



OPEN Survey on nurse-physician communication gaps focusing on diagnostic concerns and reasons for silence

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Diagnosis improvement requires physician-nurse collaboration. This study explored nurses' concerns regarding physicians' diagnoses and how they were communicated to physicians. This cross-sectional study, employing a web-based questionnaire, included nurses registered on Japan's largest online media site from June 26, 2023, to July 31, 2023. The survey inquired whether participants felt concerned about a physician's diagnosis within a month, if they communicated their concerns once they arose, and, if not, their reasons. The reasons for not being investigated were also examined. The nurses' frequency of feeling concerned about a physician's diagnosis and the barriers to communicating these concerns to the physician were evaluated. Overall, 430 nurses answered the survey (female, 349 [81.2%]; median age, 45 [35–51] years; median years of experience, 19 [12–25]). Of the nurses, 61.2% experienced concerns about a physician's diagnosis within the past month; 52.5% felt concerned but did not communicate this to the physician. The most common reasons for not communicating included concern about the physician's pride, being ignored when communicating, and the nurse not believing that a diagnosis should be made. Our results highlight the need to foster psychologically safe workplaces for nurses and create educational programs encouraging nurse involvement in diagnosis.

Keywords Physician, Nurse, Workplace safety

Diagnostic errors are pervasive, affecting all aspects of medical practice and 5% of patients, and patients may experience them at least once in their lifetime^{1,2}. Diagnostic errors are also the most common cause of medical malpractice lawsuits^{3,4}. Therefore, they are considered the most important issue to address regarding medical safety⁵. In particular, errors stemming from communication breakdowns carry a heightened risk of adverse outcomes and legal repercussions⁶. Recent emphasis has underscored the collective responsibility of physicians and medical teams in enhancing diagnostic accuracy^{7,8}.

Among medical staff, nurses are the most frequently involved with patients and play a crucial role in the diagnostic process⁹. Therefore, it is crucial to enhance nurses' diagnostic capabilities and involve them more to improve the diagnostic process. The involvement of nurses is important in preventing diagnostic errors^{5,10}.

Meanwhile, nurses tend to think that diagnosis is beyond their duties and are unwilling to get involved owing to the insecurity of knowledge¹¹. Further, physicians believe that diagnosis is the physician's responsibility⁸. There has long been a clear hierarchy between doctors and nurses worldwide. In particular, before 2002, female nurses were referred to as "kangofu" in a discriminatory way, and the term was widely used, so nursing was considered a woman's job in Japan¹². A male gender bias has predominated in Japan such that, even in the medical profession, there are very few female team leaders^{13,14}. However, while it could be expected that it would be difficult for

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nurses to actively engage with doctors in Japan about medical decision-making, no research has been conducted concerning this aspect.

Nurses have been facing obstacles in reporting medical errors in the United States, Australia, Iran, Korea, and elsewhere^{15–19}. However, there is limited research on nurses finding diagnostic errors and communicating them to doctors instead of identifying and reporting medical errors. It was hypothesized that nurses might harbor concerns about diagnoses made by physicians but could be constrained from voicing these concerns. This study aimed to examine the prevalence of such concerns among nurses in their daily practice and to determine the reasons why nurses might not express these concerns.

Methods

Setting and participants

This nationwide cross-sectional website survey study involved nurses ($n = 73,976$) registered with the Nikkei Medical Website, the largest online media site for registered healthcare professionals in Japan, created by Nikkei Business Publications (BP), Inc. The Nikkei Medical website for nurses was contacted and informed that a study on physicians' diagnostic concerns was planned to be conducted, and nurses were invited to participate. Informed consent was obtained from nurses who registered on the Nikkei Medical website to participate in the survey from June 26, 2023 to July 31, 2023. Owing to system restrictions, site access was limited to nurses who responded to the survey. In total, 433 respondents completed the survey; two were not nurses, and one was excluded owing to an incomplete age statement in the free response section. In accordance with Nikkei BP specifications, this survey was not completed unless all questionnaires were answered.

