



An analysis of the locations visited by night shift midwives and the duration spent in each while providing round-the-clock critical care to high-risk mothers in a maternity ward

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博士論文

An analysis of the locations visited by night shift midwives and the duration spent in each while providing round-the-clock critical care to high-risk mothers in a maternity ward

(24 時間体制でハイリスクの母体救命救急に対応している産科単独の病棟における夜勤帯助産師の滞在場所と滞在時間の分析)

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Introduction

Most deliveries in Japanese hospitals occur in a ward shared by obstetrics and other departments; fewer than 20% of deliveries occur in a maternity ward ¹⁾. Moreover, providing a safe and comfortable environment in which to have and raise children is a pressing issue in Japan because of changes in perinatal care since fewer facilities are performing deliveries, a decline in the birth rate, and an increase in high-risk pregnancies and deliveries ¹⁾. In order to enhance perinatal care, perinatal medical centers, regional mother and child medical centers, and transport systems have been enhanced based on the Guidelines for Enhancement of Perinatal Care (January 2020, Notice from the Head of the Health Policy Bureau, Ministry of Health, Labor, and Welfare) ²⁾. Based on the type of perinatal care provided, 68.2% of maternity wards are located in perinatal medical centers and 28.1% are located in regional mother and child medical centers ¹⁾. A high percentage of perinatal medical centers provides care to high-risk pregnant women. Nowadays, women are giving birth later as they participate in society more and as advanced reproductive technologies develop, and the number of high-risk pregnant women will presumably increase. This means perinatal medical centers that provide round-the-clock critical care to high-risk mothers will play an even more important role ³⁾.

Midwife staffing in Japan is stipulated to be “an appropriate number of midwives in obstetrics and gynecology or obstetrics” (Article 21 of the Medical Care Act) ⁴⁾, but there are no set criteria for proper staffing of midwives. Thus, the basic hospitalization fee is based on nurse staffing criteria that do not differentiate between midwives and nurses ⁵⁾. The importance of nurse staffing to ensure the safety and quality of care has been noted in various foreign countries ⁶⁾⁷⁾. The length of care provided by registered nurses is proportional to the provision of quality care and patient safety ⁶⁾⁷⁾⁸⁾. Appropriate staffing is linked to better patient outcomes (a decreased mortality rate) and a higher retention rate for nurses and it is associated with reduced burnout among nurses and patient safety and the quality of care ⁷⁾. A study focusing on perinatal care reported that proper midwife staffing and active involvement with pregnant and postpartum women were linked to a decrease in the perinatal mortality rate, the rate of caesarean sections, and the rate of excessive medical interventions ⁹⁾. The authors’ research group previously conducted basic studies on wards with severely ill patients shared by obstetrics and other departments to provide basic data on nurse staffing. Those studies revealed how caring for pregnant women in labor or critical condition overlaps with caring for dying patients ¹⁰⁾¹¹⁾. However, no studies thus far have quantitatively analyzed care provided in a maternity ward in comparison to that provided in wards shared by obstetrics and other departments, and this has been a topic of discussion for the authors’ research group.

One way to quantify care, i.e. to continuously measure activities in order to bring care to light, is a time and motion study ¹²⁾¹³⁾. In such a study, activities are self-recorded by subjects themselves or they are recorded by an observer. Self-recording reduces manpower and costs and it allows a large sample size, but it lacks accuracy, as studies have noted ¹⁴⁾¹⁵⁾¹⁶⁾. Over the past few years, time and motion studies involving observers have been conducted in Japan. Those studies used information and communication devices as part of joint research in nursing and engineering to bring care to light. The form of care provided and where it is provided are presumably closely related ¹⁷⁾, and several studies have used positional sensors ¹⁰⁾¹¹⁾¹⁸⁾¹⁹⁾²⁰⁾. Using information and communication devices to reveal the care provided in wards as a whole, including actions by midwives, allows that care to be monitored at the same time. The

current study was conducted at a perinatal medical center, which is a facility that accepts mothers and newborns around the clock in order to ensure the survival of the mother and child ^{2) 3)}. In many situations, multiple patients will be seen at the same time. If those situations are brought to light, then major crises can be averted. The current study was conducted in a maternity ward where all of the personnel were midwives. Findings revealed the concerted actions by midwives during a delivery or caesarean section. During the night shift in particular, a limited number of staff must ensure the safety and survival of the mother and child. To that end, basic data on proper staffing needs to be compiled, the care workload during the night shift needs to be quantified ²¹⁾, and the form of care provided needs to be determined ²²⁾.

