

## Original Article

## Factors Associated with *Moraichichi* among Neonatal Intensive Care Unit Nurses in Japan

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### Abstract

**Background:** In Japan, when a mother's breast milk is unavailable, the practice of *moraichichi* (a method of obtaining unpasteurized breast milk) is implemented in neonatal intensive care units (NICUs). While the rate of breast milk implementation has been studied, no research has explored the specific details of the implementation process. As such, the actual system and management procedures leading up to the provision of *moraichichi* remain largely unknown.

**Objective:** This study aimed to investigate the current state of *moraichichi* in NICUs in Japan and clarify the factors promoting *moraichichi* from the perspective of nursing staff working in NICUs.

**Methodology:** The study surveyed 743 nurses in NICU wards of perinatal medical centers in the Kanto-Koshinetsu region of Japan using a self-administered questionnaire focused on *moraichichi*.

**Results:** Of the 303 (40.8%) nurses who returned valid responses, 63.7% reported having conducted *moraichichi*. Multiple logistic regression analysis with *moraichichi* as the objective variable revealed that NICU characteristics included the number of nurses ( $p < 0.001$ ); the proactive nature of the NICU ( $p < 0.001$ ); and the Practice Environment Scale of the Nursing Work Index, specifically, the "involvement of nurses in the entire hospital's work" ( $p < 0.05$ ). Nurses' characteristics encompassed "Nurses' reluctance or resistance to *moraichichi*" ( $p < 0.001$ ) and "Nurses' knowledge about *moraichichi*" ( $p < 0.05$ ), among others.

**Conclusions:** The results revealed that Japanese nurses do not necessarily perceive *moraichichi* in a positive light, revealing distinct negativity and resistance toward the practice. In addition, differences in nurses' perceptions of *moraichichi* exist even within the same hospital. This suggests that nurses' differing perceptions may contribute to the ambiguity surrounding *moraichichi* in Japan.

**Keywords:** *moraichichi*, breast milk sharing, NICU, Japan, human milk bank, preterm infants feeding

### Introduction

Premature and low-birth-weight infants face various challenges until their life support levels and growth reach a safe range. Among these challenges, nutrition is of primary importance for these infants' well-being (Japan Academy of Neonatal Nursing, Japan Academy of Midwifery, 2010). In mothers who give birth to extremely low-birth-weight infants, the process of milk production is delayed (Chen, 1998). Oxytocin secretion is suppressed (Riordan, 2010) due to psychological stress and reduced stimulation of the nipples caused by prolonged separation

from the infant, and they may experience decreased milk secretion (Lau, 2002). Therefore, breastfeeding with the mother's milk may not be possible. When a mother's milk is not available or is contraindicated, the American Academy of Pediatrics recommends using pasteurized donor human milk (Meek and Noble, 2022). This has been shown to have lower incidences of complications, such as necrotizing enterocolitis, cholestasis, severe infection, and chronic lung disease, compared with artificial feeding (Ichihashi et al., 2002). Donor breast milk is also associated with

improved neurological prognosis (Heiman and Schanler, 2006).

Recent systematic reviews have reported that, compared with donor breast milk, formula milk has a higher incidence of necrotizing enterocolitis in premature and low-birth-weight infants (Henderson, Anthony, and McGuire, 2007), providing scientific support for the use of donor breast milk in low-birth-weight infants. The American Academy of Pediatrics recommends the use of pasteurized breast milk from another mother for preterm infants when the mother's own milk is not available (Section on Breastfeeding et al., 2012). Consequently, many countries have formulated guidelines and established and operated breast milk banks according to their national circumstances (National Institute for Health and Clinical Excellence, 2010; Human Milk Banking Association of North America [HMBANA], 2020; Human Milk Banking Association of South Africa, 2011).

In Japan, however, if the mother's breast milk is unavailable, a method known as *moraichichi* (obtaining unpasteurized breast milk) has been implemented in neonatal intensive care units (NICUs). While previous research has reported the implementation rate of *moraichichi* (Kitazawa et al., 2003; Seo et al., 2008), no studies have examined the specific factors associated with the implementation process, the actual system in place, or the management processes involved in the provision of *moraichichi*.