Survey instrument

Basic nurse participant data included gender, age, career as a nurse, educational background (vocational or junior college, university school, graduate school), managerial position (department head, chief nurse, or other managerial position in the department), specialized skills of nurses (those who have acquired disease-specific skills such as for cancer, dementia, after a specific period, or nurse practitioner), institution (clinic, community-based hospital, university hospital, nursing home, others), area of practice (urban or rural; the 20 cities designated by the Ministry of Internal Affairs and Communications and the 23 wards of Tokyo were defined as urban areas, and all other cities as rural areas), and number of beds. Regarding the main outcome question, "Did you feel any concern about the physicians' diagnoses within one month?" participants were asked to respond either "YES" or "NO." Nurses who responded "YES" were prompted to specify the physicians they harbored concerns about. If the nurse felt concerns multiple times, answering with their most memorable episode was requested. Specifically, basic information concerning the physician, including gender, age range, physician's specialty, and whether the physician was in a management position, was sought. In addition, the nurses were asked whether they communicated their concerns to physicians. If they experienced concern but refrained from informing the physician, they were surveyed to ascertain the reasons for their silence. Respondents were asked to select multiple answers from eight items, including being ignored, offended, or having their pride hurt when they expressed concerns; lack of confidence in their own diagnosis; and medical safety issues (Questionnaire Details: Appendix 1). These items were carefully vetted and developed by TM and TW, who are experts in diagnostic error research as evidenced by their previous background reports on the relationship between nurses and diagnosis^{8,11}.

Ethics

This study was approved by the Ethics Committee of the Juntendo University Hospital. (No. E23-0073). The study was conducted in accordance with the principles of the Declaration of Helsinki. All methods were performed in accordance with the Ethical Guidelines for Medical and Health Research Involving Human Subjects. All participants provided consent to participate in the study. Respondents were paid an incentive to participate in the study (3.3 USD; 500 YEN (Japanese), Japanese 150 YEN = 1 USD, September 27, 2023).

Data analysis

Results are presented as medians (interquartile range [IQR]) for continuous variables and prevalence (%) for categorical variables. Univariate and multivariate analyses were conducted using logistic regression analysis, with nurses' concerns about physicians as the objective variable. When conducting the multivariate analysis, all covariates were added to the model using the forced entry method. The selection of covariates included sex, age, years of experience, educational background, position, specialty skills, institution, region, and number of beds, considering previous studies related to nurses' diagnoses and traditional Japanese cultural background^{8,11,20}. Univariate/multivariate analysis using logistic regression analysis was conducted with nurses' failure to communicate their concerns to physicians as the objective variable. In addition to the variables used in the above analysis, the covariates included basic information regarding the physician's profile, such as sex, age, whether the physician was a managerial status, and departmental affiliation. Non-respondents on the nurses' and physicians' sides in terms of gender were excluded from the multivariate analysis. All the statistical analyses were performed using SAS version 9.4 (SAS Institute Inc., Cary, NC, USA). Variables were subjected to the chi-square test, and statistical significance was set at $P < 0.05$. A variance inflation factor (VIF) analysis was performed to assess the degree of multi-collinearity in our model. The VIF values for the nurses' ages and years of experience were 2.78 and 2.767, respectively.

Results

In total, 430 nurses responded to the survey. Of the respondents, 349 (81.2%) were female. The median age was 45 (IQR 35–51) years, and the median years of experience were 19 (IQR 12–25). The highest number of respondents (272 participants, 63.3%) were graduates of vocational schools. Among the participating nurses, 122 (28%) had experience in managerial positions. A total of 103 participants (24.0%) had specialized skills. Community-based hospitals were the most common type of institution, with 212 participants (49.3%). The most common workplace size among participants was institutions with 100 beds, accounting for 164 nurses (38.1%). In total, 263 (61.2%) nurses were concerned about their physician's diagnoses. A univariate analysis was used to compare those concerned about the physician's diagnosis ("Concerned Group") and those without any concerns about the physician's diagnosis ("Non-Concerned Group"). Those with longer careers were more likely to feel concerned (odds ratio [OR] 1.15; 95% CI 1.03–1.28; $P=0.013$).

Those in managerial positions were more likely to feel concerned (OR 1.73; 95% confidence intervals [CI] 1.10–2.71; $P=0.018$). Compared to those working in community-based hospitals, nurses working in a clinic (OR 0.62; 95% CI 0.49–0.99; $P=0.047$) and a university hospital (OR 0.41; 95% CI 0.23–0.74; $P=0.003$) were less likely to experience concerns. Further, nurses working in 101–500-bed institutions were more likely to feel concern compared to ≤ 100 beds (OR 1.72; 95% CI 1.10–2.70; $P=0.018$). In the multivariate analysis, nurses with longer careers were more likely to feel concerned (adjusted OR [aOR] 1.21; 95% CI 1.01–1.44; $P=0.039$; Table 1).