Thus, the current study used information and communication devices in an attempt to determine the locations visited by midwives and the duration spent in each in a maternity ward providing round-the-clock critical care to high-risk mothers. The night shift in particular is short on midwives. This study revealed the actions of staff members in the entire ward when sudden events, such as an unexpected delivery or emergency caesarean section, occurred or did not occur during the short-staffed night shift. This study also examined how those events affected the actions of midwives. Those findings should serve as basic data on midwife staffing during the night shift.

Aim

To determine the locations visited by midwives during the night shift and the duration spent in each in a maternity ward providing round-the-clock critical care to high-risk mothers and to examine how deliveries and caesarean sections affected staffing in each area.

Methods

1. Study Period

This study was conducted from June 27–July 8, 2019. The night shift during this period was from 4:30 PM–8:59 AM the next day. Data from 2 d were missing due to an apparent communication fault, so those days were excluded and 10 d were analyzed.

2. Study Site

A maternity ward and maternal-fetal intensive care unit (MFICU) of a perinatal medical center in Osaka Prefecture. This facility sees a combination of low- to extremely high-risk pregnant and postpartum women and it performs more than 1,000 deliveries annually. In 2019 when this study was conducted, the facility performed a total of 1,139 deliveries. The number of caesarean sections and deliveries performed during the day and night are shown in **Table 1**.

3. Subjects

All of the personnel assigned to the maternity ward and MFICU at the facility where this study was conducted were midwives. A total of 46 midwives work in 2 shifts per day. Seven personnel worked during the night shift: a leader, a prenatal supervisor, a delivery supervisor, a postpartum supervisor, 2 MFICU supervisors, and a midwifery supervisor (the night shift had the same number of personnel on weekends and weekdays).

Subjects were almost 70 midwives who worked the night shift in the maternity ward or MFICU during the 10 d this study was conducted and who consented to participate in this study.

Table 1. Number of Caesarean sections and deliveries performed during the day and night during the year in which this study was conducted

	Total	Day shift	Night shift
Total	1139 (24)	538 (10)	601 (14)
Deliveries	640 (16)	191 (8)	449 (8)
Caesarean sections	499 (8)	347 (2)	152 (6)
Percentage of Caesarean sections	43.8% (33.3%)	64.5% (20.0%)	25.3% (42.9%)

Day shift: 9:00 AM to 4:59 PM

Night shift: 4:30 PM to 8:59 AM on the following day

(): Values in parentheses are in the period when data were collected for this study

4. Data Collection

1) Use of beacons and smartphones to determine locations visited by midwives and the duration spent in each

Locations were determined using Bluetooth Low Energy smartphones (Zen Fone Live ZA550KL, ASUSTeK Computer, Inc.) and wireless beacons (Stick-N-Find, Stick-N-Find Technologies and MM-BLEBC3, Sanwa Supply). Wireless beacons were installed at 150 locations in wards and the MFICU (**Figure 1**), and midwives worked as usual while carrying a smartphone (positional sensor).

The system of information and communication devices used to determine locations visited by midwives and the duration spent in each was configured as shown in **Figure 2**. When a smartphone carried by a midwife was near a beacon (an access point), the time the signal was received and the beacon ID (proximity information) were recorded. Recorded information was transmitted to an online server every 1 min and stored as the midwife's position.

The duration spent in a given location was based on the time when a signal was received from a beacon, and the location visited by a midwife was the beacon ID. The beacon interval was set at 10 s. Measuring equipment used a Bluetooth Low Energy frequency of 2.4 GHz for that signal. A previous study found that measuring equipment using the aforementioned frequency would not affect medical equipment ¹¹⁾, so the same measuring equipment was used in the current study.

2) Collection of data on the ward status

Data regarding the number of patients admitted during the period of this study, the number of surgeries (caesarean sections), operating time, the number of deliveries, the length of delivery, the number of newborns, and the number of newborns treated (phototherapy) were collected from electronic medical records and management logs.

