16		9	14		11	12	
Position †														
Yes	62	45.9	9	53	n.s.	12	50	**	27	35	n.s.	22	40	n.s.
No	73	54.1	20	53		34	39		39	34		36	37	
Educational institution completed after license acquisition †														
Educational institution for certification of nurses /graduate school (including specialization)	20	14.8	4	16	n.s.	5	15	n.s.	8	12	n.s.	9	11	n.s.
No	115	85.2	25	90		41	74		58	57		49	66	

Between-group comparison: χ^2 test of independence was conducted. † Fisher's exact test, ‡ Bonferroni methods. ***p < 0.001, **p < 0.01, *p < 0.05, n.s.: not significant
The answer to either "1. Recommend emergency room visit"" or "2. Ask the patient to come to the hospital for confirmation because he/she is not seen directly" were "no visual information" = The answer to either "3. Confirmed by an outpatient nurse from visual information using ICT (and then reporting to the physician)" or "4. Confirmed by a physician from visual information using ICT after the outpatient nurse reports information on perceived urgency" is "with visual information" using ICT = 1.

respondents for each item and attributes showed a significant difference between "Greetings, self-introductions, and identification," and "years of clinical experience" ($\chi^2(1) = 4.928$, * $p < 0.05$, $\varphi = -0.191$), indicating that the "11 years or more" group was more likely to be aware of "Greetings, self-introductions, and identification." Furthermore, "years of experience in handling outpatient telephone consultations" was significantly biased in terms of the number of respondents in the items "Speaking slowly, clearly, and plainly," "Noting the overlap of conversation," "Making slow and large movements," "Observing conversation, facial expressions, behavior, and actions," and "Preparing for communication failure" ($\chi^2(2) = 11.385$, **$p < 0.01$, $V = 0.290$; $\chi^2(2) = 10.048$, **$p < 0.01$, $V = 0.273$; $\chi^2(2) = 7.628$, *$p < 0.05$, $V = 0.238$; $\chi^2(2) = 7.598$, *$p < 0.05$, $V = 0.237$; and $\chi^2(2) = 14.840$, ***$p < 0.001$, $V = 0.332$, respectively). Residual analysis revealed significant differences in the percentage of responses from the "less than 3 years" group in all five items (adjusted residuals: dij = 3.2, dij = 3.0, dij = 2.4, dij = 2.6, and dij = 3.7, respectively), indicating that many respondents in "less than 3 years" group were aware of these five items. Moreover, significant differences were found in the percentage of responses from the "11 years or more" group regarding "Making slow and large movements" and "Preparing for communication failure" (adjusted residuals: dij = 2.0, respectively).

3.2.3. Ideal "practice" (Table 4)

Of the outpatient nurses who participated in this study, 50–70% of the

respondents selected “3. Confirmed by an outpatient nurse from visual information using ICT (and then reporting to the physician)” and “4. Confirmed by a physician from visual information using ICT after the nurse reports information on perceived urgency” in situations where visual information can be obtained using ICT. This finding indicates the availability of visual information on the online system. In particular, in Scene 1 and Scene 2, which are consultation scenes regarding medical supplies, many respondents chose to have visual information (78.5% and 65.9%, respectively). In Scene 3 and Scene 4, which include consultation scenes regarding symptoms, about half of the respondents selected “with visual information” (51.1% and 57.0%, respectively).

The χ^2 test of the number of respondents for each item and attributes showed a significant difference between “Scene 2” and “job position” ($\chi^2(1) = 11.058$, $^{**}p < 0.01$, $\varphi = -0.286$), indicating that the “with job position” group was more likely to select “with visual information using ICT.”

4. Discussion

To minimize research bias, this survey was conducted at facilities nationwide, and the results were obtained with the judgment and consent of the participants, which, to a small extent, clarifies the current situation. The following describes the characteristics of each of several aspects of personal factors related to the environment of care for outpatient nurses and the potential future practices that were considered.