Of the 263 individuals concerned about their physician's diagnoses, 138 (52.5%) could not communicate their concerns to the physicians. A univariate analysis was conducted between the group that could not express their concerns (non-communicating group) and those that could express their concerns (communicating group). Compared to those working in community-based hospitals, nurses working in clinics conveyed fewer concerns (OR 2.88; 95% CI 1.58–5.24; $P<0.001$). In respect of bed numbers, those working in institutions with ≤ 100 beds conveyed fewer concerns than those working in 101–500-bed institutions (OR 0.34; 95% CI 0.19–0.61; $P<0.001$) and in institutions with > 500 beds (OR 0.30; 95% CI 0.15–0.60; $P<0.001$). In terms of physician age range, nurses were significantly less likely to communicate concerns to physicians aged 30–39, 40–49, 50–59, and 60–69 years compared with physicians aged 20–29 years. Moreover, a multivariate analysis demonstrated that the younger

	Total N = 430	Concerned group N = 263	Non- concerned group N = 167	Uni variate	Odds ratio	CI		P value	Multi variate	Co efficient	Odds ratio	CI		P value
						LL	UL					LL	UL	
Sex Female	349 (81.2)	215 (81.8)	134 (80.2)		1.04	0.63	1.73	0.875		0.01	1.01	0.58	1.77	0.961
Age median (IQR)	45 (39–51)	46 (40–51)	45 (36–51)		1.05	0.95	1.17	0.354		–0.10	0.91	0.76	1.09	0.313
Career median (IQR)	19 (12–25)	20 (13–25)	16 (9–25)		1.15	1.03	1.28	0.013		0.19	1.21	1.01	1.45	0.039
Educational background														
Vocational or Junior college	272 (63.3)	167 (63.5)	105 (62.9)		Reference						Reference			
University school	116 (27.0)	71 (27.0)	45 (27.0)		1.03	0.65	1.61	0.911		0.20	1.22	0.73	2.05	0.449
Graduate school	42 (9.8)	25 (9.5)	17 (10.2)		0.93	0.48	1.80	0.823		–0.19	0.83	0.39	1.76	0.623
Managerial position	122 (28.3)	86 (32.7)	36 (21.6)		1.73	1.10	2.71	0.018		0.24	1.27	0.77	2.09	0.352
Specialty skill	103 (24.0)	70 (26.6)	33 (19.8)		1.49	0.93	2.39	0.099		0.18	1.20	0.69	2.10	0.523
Institution														
Communi-ty-based hospital	212 (49.3)	150 (57.0)	62 (37.1)		Reference						Reference			
Clinic	135 (31.4)	79 (30.0)	48 (33.5)		0.62	0.39	0.99	0.047		–0.65	0.52	0.20	1.35	0.179
University hospital	60 (14.0)	30 (11.4)	30 (17.9)		0.41	0.23	0.74	0.003		–0.73	0.48	0.23	1.00	0.051
Others	23 (5.4)	4 (1.5)	19 (11.4)		0.17	0.08	0.36	0.000		–1.85	0.16	0.06	0.44	<0.001
Urban	219 (50.9)	131 (49.8)	89 (52.6)		0.89	0.60	1.31	0.541		–0.04	0.96	0.63	1.47	0.846
Bed number														
≤ 100	164 (38.1)	92 (35.0)	72 (43.1)		Reference						Reference			
101–500	171 (39.8)	118 (44.9)	53 (31.7)		1.72	1.10	2.70	0.018		–0.27	0.76	0.31	1.91	0.564
501 over	95 (22.1)	53 (20.2)	42 (25.2)		0.98	0.59	1.64	0.935		–0.54	0.58	0.21	1.63	0.301

Table 1. Comparison of the concerned and non-concerned groups. During the multivariate analysis, 429 participants were analyzed, except for 1 participant in the group in which the sex was unknown. The group that did not feel concern (Non-concerned group) about the physician's diagnosis was used as the reference. CI: confidence interval, OR: odds ratio, aOR: adjusted odds ratio, LL, lower limit, UL, upper limit.

the nurse, the less likely they were to communicate their concerns (aOR 0.72; 95% CI 0.53–0.97; $P=0.030$). The longer the nurses' career, the less likely they were to express their concerns (aOR 1.35; 95% CI 1.01–1.79; $P=0.040$). Nurses were also less likely to express their concerns to physicians ranging in age from 40 to 49 (aOR 18.10; 95% CI 4.09–80.06; $P<0.001$), 50–59 (aOR 7.87; 95% CI 1.83–33.77; $P<0.001$), and 60–69 (aOR 8.82; 95% CI 1.79–43.54; $P=0.008$) years compared with expressing their concerns to those who were in their 20s (Table 2).