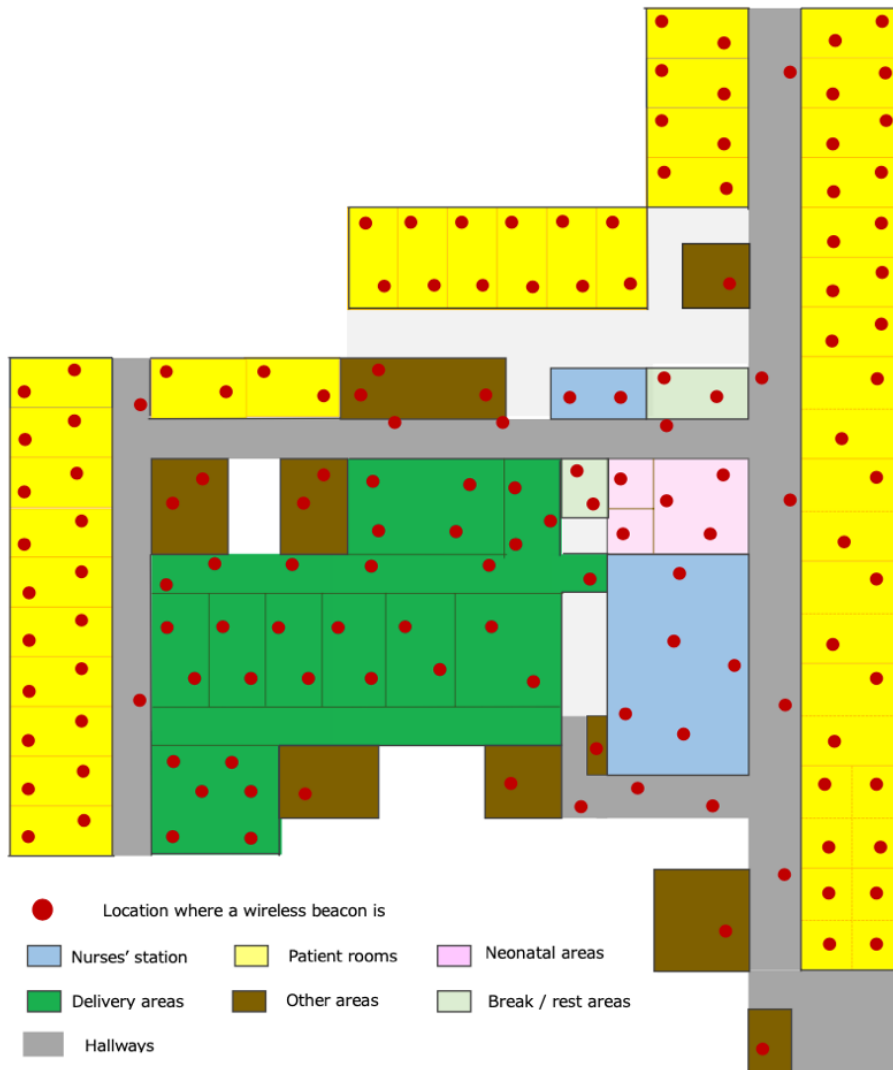


Figure 1 Locations where wireless beacons are installed and the 7 areas visited by midwives

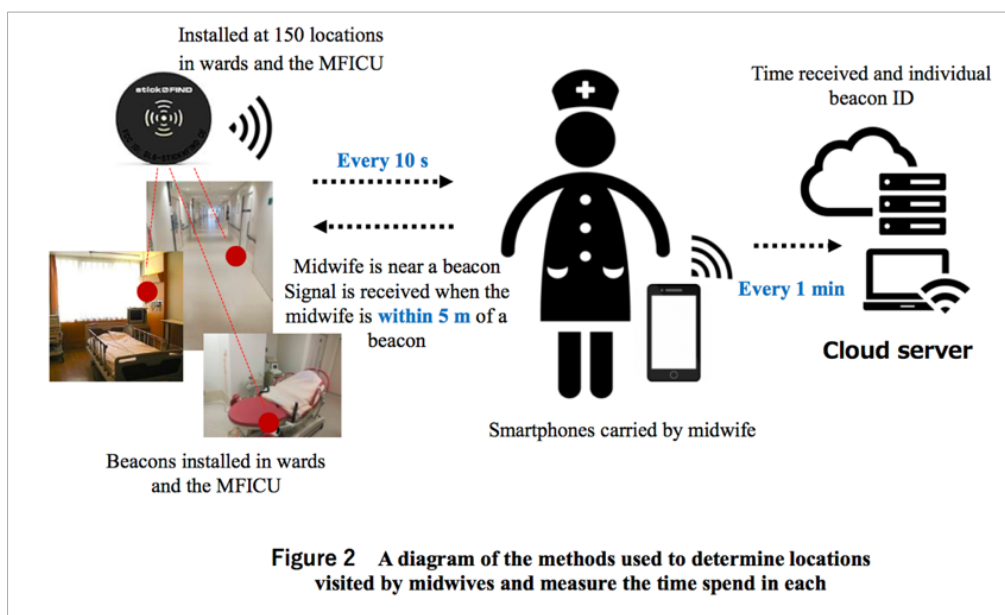


Figure 2 A diagram of the methods used to determine locations visited by midwives and measure the time spend in each

3) Collection of staff information

Information was collected on the years of midwifery experience staff who worked the night shift during the period of this study had.

5. Definition of Terms

1) Events

An event is an unscheduled or unexpected delivery or caesarean section occurring during the night shift. The time when an event occurred was when a child was delivered naturally or via caesarean section.

2) Maternity ward

A maternity ward refers to an obstetric ward with beds for obstetrics and MFICU patients. Such a ward does not have beds for patients from other departments.