### **Status of Human Milk Banks in Japan**

Until the 1950s, it was common practice in Japan for infants of mothers who could not produce enough breast milk to be breastfed by other mothers who could produce breast milk, a practice known as *moraichichi* (Ishibashi, 2010). However, as childbirth shifted from home to hospitals, *moraichichi* was no longer common. Simultaneously, with the advancement of neonatal medical care, *moraichichi* for very preterm infants in NICUs, or human milk banks, became more important. As of 2013, when this study was conducted, breast milk banks were operational in approximately 40 countries worldwide with the number growing to over 750 breast milk banks in 66 countries (Fang et al., 2021). By contrast, Japan did not have a

breast milk bank until 2017; even now, there are only three such facilities (Mizuno, 2021), indicating a lack of widespread availability. It is hoped that the presence of breast milk banks in Japan will increase in the future.

**Aim:** The purpose of this study is to clarify the current status of *moraichichi* in NICUs and to understand the factors related to *moraichichi* from nurses' perspectives. In this study, *moraichichi* refers to the practice of receiving breast milk expressed by another mother and administering it to an infant when the infant's own mother is unable to provide her breast milk for any reason.

### **Research Questions**

1. What is the current status of *moraichichi* in NICUs in Japan?
2. What are the factors related to *moraichichi*?

### **Methodology**

**Participants:** The research participants comprised 743 nurses—including midwives, nurses, public health nurses, and associate nurses, and excluding chief nurses—working in NICUs at comprehensive perinatal maternal and child medical centers in the Kanto-Koshinetsu region of Japan. Research cooperation was sought from the head of the nursing department, and a research cooperation request form, survey form, and set of return envelopes were mailed to the 13 hospitals that agreed to participate. These materials were then distributed to all nurses working in the NICUs of all the medical centers. The questionnaires were collected by mail or in person, and the survey period was July to September 2013.

**Survey Questionnaire:** The survey commenced by assessing basic characteristics of the participants, including age, years of nursing experience, and years of experience in NICUs. The survey items regarding *moraichichi* were developed by referencing domestic and international literature (Iwata and Iwata, 2005; Nagaya and Hayashi, 2008; HMBANA, 2011; Oku, 2012). The questionnaire comprised 7 items regarding the attitude toward *moraichichi* of the NICUs where the nurses worked, 11 regarding specific initiatives undertaken by NICUs implementing *moraichichi*, and 19 regarding individual nurses' perceptions of *moraichichi*. To gain a comprehensive understanding of the

current situation, options were provided for items related to NICUs' attitudes toward *moraichichi* and the specific practices of NICUs implementing *moraichichi*. Response options to items related to nurses' perceptions of *moraichichi* were provided on a four-point scale ranging from "strongly agree" to "strongly disagree." The survey items were carefully considered to include elements related to perceptions of *moraichichi*, and a pretest was conducted with 10 nurses with experience working in NICUs to make necessary modifications, such as changing difficult-to-understand words. Then, we checked to see if the questions were duplicated and if the necessary questions were included. To measure the nursing practice environment, the Japanese version of the Practice Environment Scale of the Nursing Work Index (PES-NWI), developed by Lake (2002) and translated into Japanese by Ogata et al. (2008), was employed. It comprises 31 items and 5 subscales, rated on a four-point scale ranging from "strongly agree" to "strongly disagree." Higher scores in any subscale indicate a more favorable nursing practice environment. Additionally, the Generalized Self-Efficacy Scale (GSES) was utilized to measure the strength of general self-efficacy. It comprises 16 items and 3 subscales with each item measured using a binary system (yes/no). The higher the total score, the higher the degree of self-efficacy.

**Data Analysis:** Statistical analysis was performed using IBM-SPSS Statistics Version 22.0 for Windows. Descriptive statistics were computed regarding the participants' characteristics, attitude toward *moraichichi* at their respective hospitals, and implementation details of the hospitals implementing *moraichichi*. Owing to the potential differences in how various NICUs approach *moraichichi* and the varying perceptions of individuals, exploratory factor analysis was expected to be influenced by multiple concepts. Therefore, a principal component analysis was performed. Furthermore, a multiple logistic regression analysis was conducted with the practice of *moraichichi* in NICUs as the objective variable and the results extracted from the principal component analysis, hospital characteristics, the Japanese version of PES-NWI, characteristics of nurses, and GSES as

explanatory variables.