The most common reasons included concern about hurting the physician's pride (59, 21.1%), fear their concerns would be dismissed (52, 18.6%), and the belief that the physician should be responsible for making the diagnosis (44, 15.7%). These top three reasons were cited by 155 nurses (55.4%; Table 3).

Discussion

To our knowledge, this is the first study to investigate nurses' diagnostic concerns. In this study, 263 (61.2%) nurses experienced concerns regarding physicians' diagnoses within a month. Of these, 138 (52.3%) reported that they could not communicate their concerns regarding the diagnosis to the physicians. The most prevalent reasons for not communicating their concerns were apprehensions about potentially damaging the physician's pride, being disregarded when expressing their concerns, and nurses feeling that a diagnosis should solely rest within the purview of physicians.

Nurses feel concerned about physicians' diagnoses

Over 60% of the nurses expressed concerns regarding a physician's diagnosis, and nurses with more experience were more likely to feel concerned. Nurses, as the primary caregivers with frequent patient interaction, often hold significant roles in clinical practice. To our knowledge, there is a lack of previous research on whether the nurses are concerned about a physician's diagnosis. However, in reality, it is plausible that such concerns are more widespread considering the prevalence of diagnostic errors, given that patients typically encounter diagnostic errors at least once during their lifetime^{1,2}. Nurses actively seek knowledge and information about patients in the healthcare setting and play an important role in assessing and understanding patient conditions²¹. Previous findings indicate that nurses often recognize deterioration in a patient's facial expressions and general condition rather than vital signs based on bedside education and nursing experience^{22–24}. Therefore, it was reasonable to observe an increase in the percentage of respondents feeling concerned about diagnoses as their years of experience increase.

In addition, in recent years, it has become increasingly important for doctors and nurses to work as a team to reduce diagnostic errors^{5,7}. Therefore, based on this study, it is crucial to first understand the current state of nurses' involvement in diagnoses. It is also important to continually evaluate the way nurses and doctors collaborate in the diagnostic process, recognizing the central role nurses play in this area.

Why nurses were unable to communicate concerns to physicians

More than 50% of respondents of the respondents did not communicate their concerns when they felt concerned, which was more frequent than expected. However, in reports by nurses of medical errors, 34.8% of nurses in Iran did not report adverse events, nor did 48.4% of nurses in South Korea. When compared with other countries, Japan has a relatively low level of such reports^{18,19}. The older the doctor and the younger the nurse, and the more they worked in the clinical setting, the less likely nurses were to express their concerns, possibly because of hierarchical issues. A previous study reported the existence of a "doctor–nurse game," highlighting the hierarchy disparity between doctors and nurses, which could hinder the expression of nurses' concerns²⁵. In previous cases, nurses reported having concerns about the poor surgical progress of one patient who underwent a relatively minor nose operation but could not communicate these concerns to the physician²⁶. In addition, research related to incident reports has shown that reporting incidents is less likely if no feedback on incident reports is provided or if anonymity is not maintained when reporting²⁷.

Furthermore, there is a tendency in the medical community to be reluctant to speak out against what is wrong²⁸. A previous study undertaken in the United States supported this, indicating that 16% nurses did not report medication errors owing to a fear of being fired¹⁵. It is worth noting the dynamics in Japanese clinic settings, where physicians often hold dual roles as managers, sometimes with the authority of sole proprietors. This organizational structure may further influence the psychological safety experienced by employees while on the job. These reasons may have contributed to the fact that they often failed to communicate their concerns. The nurses reported their reasons for being unable to express concerns to the physician were based on the belief that it would hurt the physician's pride, that the physician would ignore them if they told them, and that the physician made the diagnosis. The notion of offending physicians' pride may be rooted in cultural norms, particularly in East Asia, including Japan, where there is a strong emphasis on Confucian values and respect for authority figures²⁹. Partly owing to this influence, seniority bias in academia is often observed out of excessive respect for superiors³⁰. The findings suggest a trend where nurses are less inclined to communicate their concerns to older physicians, potentially influenced by the perception that such actions could damage the pride of the physicians.