3) Perinatal medical center

A perinatal medical center is a medical facility with a maternity ward that has an MFICU with at least 6 beds and a neonatal intensive care unit with at least 12 beds. These facilities have a system for routinely accepting mothers and newborns and they are responsible for providing round-the-clock critical care for mothers, medical care for high-risk pregnancies, and advanced neonatal care.

4) The night shift

The night shift refers to the shift comprising a total of 990 min from 4:30 PM to 8:59 AM on the following day.

6. Data Analysis

The locations visited by midwives were the maternity ward and MFICU where beacons were installed. Those locations were categorized into 7 areas: the nurses' station, patient rooms, neonatal areas, delivery areas, other areas, hallways, and break/rest areas (**Table 2** and **Figure 1**). The nurses' station included the maternity ward nurses' station and the MFICU nurses' station. Patient rooms (where patients received care) included all patient rooms in the maternity ward and MFICU. Neonatal areas were all areas required to look after or care for an infant and included the breastfeeding room and bathing room. Delivery areas included the delivery room as well as the caesarean section room where emergency caesarean sections were performed at night.

Table 2. Details on 7 areas visited by midwives

Nurses' station	Ward nurses' station and MFICU nurses' station
Patient rooms	All patient rooms in wards and the MFICU
Neonatal areas	Neonatal rooms, the breastfeeding room, and the bathing room
Delivery areas	Labor room, 5 residential rooms, 2 midwife-assisted delivery rooms, and operating room
Hallways	Passageways in the ward and MFICU
Break/rest areas	Staff lounge and nap room
Other areas	Pelvic examination room, the echocardiography room, the shower room, the supply room, the kitchenette, the maternity classroom, and the waste disposal room

The current study analyzed actions by night shift midwives with a focus on days on which events occurred and days on which no events occurred. This study ascertained the locations visited by midwives and the duration spent in each during normal night shifts and during night shifts when an event occurred. This study also examined how events affected staffing in each area. Collected data were summarized as descriptive statistics.

Data on locations visited by midwives and the duration spent in each were summarized as descriptive statistics. Data were divided into 2 groups based on whether or not an event (a delivery or caesarean section) occurred, and the Mann-Whitney U-test was used to compare differences between the 2 groups.

All statistical analysis was performed using IBM SPSS statistics ver.26 for Mac, and $P < .05$ was considered statistically significant.

7. Ethical Considerations

This study was submitted to and approved by the ethics committee of Kobe University Graduate School of Health Sciences (approval no. 839) and the ethics committee of the facility where this study was conducted.

Beacons were installed in the maternity ward and MFICU. An administrator at the facility where this study was conducted explained the purpose of this study in writing to pregnant and postpartum women in the maternity ward and MFICU, and consent was obtained via a signature on the consent form.

A researcher who was not affiliated with the facility where midwives worked held a briefing session for all maternity ward and MFICU staff. The purpose of this study was explained in writing to midwives (the subjects of this study), and consent was obtained via a signature on the consent form.

Results

1. Status of the Ward during the Study Period

Data from 2 d were missing due to an apparent communication fault, so those days were excluded and 10 d were analyzed. During the 10 d analyzed, an event occurred on 8 d and no events occurred on 2 d. Types of events that occurred during the period of data collection and when they occurred are as shown in **Table 3**.

Table 3 Status of events

	Events that occurred during the night shift and when they occurred		
Day 1	C-section (5:27 a.m.)		
Day 2	Delivery (7:02 p.m.)	Delivery (11:47 p.m.)	
Day 3	<i>No events</i>		
Day 4	Delivery (7:31 a.m.)		
Day 5	Delivery (3:53 a.m.)		
Day 6	C-section (4:43 p.m.)		
Day 7	C-section (5:16 p.m.)	C-section (5:31 p.m.)	
Day 8	<i>No events</i>		
Day 9	Delivery (10:45 p.m.)	C-section (8:30 a.m.)	Delivery (8:58 a.m.)
Day 10	C-section (10:49 p.m.)		

C-section : Caesarean section

() : indicated the time when the event occurred

2. The Number of Personnel Working the Night Shift and their Roles

During the 10 d analyzed, a total of 70 midwives worked the night shift.

On all of the 10 d analyzed, 7 midwives were assigned to the night shift. One of the 7 midwives served as the leader, 1 served as the prenatal supervisor, 1 served as the delivery supervisor, 1 served as the postpartum supervisor, 2 served as the MFICU supervisors, and 1 served as the midwifery supervisor. When both a delivery and a caesarean section coincided, the leader selected a supervisor for each.

In expectation of an emergency caesarean section during the night shift, 1 of the 7 staff members on the night shift was always tasked to assist with surgery.