**Ethical Considerations:** The study was conducted with the informed consent of the research participants, who were provided with a research cooperation request form explaining the research purpose, methods, and content and the voluntary nature of participation. The study ensured strict compliance with privacy protection and anonymity maintenance. The participants filled out the survey forms, enclosed them in return envelopes, and returned them directly to the researcher. Consent was deemed to have been obtained upon the return of the survey. This study was conducted with the approval of the ethics committee.

## Results

The questionnaire was distributed to 743 nurses, and responses were received from 304 nurses (response rate: 40.9%). Of these, one incomplete face sheet was excluded from the analysis, leaving 303 nurses as the target for analysis (valid response rate: 40.8%).

**Participant Attributes:** The participants had an average of  $7.7 \pm 6.9$  years of work experience and  $4.5 \pm 4.4$  years of NICU experience. Among the participants, 177 (58.4%) were in their 20s, 95 (31.4%) were in their 30s, 24 (7.9%) were in their 40s, and 7 (2.3%) were in their 50s or older.

**Findings Related to Moraichichi:** A total of 272 nurses (89.8%) had heard about *moraichichi*, 193 (63.7%) had experience with *moraichichi* in the NICUs where they worked, and 110 nurses (36.3%) had no experience. Regarding the attitude of NICUs toward *moraichichi*, 132 nurses (43.6%) indicated a negative attitude, 89 (29.4%) expressed a positive attitude, 77 (25.4%) were unsure, and 5 (1.7%) did not respond. By contrast, 156 nurses (51.5%) had a negative perception regarding *moraichichi*, 97 (32.0%) held a positive perception, 47 (15.5%) were unsure, and 3 (1.0%) did not respond. Regarding safety, 103 nurses (34.0%) mentioned that safety was not ensured, 42 (13.9%) believed it was, 152 (50.2%) were unsure, and 6 (2.0%) did not respond. Regarding documents outlining standards and procedures for *moraichichi*, 98 nurses (50.8%) confirmed their presence, while 42 nurses (21.8%) reported that there were no

such documents, 52 (26.9%) were unsure, and 1 (0.5%) did not respond. When considering the proximity in age between donor and recipient infants, 36 nurses (18.7%) thought it was important, while 105 (54.4%) thought it was not important, 50 (25.9%) were not sure, and 2 (1.0%) did not respond. When obtaining informed consent from the recipient, 106 nurses (54.9%) used documents for explanation and obtaining signatures, 15 (7.8%) used documents for explanation but did not obtain signatures, 54 (28.0%) provided verbal explanations only, 3 (1.6%) did not obtain consent, and 15 (7.8%) did not respond. Similarly, when obtaining informed consent from the donor, 49.7% of nurses used documents for explanation and signatures, 7.8% used documents for explanation but did not obtain signatures, 30.6% provided verbal explanations only, 1.0% did not obtain consent, and 21 (10.9%) did not respond. Doctors were the most common medical personnel responsible for obtaining informed consent followed by nurses. A total of 72 nurses (37.3%) had interviewed donors, 81 (42.0%) had not, and 40 (20.7%) did not respond. Regarding serological infectious disease testing, all respondents, except non-responders, responded that they were checking laboratory data. Regarding sterilization of *moraichichi*, the majority, 157 nurses (81.3%), employed freezing; 6 (3.1%) performed bacterial testing; none performed pasteurization; 3 (1.6%) were not sure; and 27 (14.0%) did not respond. An interesting finding was the differences in responses related to breast milk within the same NICU regarding standards and procedures, explanation and consent, confirmation of infectious disease tests, and sterilization methods.

**Principal Component Analysis of Items Related to Awareness of Moraichichi:** When conducting a principal component analysis with an eigenvalue of 1.0 on the 19 items related to nurses' perceptions of *moraichichi*, five principal components were extracted (Table 1). The respective principal components were named as follows. The first principal component was "Nurses' reluctance or resistance to *moraichichi*," the second principal component was "Lack of knowledge and experience with receiving *moraichichi*," the third principal component was "Nurses have knowledge about *moraichichi*," the fourth principal component was "Mother's choice and responsibility for *moraichichi*," and The fifth principal component was "The mother, not the nurse,

takes the lead in *moraichichi*." The variances of these principal components were 4.54, 2.83, 1.40, 1.30, and 1.08, respectively. The cumulative contribution rate of the five principal components was 58.62% of the total variance.