Moreover, the predominance of female nurses (92.2%) and male doctors (77.2%) in Japan underscores a gender-skewed dynamic, potentially complicating communication of concerns^{22,23}. Physicians should consider this situation and be aware of the need to improve organizational performance by creating a psychologically secure organization²⁴. The Power Distance Index, which suggests the degree to which a society maintains equality toward those without power, is relatively high in Japan at 54 compared to that in countries such as Australia or Denmark, indicating a tendency toward inequality³⁰. This factor could also contribute to the difficulty nurses experience in expressing their concerns to physicians. However, the Agency for Healthcare Research and Quality in the US suggests that it is necessary to communicate concerns about medical safety when they are felt³¹. In addition, education concerning medical errors is important to increase the frequency of such reports³².

	Total N = 263	Communicating group N = 125	Non-communicating group N = 138	Uni Variate	Odds ratio	CI		P value	Multi variate	Co efficient	Odds ratio	CI		P value
						LL	UL					LL	UL	
Nurse characteristics														
Sex Female	215 (81.8)	105 (84.0)	110 (79.7)		0.81	0.43	1.55	0.529		− 0.18	0.84	0.39	1.81	0.657
Age median (IQR)	46 (40–51)	46 (40–50)	46 (39–51)		0.95	0.82	1.10	0.504		− 0.33	0.72	0.53	0.97	0.030
Career median (IQR)	20 (13–25)	20 (13–26)	20 (13–25)		1.01	0.88	1.15	0.940		0.30	1.35	1.01	1.79	0.040
Educational background														
Vocational or Junior college	167 (63.5)	83 (66.4)	84 (60.9)		Reference						Reference			
University school	71 (27.0)	26 (20.8)	45 (32.6)		1.67	0.94	2.97	0.079		0.63	1.88	0.91	3.86	0.086
Graduate school	25 (9.5)	16 (12.8)	9 (6.5)		0.56	0.23	1.33	0.187		− 0.58	0.56	0.19	1.65	0.294
Managerial position	86 (32.7)	40 (32.0)	46 (33.3)		1.11	0.66	1.87	0.684		0.20	1.22	0.65	2.29	0.528
Specialty skill	70 (26.6)	37 (29.6)	33 (23.9)		0.78	0.45	1.36	0.385		0.17	1.19	0.57	2.48	0.653
Institution														
Community-based hospital	150 (57.0)	84 (67.2)	66 (47.8)		Reference						Reference			
Clinic	79 (30.0)	25 (20.0)	54 (39.1)		2.88	1.58	5.24	< 0.001		0.07	1.07	0.30	3.81	0.913
University hospital	30 (11.4)	16 (12.8)	14 (10.1)		1.21	0.54	2.68	0.645		0.75	2.11	0.69	6.48	0.193
Others	4 (1.5)	0	4 (2.9)		3.45	0.88	13.51	0.076		0.69	2.00	0.36	11.06	0.429
Urban	131 (49.8)	61 (48.8)	70 (50.7)		1.06	0.65	1.73	0.804		0.25	1.28	0.71	2.30	0.409
Bed number														
≤ 100	92 (35.0)	28 (22.4)	64 (46.4)		Reference						Reference			
101–500	118 (44.9)	65 (52.0)	53 (38.4)		0.34	0.19	0.61	< 0.001		− 1.02	0.36	0.11	1.17	0.089
501 over	53 (20.2)	32 (25.6)	21 (15.2)		0.30	0.15	0.60	< 0.001		− 1.65	0.19	0.05	0.80	0.023
Physician's characteristics														
Sex Female	34 (12.9)	16 (12.8)	18 (13.0)		1.03	0.50	2.12	0.937		0.14	1.15	0.47	2.81	0.757
Age														
20s	21 (8.0)	18 (14.4)	3 (2.2)		Reference						Reference			
30s	68 (25.9)	39 (31.2)	29 (21.0)		4.46	1.20	16.59	0.026		1.42	4.13	1.00	17.18	0.051
40s	59 (22.4)	17 (13.6)	42 (30.4)		15.75	4.08	60.82	< 0.001		2.90	18.10	4.09	80.06	< 0.001
50s	68 (25.9)	31 (24.8)	37 (26.8)		7.16	1.93	26.60	0.003		2.06	7.87	1.83	33.77	0.006
60s	35 (13.3)	15 (12.0)	20 (14.5)		8.00	1.99	32.23	0.003		2.18	8.82	1.79	43.54	0.008
70s and over	12 (4.6)	5 (4.0)	7 (5.1)		6.00	1.05	34.21	0.044		1.43	4.17	0.58	30.20	0.157
Managerial position	124 (47.2)	53 (42.4)	71 (51.5)		1.42	0.87	2.32	0.160		− 0.38	0.69	0.35	1.34	0.271
Department														
General medicine	25 (9.5)	12 (9.6)	13 (9.4)		Reference						Reference			
Internal medicine	113 (43.0)	48 (38.4)	65 (47.1)		1.23	0.52	2.94	0.640		0.15	1.16	0.42	3.20	0.770
Surgery	31 (11.8)	18 (14.4)	13 (9.4)		0.67	0.23	1.93	0.454		− 0.41	0.67	0.19	2.34	0.527
Psychiatry	21 (8.0)	11 (8.8)	10 (7.3)		0.84	0.26	2.68	0.767		− 0.59	0.55	0.14	2.16	0.394
Orthopedics	20 (7.6)	7 (5.6)	13 (9.4)		1.58	0.47	5.35	0.460		0.61	1.83	0.46	7.40	0.394
Others	53 (20.2)	29 (23.2)	24 (17.4)		0.79	0.30	2.06	0.631		− 0.33	0.72	0.23	2.21	0.561