3. The Actions of Midwives during the Night Shift depending on Whether or not an Event Occurred

Information and communication devices were used to simultaneously determine the actions of 7 midwives over the 990-min course of each night shift. Results are shown in **Figures 3-1** and **3-2**. Analysis first focused on how many midwives were assigned to delivery areas when a delivery or caesarean section occurred. When an event occurred, 2-4 midwives were assigned to delivery areas. Two to 4 midwives were assigned, regardless of whether the event was a delivery or a caesarean section. Analysis next focused on the actions of midwives, including those before and after a delivery or caesarean section. For a delivery, personnel assembled 30 min before birth. For a caesarean section, personnel assembled 1 h before birth. Three to 4 personnel were assigned to a delivery and 3-6 were assigned to a caesarean section. After birth, 2-5 midwives were assigned to delivery areas. Personnel assembled for about 1 h after birth either naturally or via caesarean section.



Figure 3-1 Day1-Day5 : Actions of 7 midwives during the 990-min night shift

Mw : Midwives Mw1-Mw7: Midwives working the night shift

Mw.1: leader Mw.2: prenatal supervisor Mw.3: delivery supervisor Mw.4: postpartum supervisor Mw.5 and Mw.6: MFICU supervisor Mw.7: mid

The night shift ; The night shift refers to the shift comprising a total of 990 min from 4:30 PM to 8:59AM on the following day

Actions of midwives over time are color-coded for each area. The red vertical line in the figure indicates when an event occurred.

There were no events on Day 3.

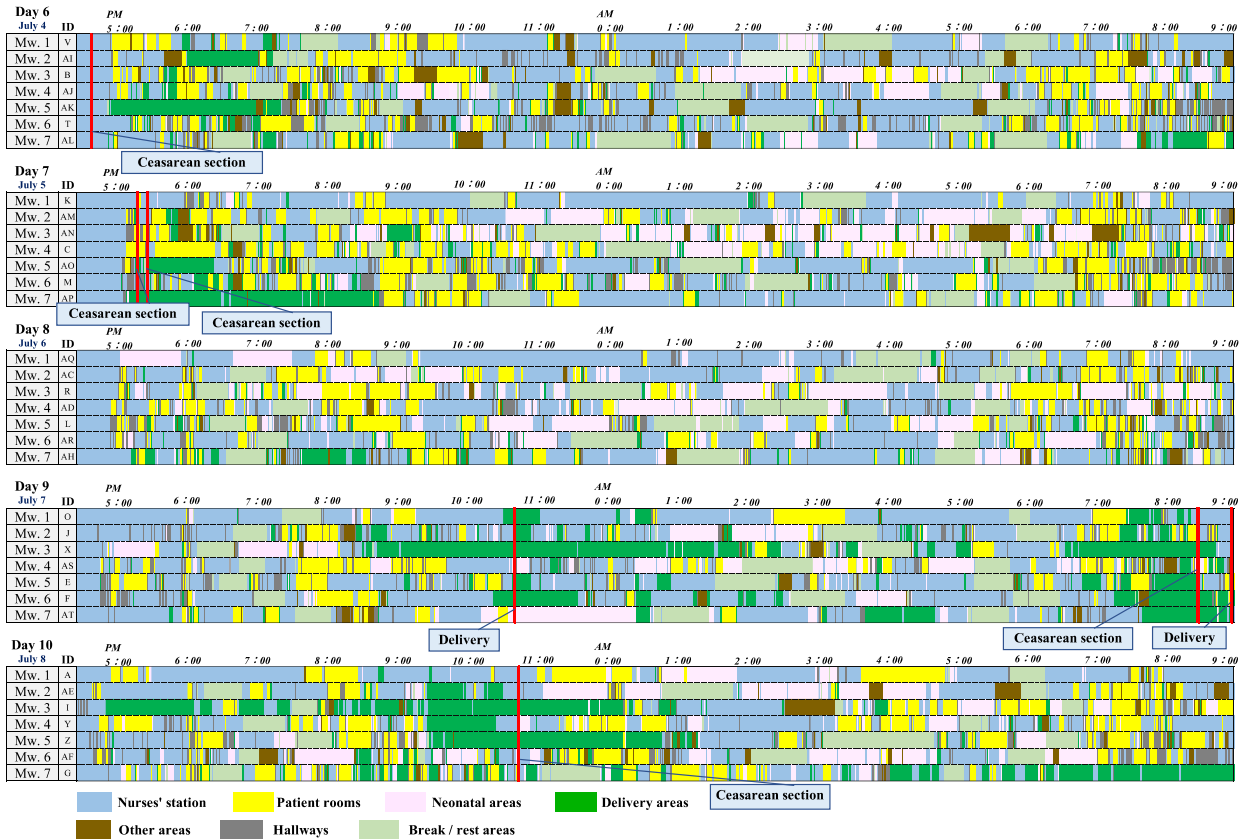


Figure 3-2 Day6-Day10 : Actions of 7 midwives during the 990-min night shift

Mw : Miwives Mw1-Mw7: Midwives working the night shift
 Mw.1: leader Mw.2: prenatal supervisor Mw.3: delivery supervisor Mw.4: postpartum supervisor Mw.5 and Mw.6: MFICU supervisor Mw.7: mid
 The night shift : The night shift refers to the shift comprising a total of 990 min from 4:30 PM to 8:59AM on the following da
 Actions of midwives over time are color-coded for each area. The red vertical line in the figure indicates when an event occurred.
 There were no events on Day 8.