**Correlation between NICU Characteristics and Nurses' Characteristics based on the Implementation of Moraichichi:**

Table 2 presents the results of multiple logistic regression analysis using a variable reduction method; the criterion for variable selection was set at  $p = 0.14$  and the criterion for removing variables at  $p = 0.15$ . Regarding NICU characteristics, as the number of nurses increased by one, the odds ratio was 1.02 (95% CI: 1.01–1.03,  $p = .0027$ ), and the odds of *moraichichi* being introduced were higher when the NICU was actively involved in *moraichichi* by 1.97 (95% CI: 1.38–2.79,  $p = .0002$ ) compared with when it was not. Additionally, the odds ratio for "nurse's involvement in hospital-wide operations" in the Japanese version of the PES-NWI was 5.88 (95% CI: 1.15–29.93,  $p = .033$ ), indicating that the better the nursing practice environment, the higher the likelihood of *moraichichi* being introduced. Regarding nurses' characteristics, for each decrease in NICU experience by one year, the odds ratio was higher by 1.15 (95% CI: 1.01–1.32,  $p = .0384$ ). The odds ratio was higher by 18.29 for nurses in their 40s compared with those in their 20s (95% CI: 1.61–207.2,  $p = .019$ ). In addition, there were significant differences in *moraichichi* practices depending on the nurse's own infant-feeding method ( $p < 0.05$ ). Furthermore, among the extracted principal components, the odds of *moraichichi* practices were higher if there was less "Nurses' reluctance or resistance to *moraichichi*" by 5.82 (95% CI: 3.27–10.37,  $p = 2.18E-09$ ), by 1.54 (95% CI: 1.04–2.27,  $p = .0312$ ) if "Nurses have knowledge about *moraichichi*," and by 2.11 (95% CI: 1.33–3.36,  $p = .0016$ ) if the nurses did not feel "Mother's choice and responsibility for *moraichichi*." The odds of *moraichichi* being introduced were higher by 1.81 (95% CI: 1.15–2.87,  $p = .0108$ ) when the GSES score was very low compared with when it was high. The model fit was  $p < 0.001$ . The Hosmer–Lemeshow test yielded  $p > 0.05$ , retaining the null hypothesis, indicating the suitability of the regression equation. Furthermore, Nagelkerke's  $R^2$  was as high as 0.63, and Cramer's correlation coefficient was 0.70, indicating that the fit of this model was sufficient.

Table 1 Component matrix of principal component analysis regarding nurses' perceptions of *moraichichi*<sup>a</sup>

Contents of breast milk	<i>moraichichi</i> <sup>a</sup>			
	1st	2nd	3rd	4th
	Nurses reluctance or resistance regarding <i>moraichichi</i>	Lack of knowledge and experience with receiving <i>moraichichi</i>	Nursing staff have knowledge about <i>moraichichi</i>	Mother's choice and responsibility for <i>moraichichi</i>
I am reluctant to implement <i>moraichichi</i>	0.8118	0.0921		
Human milk is part of the treatment	-0.7479	0.2008	0.2617	-0.0754
▲ b I'm positive to implement <i>moraichichi</i>	0.7399		-0.1027	0.1376
I can collaborate and practice with other staff in the implementation of <i>moraichichi</i>	-0.6822	0.2853	0.1484	-0.1492
I find it stressful to recommend <i>moraichichi</i>	0.6686	0.1667	0.3193	-0.0575
It is good to recommend <i>moraichichi</i> if safety standards are met	-0.6538	0.3951	-0.0663	-0.1204
<i>moraichichi</i> does not meet the mother's needs	0.6146		0.3900	
It is difficult to think about <i>moraichichi</i> with the mother	0.5030	0.2218	0.4515	
Encouraging mothers to <i>moraichichi</i> may hurt their self-esteem	0.4240	0.3281	0.3228	-0.3032
Nursing staff's lack of knowledge and experience regarding <i>moraichichi</i> affects implementation	0.1562	0.7547	-0.3052	-0.1024
Lack of understanding of <i>moraichichi</i> among mothers affects implementation	0.2541	0.7361	-0.2255	-0.1043
Lack of understanding of <i>moraichichi</i> among doctors affects implementation	-0.0564	0.6636	-0.2142	-0.3043
Nursing staff is required to implement <i>moraichichi</i>	0.2073	0.4524	-0.0701	0.4222
Implementation of <i>moraichichi</i> requires funding	0.1577	0.4096	0.2683	-0.0984
Leadership regarding <i>moraichichi</i> is the role of the doctor	-0.3209	0.3749	0.2599	-0.0568
I have knowledge about <i>moraichichi</i>	-0.3687	-0.0858	0.5883	
The mother is responsible for the child's nutrition and treatment		0.1690		0.6336
The use of <i>moraichichi</i> is a mother's choice and decision	-0.1870	0.4571		0.5731
Leadership regarding <i>moraichichi</i> is the role of the nurse	-0.4316	0.2165	0.2285	0.3201
Eigenvalue (variance)	4.54	2.83	1.40	1.30
Contribution rate %	23.88	14.89	7.38	6.82
Cumulative contribution ratio %	23.88	38.76	46.15	52.97