Table 2. Comparing the communicating and non-communicating groups. During the multivariate analysis, 260 participants were analyzed, except for 3 participants in the group in which the sex of the doctor was unknown. The group that was able to communicate their concerns (communicating group) to the doctor was designated as the reference. CI: confidence interval, OR: odds ratio, aOR: adjusted odds ratio, LL, lower limit, UL, upper limit.

	Total N = 280	%
Felt that it would hurt the physician's pride	59	21.1
Felt that the concern would be ignored or not taken seriously	52	18.6
Believed that diagnosis is a task for physicians	44	15.7
Felt that expressing concern would result in anger from the physician	40	14.3
Lack of confidence in the diagnostic assessment	34	12.1
Only realized after the end of the clinical session (after outpatient clinic, discharge, etc.)	17	6.1
Because the patient or their family was present	11	3.9
The physician seemed too busy	7	2.5
Out of respect for the physician	4	1.4
Other reasons	12	4.3

Table 3. Reasons why nurses failed to communicate concerns to physicians and the frequency of occurrence. The 136 nurses who were unable to express their concerns to the physicians were asked to select more than one of the 10 items above.

Additionally, it is important to create a safety-assured environment as a team since fostering a culture of medical safety improves not only patient safety but also the working environment of the medical staff^{33,34}.

Should only physicians make the diagnosis?

While it may seem obvious, the practice of leaving diagnosis solely to physicians should be avoided to reduce diagnostic errors. Instead, all medical staff should play an active role in the diagnostic process^{7,8}. Collaboration between nurses and physicians is especially important as it improves outcomes, such as inpatient length of stay³⁵. Active involvement in the diagnosis is especially important, as there have been reports of improved outcomes when nurses were part of the diagnostic process³⁶. However, what are the reasons behind nurses' lack of involvement in diagnosis is the question.

Cultural, educational, scope of practice, and regulatory aspects are why nurses worldwide consider that physicians should make diagnoses⁸. One symbol of this may be the impact of nursing diagnoses. Nurses traditionally used nursing diagnoses to identify patient conditions and plan care. Until the proposal in the 2018–2020 International Nursing Diagnoses Classification by NANDA International, nurses were generally not involved in addressing medical diagnoses³⁷. In Japan, the law may serve as a background for nurses to believe that solely physicians should make diagnoses. While nurses can perform limited medical treatment under physicians' supervision, they are not authorized to independently diagnose or treat patients³⁸. There are many issues to be addressed regarding culture, education, and scope of work. However, countries and organizations need to create an environment and educational system that allows nurses to be more involved in diagnosis.