4. The Percentage of the Duration Midwives Spent in Each of the 7 Areas

The percentage of the duration that night shift staff spent in each area when an event did or did not occur is shown in **Figure 4**. On days when no events occurred, midwives spent 46.9% of the 990-min night shift in the nurses' station, 14.6% in patient rooms, and 15.5% in neonatal areas. On days when no events occurred, midwives spent only 3.4% of the night shift in delivery areas versus 15.2% on days when events occurred. Midwives spent a markedly higher percentage of the night shift in delivery areas on days when events occurred. On days when events occurred, however, midwives spent 36.9% of the duration of the night shift in the nurses' station, 16.0% in patient rooms, and 11.7% in neonatal areas. The percentage of the duration spent in a given area did not increase or decrease substantially.

5. An Intergroup Comparison of Whether or not an Event Occurred during the Duration Spent in Each Area

Results are shown in **Table 4**. Significant differences during the duration spent in the nurses' station, delivery areas, and break/rest areas ($P<.05$) were noted depending on whether or not an event occurred. Significant differences in the duration spent in patient rooms ($P=.644$), neonatal areas ($P=.237$), other areas ($P=.547$), and hallways ($P=.977$) were not noted depending on whether or not an event occurred. Based on these findings,

midwives on the night shift when an event occurred spent a shorter duration in the nurses' station and break/rest areas but spent a longer duration in patient rooms and neonatal areas.

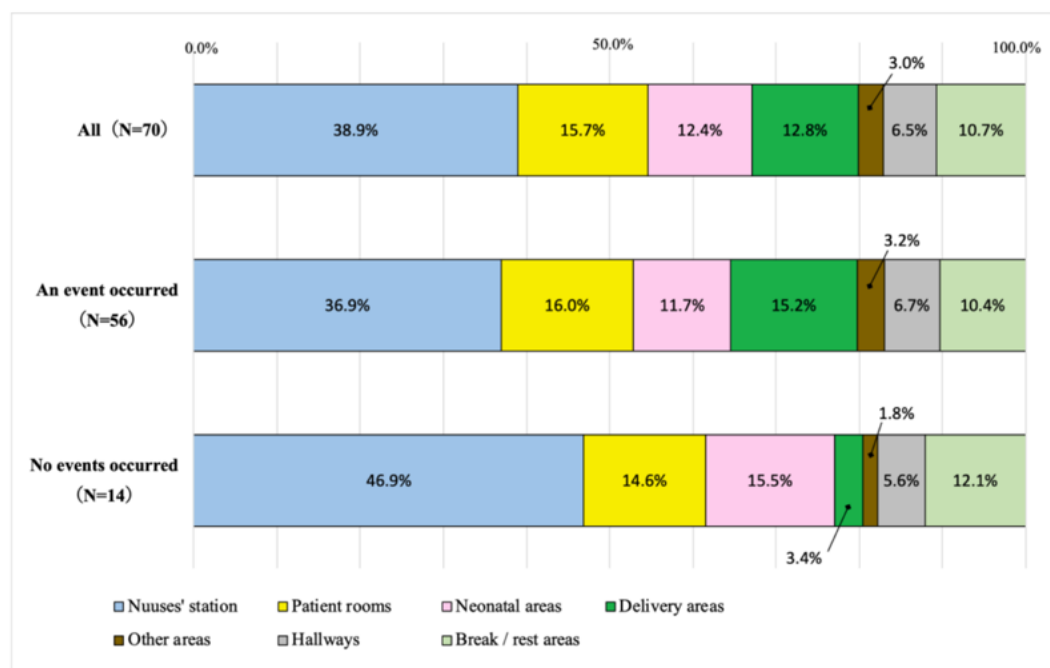


Figure 4 Percentage of the duration that midwives spent in each of the 7 areas during the night

N: number

Total number of midwives: Seven midwives placed $\times 10$ days = 70 midwives

No. of midwives on a day when an event occurred: Seven midwives assigned $\times 8$ days = 56 midwives

No. of midwives on a day when no events occurred: Seven midwives assigned $\times 2$ days = 14 midwives

Table 4 A comparison of the duration spent in each area: An intergroup comparison of whether or not an event occurred