a) The factor extraction method was principal component analysis, and components were extracted on the condition of eigenvalue ≥ 1.0.

b) ▲ is a reverse scoring.

Table 2 Multiple logistic regression model with whether *moraichichi* is introduced as the objective variable  
N=239

Explanatory variables (contrastive categories)	B	SE	p	odds ratio:exp(B)[exp(-B)]	95% confidence interval	
					limit	limit
<b>NICU characteristics</b>						
Number of nursing positions (treated as measured value)	0.0166	0.0056	0.0027	1.02	1.01	1.03
Ward aggressiveness (compared with aggressiveness) (compared with non-aggressiveness)	-0.6761	0.1789	0.0002	0.51	0.36	0.72
PES-NWI Japanese version (handled as measured values)				[1.97]	[1.38]	[2.79]
Involvement of nurses in the work of the entire ward	1.7710	0.8305	0.0330	5.88	1.15	29.93
The foundation of nursing that supports quality of care	-1.3428	0.8730	0.1240	0.26	0.05	1.45
<b>Nurses' characteristics</b>						
Years of NICU experience (treated as measured value)	-0.1434	0.0693	0.0384	0.87	0.76	0.99
				[1.15]	[1.01]	[1.32]
Age (compared with those in their 20s)			0.1360			
30s	0.3903	0.5862	0.5055	1.48	0.47	4.66
40s	2.9062	1.2385	0.0190	18.29	1.61	207.20
Over 50s	1.6692	3.9566	0.6731	5.31	0.00	12381.83
Nurses' own infant feeding methods (compared with breastfeeding)			0.0211			
Mixed nutrition	2.9373	1.5011	0.0504	18.87	1.00	357.62
No nutrition method	-1.0552	0.6858	0.1239	0.35	0.09	1.34
Principal components of nurses' perception of <i>moraichichi</i>						
Nurses have reluctance or resistance to <i>moraichichi</i>	-1.7615	0.2944	2.1873E-09	0.17	0.10	0.31
				[5.82]	[3.27]	[10.37]
Nurses have knowledge about <i>moraichichi</i>	0.4290	0.1992	0.0312	1.54	1.04	2.27
Mother's choice and responsibility for <i>moraichichi</i>	-0.7465	0.2368	0.0016	0.47	0.30	0.75
				[2.11]	[1.33]	[3.36]
GSES 5-level rating (compared with very low) (compared with very high)	-0.5951	0.2334	0.0108	0.55	0.35	0.87
				[1.81]	[1.15]	[2.87]

a) If the odds ratio and the 95% confidence interval of the odds ratio are both less than 1, the odds ratio was recalculated as  $\exp(-B)$ , and the 95% confidence interval was recalculated as  $\exp(-B \pm 1.96 * SE)$  so that the odds ratio was greater than 1.