4.1.1. Aspect of “knowledge” regarding online medical treatment

The outpatient nurses who participated in this study were the most likely to respond “I know” about “what online medical treatment is” in the five “knowledge” items regarding online medical treatment (65.2%). Outpatient nurses need to understand telemedicine using ICT to support the decision-making of patients regarding access to medical treatment; it is considered a necessary care that supports self-determination for patients and caregivers who choose online treatment. However, more than half of the outpatient nurses answered that they did not know about “telemedicine,” what is “recommendation for online medical examination,” regarding “recommendation for online medical examination,” and “online medical treatment supporter.” This indicates that outpatient nurses “Assisting in medical treatment,” as stipulated in the Act on Public Health Nurses, Midwives, and Nurses (e-GOV n.d.), are aware that online medical treatment is performed between physicians and patients, but their awareness of situations that require consensus building and role-sharing with multiple professions, such as setting up the care environment for online medical treatment, varies. As age increased, the proportion of respondents who knew about “telemedicine” and “online medical treatment” was significantly higher for “40 years or above” than for “20–39 years old.”

Further, outpatient nurses with “less than 3 years” of experience in handling telephone consultations in outpatient departments were considered to be less knowledgeable about “telemedicine.” In contrast, significantly more outpatient nurses “with positions” were aware about “telemedicine” than those “without position.”

In other words, many nurses with “11 years or more” of experience in handling

telephone consultations in outpatient departments and nurses “with position” are knowledgeable. This tendency to be significantly higher with higher positions has been reported because adaptability to changes, such as advancements in medical care, progress in nursing theories, and career awareness, also influence autonomy (Kikuchi 1999). It is considered that these nurses understand the concept of telemedicine, positively recognize its influence, and are ready for its implementation.

4.1.2. Aspect of “Attitude” using communication techniques via ICT

The outpatient nurses who participated in the study were aware of “Progressing general questions and then transitioning to focused questions,” “Maintaining an empathetic attitude,” “Using delay techniques,” and “Observing conversation, facial expressions, behavior, and actions” in their communication techniques using ICT, and were conscious of communication to encourage patients to speak up and obtain information, even through the screen. In telemedicine service, there are communication technology issues such as communication becoming hampered when conversation overlaps or uncomfortable periods of silence are created due to the lapse of video or audio (Shaw et al. 2020), etc. However, respondents with “less than 3 years” of experience in handling outpatient telephone consultations were not aware of the following five items: “Speaking slowly, clearly, and plainly,” “Noting the overlap of conversation,” “Making slow and large movements,” “Observing conversation, facial expressions, behavior, and actions,” and “Preparing for communication failure.” On the other hand, respondents with “11 years or more” of experience were conscious of two items: “Making slow and large movements” and “Preparing for communication failure.” It was inferred that these respondents understood the challenges of communication technology and were actively aware of and prepared for its impact. Therefore, to promote safe online medical treatment, outpatient nurses with “less than 3 years” of experience must understand how to communicate effectively and smoothly through a screen. Measures to foster active communication are considered necessary (e.g., listening to the patient’s voice, encouraging conversation by incorporating gestures, facial expressions, nodding, etc., and simultaneously observing the patient).

4.1.3. Aspect of ideal “practice”

Many outpatient nurses (50–70%) who participated in this study answered “3. Confirmed by an outpatient nurse from visual information using ICT (and then reporting to the physician)” and “4. Confirmed by a physician from visual information using ICT after the nurse reports information on perceived urgency” in response to the ideal “practice” “with visual information.” The advantages of obtaining visual information in advance include confirming the availability of appropriate management methods or reporting health problems to the physician. During telephone consultations, professional services tailored to each patient's needs are typically provided. It is important to identify situations where emergency medical services are required, as opposed to regular outpatient services (Usui and Yamauchi 2019). In addition, considering the risk of patient movement and wait times, it is possible to consider patient safety, such as predicting the time of visit to the outpatient clinic and supporting the method of visiting the

outpatient clinic, and the smooth process after the visit may lead to tests, examination, and treatment. In ideal "practice," there was also a significant difference for nurses "with position" than for those "without position" in "with visual information". However, it specialized in Scene 2. In situations where unexpected problems arise for the patient, guidance on how to deal with the situation using timely and convenient telephone consultations, etc., by nurses and other professionals is needed' (Terashima et al. 2009). By selecting visual information to address problems related to medical materials, it is possible to add what is being seen visually to the explanation, which may be more likely to reassure patients and their families. It was inferred that outpatient nurses "with position" understand the benefits of online medical treatment, positively recognize its influence, and are ready for its implementation. Therefore, it is necessary to understand the benefits of online medical treatment, such as the ability to check on the patient's condition at home using visual information obtained through ICT, which makes it easier to compare the patient's complaints with the problems that the medical provider believes exist, and to report more clearly to the physician.