Area	Median (IQR) overall (N=70)	Whether or not an event (delivery/C-section) occurred		P-value
		Median (IQR) for the group that experienced an event (N=56)	Median (IQR) for the group that experienced no events (N=14)	
Nurses' station	359.0 (272.5–472.7)	343.0 (258.5–445.0)	460.5 (329.0–564.5)	.014
Patient rooms	152.5 (99.2–203.2)	162.0 (94.7–218.2)	143.5 (118.0–187.0)	.644
Neonatal areas	102.5 (52.0–186.2)	94.0 (50.2–171.7)	155.5 (48.7–229.7)	.237
Delivery areas	72.0 (31.0–169.2)	82.5 (47.0–200.0)	26.0 (17.5–34.5)	.000
Hallways	51.0 (32.7–83.5)	51.0 (31.2–88.7)	53.5 (41.2–70.2)	.977
Break/rest areas	111.5 (100.0–122.5)	109.0 (91.2–120.5)	120.0 (114.0–128.7)	.010
Other areas	12.5 (9.0–21.0)	13.0 (9.0–21.7)	11.5 (7.0–19.5)	.547

N: number; IQR: interquartile range; $P < .05$ Mann-Whitney U-test

Discussion

1. Characteristics of the Locations Visited by Midwives during the Night Shift and the Duration Spent in Each

In this study, midwives spent the longest duration of the night shift [359.0 min (272.5-472.7 min)] in the nurses' station (**Table 4**), regardless of whether or not an event occurred. This is similar to the results of a previous study that analyzed the work of nursing staff²³⁾. Fewer staff work the night shift than the day shift, and each midwife has to care for more patients²⁴⁾. Thus, midwives will necessarily need more information to provide patients with safe and quality care²⁵⁾, and collecting information from medical records and checking it with a leader presumably results in a longer duration spent in the nurses' station. In addition, nursing staff work with other staff to provide quality care^{26) 27)}, so required work information must be shared with other staff members²⁸⁾. A perinatal medical center accepts mothers and newborns around the clock to ensure the survival of the mother and child^{2) 3)}, and in many situations multiple patients will be seen at the same time. In fact, 2 events occurred during the night shift on 4 of the 10 days during which data were collected. Moreover, 3 events occurred on day 9 (**Table 3**). When an event occurs, the total nighttime workload in the ward necessarily increases²⁵⁾. In other words, there are more situations where staff must perform work outside their usual duties. In order to make that work more efficient, night shift staff perform their duties while coordinating work^{29) 30)}, and this phenomenon is reflected in the duration spent in the nurses' station.

The duration spent in delivery areas differed substantially depending on whether or not an event occurred. The actions of the 7 midwives working the night shift are shown in **Figure 3-1** and **Figure 3-2**. As is apparent, 3-6 personnel must be present when an event occurs (as well as afterwards). This finding quantitatively reveals the need for an adequate number of personnel and close involvement with the patient in order to ensure the safety of a delivery or emergency caesarean section at night and the survival of the mother and child. Moreover, over half of the women seen at a perinatal medical center are high-risk pregnant and postpartum women³¹⁾, suggesting that delivery must be closely monitored. This is echoed by the results of a previous study, which found that patients in obstetrics requiring a medical intervention need about 1.3 times more care than postpartum women who give birth naturally³²⁾.

2. Staffing Proposals regarding the Night Shift

At a facility providing round-the-clock critical care to high-risk mothers, the timing of an event cannot be predicted accurately. Thus, staffing must be considered with the assumption that an event might occur. The study has provided data to do so. The facility where this study was conducted is distinctive in that it is a perinatal medical center providing round-the-clock critical care to high-risk mothers and all of the personnel working there are midwives.

An analysis of objective quantitative data revealed that midwives working the night shift do not spend a shorter duration in patient rooms or neonatal areas when a sudden event, i.e. a delivery or emergency caesarean section, occurs. Instead, night shift staff work together to provide patients with necessary bedside care and to look after or care for infants in the neonatal rooms. When a sudden event, i.e. a delivery or an emergency caesarean section, occurs, the short-staffed night shift must spend a longer duration in delivery areas to ensure the safety and survival