Limitations

This study had several limitations. First, there is the issue of sample size. In Japan, there are 1.28 million nurses, and the target number of members of the Nursing Association for this survey was 73,976 (as of June 2023), making the sample size for this study extremely small compared to the total number and thus limited in representativeness. While it was possible that those who responded as registered nurses may not, in fact, have been nurses, given they were self-identified, there was a box on the survey to indicate the year their nursing license was obtained. In addition, we did not ask whether the nurses worked alongside doctors, and it was unclear whether they engaged in such work. Data sampling is a major barrier in conducting surveys on diagnostic errors and is a sensitive issue for medical practitioners. Moreover, the specific sample size remains unclear owing to the unknown number of active Nikkei Medical users. One issue concerning the Nikkei Medical survey specifications was that completion was prevented unless complete responses had been made, which may have resulted in a smaller sample size. In addition, the average age of nurses registered with Nikkei Medical is similar to that of the Ministry of Health, Labour and Welfare (MHLW), but the proportion of nurses working in clinics (MHLW: 13.4%, this survey: 31.4%) and the proportion of female nurses (MHLW: 91.9%, this survey: 81.2%) differed³⁹. Therefore, it cannot be said that the data fully reflect the situation of nurses in Japan. Therefore, there is a possibility that sampling bias has occurred. The number of individuals who dropped out of the survey prior to completion could not be determined; therefore, the exact number of individuals who accessed the survey is not known. However, the responses of those who provided completed details concerning their personal information, and who responded relatively carefully through to the end of the survey are likely to be highly reliable. As the survey gratuity was relatively low (USD \$3.3), we also consider it likely that the nurses responded based on genuine interest.

The sample size was challenging to calculate as studies in which nurses considered there had been diagnostic errors and reported them as opposed to medical errors are limited. This is the largest limitation of this study. A qualitative study provides the best means to obtain the viewpoints of individual nurses. We intend to conduct a qualitative study of nurses using semi-structured interviews as our next research project. The survey, limited to episodes within the past month for participating nurses, inevitably led to a recall bias. Therefore, there is likely a discrepancy between the actual frequency of concerns regarding the doctors' diagnosis and the survey results, with a high level of underreporting.

While the frequency of nurses' concerns was high (61.2%), it is possible that this percentage relates to only a small fraction of the number of physicians and patients that nurses came into contact with during the one-month study period. Additionally, it is unclear whether the nurses' diagnostic concerns toward doctors were valid, as this was not investigated. One of the reasons for this is that to the best of our knowledge, the authors were unaware of any information regarding the environment of pre- and post-graduate education regarding nursing diagnosis. In addition, even if nurses feel concerned about diagnoses, their training and recommendations for communicating with doctors are also unclear. We would like to investigate the actual situation regarding this collaborative diagnostic process in the future. Finally, this study, limited to Japanese nurses, may not accurately evaluate the nurse-doctor relationship universally, raising concerns about external validity. Future studies should also include international comparisons.

Conclusion

The survey revealed that 61.2% of nurses harbored concerns about doctors' diagnoses, with 52.5% reporting they were constrained from being able to communicate their concerns. The study findings raise an important issue in terms of medical safety, and doctors nationwide should reconsider their approach, including involving nurses in the diagnosing team.

Data availability

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Received: 26 February 2024; Accepted: 24 July 2024

Published online: 29 July 2024

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Acknowledgements

We greatly appreciate all the nurses who responded to the survey.

Author contributions

T.M. and T.W. had full access to all of the data in the study, and they take responsibility for the integrity of the data and the accuracy of the data analysis. Concept and design: T.M., T.W., Y.N., M.M., V.C. and T.N. Acquisition, analysis, or interpretation of data: T.M., T.W., Y.N., M.S., K.S., M.M., V.C. and T.N. Drafting of the manuscript: T.M., T.W., Y.N., M.S., K.S. and T.N. Critical review of the manuscript for important intellectual content: T.M., T.W., Y.N., M.S., K.S., M.M., V.C. and T.N. Statistical analysis: T.M., T.W., Y.N. and M.S. Obtained funding: None. Administrative, technical, or material support: T.M., T.W. and T.N. Supervision: T.W., Y.N., M.M., V.C. and T.N.

Competing interests

The research data were considered by the authors' research team and collected using the Nikkei BP platform. The data obtained was provided free of charge, and there was no funding from Nikkei BP; the compensation paid to participants was covered by the Department of General Medicine at Juntendo University. However, when an article related to the results of this research is published on Nikkei BP's online site, the first author, TM, will receive the usual manuscript fee. All other Authors do not declare any Competing Interests.

Additional information

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1038/s41598-024-68520-6>.

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