4.2. Limitations of this study and implications for future research

It should be noted that this study has some limitations. Due to the following reasons, namely, the fact that the survey was conducted during the COVID-19 pandemic and that some facilities did not provide online medical treatment initially, were busy dealing with COVID-19 cases, or refused to cooperate with the research, only 29 facilities participated in the survey. The number of respondents was very small, 135 participants, which made it difficult to conduct a necessary and adequate analysis. It is necessary to continue the survey in the future and improve the quality of the data to contribute to the spread of appropriate online medical treatment.

Conclusion

As a result of implementing an anonymous, self-administered questionnaire to 135 nurses in the outpatient department, the following aspects were identified.

Regarding "knowledge" about online medical treatment, more than half of the respondents did not know about "telemedicine," "recommendation for online medical examination," or "online medical treatment supporter," and 88 (65.2%) were most familiar with "online medical treatment".

Regarding the ideal "practice" setting, the addition of the availability of visual information through the use of ICT resulted in more than half (50–70%) of the respondents choosing "with visual information."

In addition, a significant difference was found in the percentage of respondents with "less than 3 years of experience in handling telephone consultations in outpatient departments" who were knowledgeable about "Speaking slowly, clearly, and plainly," "Noting the overlap of conversation," "Making slow and large movements," "Observing conversation, facial expressions, behavior, and actions," and "Preparing for communication failure" in terms of "attitude" using communication techniques via ICT, indicating that many were not aware of those. Thus, safe communication is a challenging aspect of telemedicine for this subset of respondents.

When promoting safe online medical

treatment, the issues surrounding "knowledge" about online medical treatment and communication skills via ICT must be considered and resolved. It is necessary to expand education focusing on both aspects, and to provide education and support for nurses, especially those with "less than 3 years" of experience in handling outpatient telephone consultations, to enhance the benefits of online medical treatment appropriately.

Conflicts of interest

The authors declare no conflicts of interest.

Acknowledgments

We express our heartfelt gratitude to everyone who has provided their cooperation in this study. We also thank Professor Yukiyoshi Tsukata of the Asahi University, for his cooperation in writing this report.

Funding

This study was conducted with the aid of the Gifu Shotoku University Faculty of Nursing (Donation) Research Grant and JSPS (24K14128).

Author contributions

Author 1 contributed to the study design, data collection and analysis, funding acquisition, project management, and writing. Author 2 and Author 4 contributed valuable suggestions for the entire research process and manuscript writing. Author 3 helped with statistical analysis.

Ethics statement

The Ethics Review Committee for Medical Research at Gifu University Graduate School of Medicine approved the study (2022-088).

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オンライン診療における外来看護師のケア環境に関連する個人的要因の特徴：200 床以上の病院を対象とした横断的調査

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要旨

本研究の目的は、オンライン診療における外来看護師のケア環境に関連する個人的要因の特徴について明らかにすることである。アンケート調査は、200 床以上の病院に勤務する外来看護師 225 名を対象に実施された。主要評価項目は、オンライン診療に関する知識・態度・実践の程度であり、さらに個人的要因との関連を調査した。各項目と個人的要因の割合を属性間で比較するため独立性の χ^2 検定を用いて分析した。分析の結果、参加者は 135 名を分析対象とした。オンライン診療に関する「知識」は，「オンライン診療」を知っている 88 名（65.2 %）が最も多く，半数以上が「遠隔医療」,「オンライン受診勧奨」,「オンライン診療支援者」については知らない結果だった。理想的な「実践」では, ICT を活用して視覚的情報を得ることができる状況を加えると, 半数以上（50～70%）が“視覚的な情報あり”を選択した。ICT を介したコミュニケーション技法による「態度」において,「外来における電話相談の対応経験年数」の「3 年未満」の割合に有意差が認められ，意識しないが多く，安全なコミュニケーションへの課題が示された。今後，オンライン診療を安全にすすめるためには，医療機関すべての外来看護師がオンライン診療の利点を理解し，オンライン診療に関する「知識」と ICT を介したコミュニケーション技術の両面を含めた「態度」に関する教育の拡充を図ることが重要となる。

キーワード: オンライン診療、外来看護師、オンライン受診勧奨、遠隔医療