## Discussion

### Current Status of *Moraichichi* in Japan

The implementation rate of *moraichichi* was 39% in a study by Seo et al. (2008) and 17% in a study by Kitazawa et al. (2003). The higher rate in this study, compared with the aforementioned ones, might be related to the fact that the participants were nurses at comprehensive perinatal medical centers for mothers and children, which are responsible for advanced medical care within NICUs. Despite the relatively high percentage of nurses who practice *moraichichi*, a significant proportion of the nurses did not demonstrate proactive engagement with this practice, suggesting that they may not necessarily have a strong commitment to it. In addition, the first principal component, "resistance or reluctance toward *moraichichi*," extracted from nursing staff's perceptions of

*moraichichi*, supports the idea that nurses' reluctance toward *moraichichi* can be an inhibiting factor in the implementation of the practice. Over 80% of respondents expressed reluctance toward *moraichichi*, citing concerns regarding the safety of the practice or a lack of information; this indicates a widespread belief that there is no established system to ensure the safe provision of *moraichichi*. From the safety point of view, since *moraichichi* is human milk, which is a body fluid, it is presumed that there is a certain number of nurses who think that giving *moraichichi* is undesirable in terms of infection control.

In addition, it is important to emphasize the need for essential measures such as confirming serological infectious disease tests, evaluating physical conditions (including underlying diseases and medication use), and obtaining informed

consent when conducting *moraichichi*. However, the survey results reveal significant variations in responses regarding standards and procedures, informed consent processes, infectious disease screening tests, and sterilization methods, even within the same NICU. This finding highlights the differences in perception and practice standards among healthcare professionals regarding *moraichichi*.

### **NICU Characteristics Regarding Moraichichi**

Several NICU characteristics related to the implementation of *moraichichi* were identified in this study. These include the number of nurses, the proactive nature of the NICU, and the “nurse’s involvement in hospital-wide operations” aspect of the Japanese version of the PES-NWI. The findings suggest that it is necessary to secure adequate staffing levels within NICUs and designated managers with knowledge and information regarding *moraichichi*.

In addition, a positive work environment tends to increase the likelihood of *moraichichi* practices, suggesting that the overall work environment significantly influences individual nurses’ perceptions. The association of “nurse involvement in hospital-wide operations” with *moraichichi* practice indicates that a sense of professional competence and accomplishment can influence the adoption of special care practices such as *moraichichi* in healthcare settings.

### **Nurse’s Characteristics Regarding Moraichichi**

The findings revealed that the absence of “Nurses’ reluctance or resistance to *moraichichi*” is associated with increased *moraichichi* practice, indicating that the personal values and intentions of nursing staff play an important role in the adoption of *moraichichi*. The feeding methods chosen by nurses for their own children were also found to be a factor influencing *moraichichi*.

In addition, the results showed that nursing staff who possessed knowledge about *moraichichi* were more likely to engage in the practice. This result is consistent with the view that a lack of awareness among medical

professionals can hamper the progress of *moraichichi* practices, as the participation of perinatal care staff plays a vital role in its success (Iwata and Iwata, 2005).

Furthermore, contrary to our expectations, nurses who took leadership in implementing *moraichichi* practices had lower GSES scores. This may suggest that even nurses with some knowledge and experience are unsure about implementing and promoting the program, and they may be reluctant to do so.

In summary, providing nursing staff with accurate knowledge about *moraichichi* and minimizing gaps in understanding are important issues going forward. To this end, it will be necessary to organize regular study sessions and develop effective educational programs. In addition, it was found that nurses implementing *moraichichi* believed that the responsibility lies with medical professionals rather than leaving the choice and responsibility for *moraichichi* to mothers.

Therefore, it is important for nurses to intervene as experts and take a leadership role, especially considering the current situation in which informed consent for the use of *moraichichi* is not sufficiently obtained. Nurses should collaborate with doctors, engage closely with mothers, think together with them, and obtain informed consent.

**Limitations:** Although the present study reveals important findings, it has some limitations. This study was a cross-sectional survey using a questionnaire, which may limit its generalizability. The valid response rate was 40.8%, and it is possible that individuals who were less proactive or interested in *moraichichi* may not have responded, which may potentially bias the results.

**Conclusion:** The findings of the current study indicate that, even among NICU nurses who facilitate *moraichichi*, there is a lack of proactive engagement and a tendency toward being passive or resistant. Many nurses believe that the system for providing *moraichichi* safely is not adequate. Key characteristics of nurses more likely to practice *moraichichi* include not being passive or resistant, having knowledge about *moraichichi*, and recognizing that the choice and responsibility for *moraichichi* do not solely rest with the mother. Factors within

NICUs that increase the use of *moraichichi* include a higher number of nursing staff in the NICU, a proactive approach to *moraichichi*, and a high level of “nurse’s involvement in hospital-wide operations” within the nursing practice environment.

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