of the mother and child ³²⁾. When an emergency caesarean section is deemed necessary to save the life of the mother and infant, preparations must be quickly made to perform that procedure. Based on the actions of the 7 midwives during the 990-min night shift as shown in **Figure 3**, 3–6 midwives were assigned to delivery areas, where they prepared for a caesarean section to ensure the survival of the mother and child. Over half of the night shift staff were assigned to those areas. However, the study noted no significant differences in the duration spent in patient rooms and neonatal areas depending on whether or not an event occurred. This is because the 7 staff members on the night shift worked together and acted as a team with a common goal: ensuring the survival of the mother and child and the quality of patient care ³⁰⁾. Implicit coordination is a major factor for exceptional team performance ³³⁾. Implicit coordination is when team members anticipate the actions and thoughts of other members without communicating directly, they anticipate the actions that need to be taken in a situation, and team members modify and adjust their actions accordingly. Adept teamwork by medical staff is required to provide safe and quality care ³⁴⁾. The 7 staff members on the night shift at the facility where the current study was conducted displayed teamwork, and this was a major factor for why they were able to provide safe and quality care, regardless of whether or not an event occurred. All of the personnel in the maternity ward and MFICU at the facility where this study was conducted are midwives. These personnel are in the same profession, so they can predict the thoughts of their colleagues and actions that should be taken and they can modify their actions to achieve a common goal, i.e. saving the life of the mother and child. Presumably, this is why implicit coordination occurred. In addition, midwives spent a sufficient duration in patient rooms and neonatal rooms and they ensured the quality of care even when events occurred during the night shift. A major factor for this is presumably because this study was conducted at a perinatal medical center. A previous study of wards shared by multiple departments revealed the potential for MRSA infection of newborns ³⁴⁾, and another study revealed the overlapping of care for pregnant women in labor and care for dying patients from other departments ³⁵⁾. These findings have highlighted issues with wards shared by obstetrics and other departments. Of the births at a perinatal medical center, about 53.3% involve high-risk to extremely-high-risk pregnant and postpartum women ³¹⁾. Under such circumstances, staffing to provide safe and quality care needs to be examined, as the current results have revealed. Moreover, wards need to be reorganized to allow a focus on care for high-risk pregnant and postpartum women, i.e. medical care needs to be reconsidered.

The mission of nurses is to ensure the quality and amount of care, regardless of the circumstances ³⁶⁾. A previous study found that sufficient midwife staffing leads to a decrease in the perinatal mortality rate, the rate of caesarean sections, the rate of evacuation deliveries, and the rate of forceps deliveries ⁹⁾. In light of those results, a system of perinatal care that can draw on the expertise of midwives needs to be created ⁵⁾, staffing to provide a safe and comfortable environment in which to give birth needs to be examined, and the nature of perinatal care needs to be reconsidered. The workload and duties of midwives need to be ascertained ⁵⁾, and the current results can contribute greatly to that end.

In addition, revealing the locations visited by midwives and the duration spent in each during the night shift will inform society of the work done by midwives. The current study has examined midwife staffing during the night shift. The current results can help to better educate society about the job of a midwife and inform society of the valuable care only a midwife can provide.

Conclusion

The current study used information and communication devices to analyze the locations visited by midwives and the duration spent in each while on the night shift at a perinatal medical center providing round-the-clock critical care to high-risk pregnant women. When an event occurred, over half of the midwives were assigned to delivery areas to ensure the survival of the mother and infant. Even when sudden events occurred, midwives provided patients with needed care without reducing the duration of time they spent in patient rooms and neonatal rooms. Major factors for this were midwives on the short-staffed night shift collaborating with other members of the care team and the fact that this study was conducted at a facility dedicated to perinatal care. The current results offer a chance to reconsider the nature of perinatal care.

Limitations

This study used information and communication devices to analyze the locations visited by midwives and the duration spent in each, but it did not analyze factors influencing the duration spent in a given area nor did it determine what forms of care were provided in those areas. In addition, data were collected during the night shift, which is when a relatively large proportion of caesarean sections are performed for the year. Additional data would need to be compiled in order to generalize the results of the current analysis. Moreover, the current authors would like to use information and communication devices to determine what care is provided, like the current study did, to further analyze results in light of staff attributes, and to conduct additional studies to provide basic data on midwife staffing.

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COI disclosure

The authors have no conflicts of interest directly relevant to the content of this article.

Abstract

In Japan, about 80% deliveries occur in a ward shared by Obstetrics and other departments, and studies have revealed that nurses have overlapping duties in assisting with delivery and caring for dying patients from other departments. Moreover, 68.2% of deliveries in the maternity ward are high risk, so there are concerns about the safety of the delivery environment. Thus, the current study sought to ascertain the realities of care in a maternity ward providing round-the-clock critical care to high-risk mothers. This study also sought to examine the nature of perinatal care. This study used beacons and smartphones to reveal the locations visited by midwives and the duration spent in each. When sudden events occurred, over half of the midwives were assigned to delivery areas to ensure the survival of the mother and infant, and they provided patients with needed care without reducing the duration of time they spent in patient rooms and neonatal rooms. The outcomes of collaboration among members of the care team were associated with the fact that this study was conducted at a facility dedicated to perinatal care.

Key Words : maternity ward, night shift, information and communication devices, time and motion study, midwife staffing

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