

## Original

# Factors related to midwives' use of eyeguards during childbirth assistance

Hitomi KUSUMI, Miki UENO

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**Abstract:** This study elucidated about the factors related to midwives' use of eyeguards during childbirth assistance. We surveyed 1254 midwives (665 valid responses) about their exposure to blood and body fluids and the factors that influence their use of eyeguards during childbirth assistance. The results indicated that 96.5% of the respondents had been exposed to blood and fluid, with 20.8% being exposed to their palpebral conjunctiva. Of the respondents, 9.2% reported using eyeguards during childbirth assistance, whereas 61.1% reported not using them.

The results of the multiple regression analysis (with eyeguards use as the dependent variable) indicated that the organizational factor, the midwife at work wears eyeguards, had the strongest influence on such behavior. Other relevant factors were as follows: I can use the eyeguards when assisting with delivery (behavior control feeling), midwives must wear the eyeguards (behavior attitude), and the manager expected midwives to use the eyeguards (subjective norms).

To promote the use of eyeguards among midwives, these results suggest that facilities need to adopt an organizational culture that supports this behavior and have managers, such as ward chiefs, exercise leadership by use eyeguards themselves and encouraging their use.

**Key words:** occupational infection prevention / blood and fluid exposure /  
eyeguards / personal protective equipment / childbirth assistance /  
standard precautions / planned behavior theory

## Introduction

Occupational infection control through the proper use of personal protective equipment (PPE) is very important for preventing the spread of infectious diseases in medical facilities and communities. PPE use also helps ensure the health and safety of healthcare workers, patients, and caregivers. Therefore, compliance with standard precautions is the most important infection control measure in all medical and social welfare facilities.<sup>1)</sup> It is also important for medical professionals to perform proper hand hygiene and use PPE whenever there is a risk of blood and body fluid exposure. Along with needlesticks and cuts, exposing the skin and mucous membranes to blood poses a high risk of occupational infection. For example,

there have been reports of infections caused by blood coming into contact with the eyelid conjunctiva.<sup>2,3)</sup> Because eye exposure has a high risk of infection,<sup>3)</sup> using goggles and/or a mask with a face shield is necessary in situations where blood can be dispersed. Those providing perinatal care can be exposed to several body fluids (e.g., blood, amniotic fluid, and breast milk) and therefore face a high risk of occupational infection. In particular, those providing childbirth assistance handle maternal blood and body fluids close to the delivery field and therefore have a high likelihood of being exposed to blood and amniotic fluid, especially their eyes.<sup>4)</sup> It is important, therefore, for delivery assistants to thoroughly adhere to barrier precautions for protecting the skin and

mucous membranes using PPE.

The high risk of blood exposure during childbirth assistance has been reported in the literature<sup>5, 6)</sup> and through observational studies of childbirth scenarios.<sup>7, 8)</sup> To verify the risk of blood exposure, a luminol test was conducted on face shields used during birth assistance.<sup>9)</sup> As a result, blood exposure was confirmed on all the collected face shields, verifying the high risk of blood exposure during birth assistance and the need for face protection. Therefore, we conducted a national survey in Japan with the aim of clarifying the actual level of blood exposure experienced by midwives during childbirth assistance and the factors related to their eyeguards use. We believe that clarifying these factors would allow us to consider some effective measures for promoting this behavior.

## Methods

### 1. Sample and recruitment

The desired sample for our survey was midwives working in hospitals all over Japan. To obtain our sample, we first visited a website (<http://www.10man-doc.co.jp/>) that included a directory of more than 150,000 hospitals, medical clinics, and dental clinics grouped by region and medical specialty. We then extracted a list of 1325 hospitals that provide obstetric services from the directory. After classifying the hospitals into six categories according to the number of beds (fewer than 100 beds, 100–199 beds, 200–299 beds, 300–399 beds, 400–499 beds, and 500 or more beds), we randomly selected 52 facilities from each category, for a total of 312 facilities. These 312 target facilities were randomly selected by obtaining random numbers using the RAND function in Excel, which is a spreadsheet software.

Next, we asked the nursing managers of the 312 hospitals to participate in our research using a round-trip postcard. We received replies from 180 facilities (response rate: 57.7%), of which 105 provided consent for participation. The final

survey sample included 1254 midwives working at 105 facilities.

### 2. Study method and period

The study used an anonymous self-administered survey – delivered via mail – and was conducted between March 2013 and August 2013.

### 3. Survey contents

The survey contents are described in sections 3.1–3.7 below. These items were created in accordance with the theory of planned behavior. This theory states that behavior is caused by behavioral intentions that are defined by attitudes toward behavior, subjective norms, and a sense of control of behavior.<sup>10)</sup> We also investigated the organizational environment<sup>11, 12)</sup> and the presence or absence of infection training<sup>13)</sup> that were associated with PPE use behavior in previous studies using planned behavior theory.

Among the survey contents, we asked respondents to report on their attitudes, subjective norms, and feelings of control regarding eyeguards use during childbirth assistance using a four-stage Likert scales with the following responses: Strongly agree, Agree, Disagree, and Strongly disagree.

#### 1) Midwife attributes

We investigated respondents' age, years of midwife experience, and number of childbirth assistance cases in the previous year.

#### 2) Personal factors

We examined respondents' experience associated with attending infection education session/seminars, contributing to the infection control team (ICT), and fear of infection from childbirth assistance. We also documented exposure to blood and body fluids during childbirth assistance, including the part exposed and exposure frequency (frequent, occasional, and rare exposure).

#### 3) Organizational factors

As organizational factors, we documented whether eyeguards were present or absent in delivery rooms and the frequency that midwives in the same workplace wore them during childbirth assistance (everyone wears it, more than half wear it, most do not wear it, or no one wears it).

#### 4) Attitude toward eyeguards use during childbirth assistance

An attitude toward a behavior is an expectation for the outcome of the behavior and a way of thinking about the behavior. We investigated the following five attitude items: it is necessary to wear eyeguards in the childbirth assistance area (necessity of eyeguards use), using eyeguards reduces assistive skills such as dexterity (assistive technology of eyeguards use), comfort is impaired when using eyeguards (self-comfort of eyeguards use), my appearance is not good when using eyeguards (effect on appearance of eyeguards use), and it is rude to the birthing woman to use eyeguards (effect of eyeguards use on the relationship of the midwives with the birthing woman).

#### 5) Subjective norms for eyeguards use during childbirth assistance

A subjective norm is a motivation from social norms to live up to people's expectations. In this study, we explored the perception that ward chiefs and other managers are expected to wear eyeguards.

#### 6) Perceived behavioral control over eyeguards use during childbirth assistance

Perceived behavioral control is the feeling of being capable of performing an action. In this study, we investigated the feeling; I can take the measure of using eyeguards.

#### 7) Eyeguards use during childbirth assistance

We asked respondents to report on the percentage of time eyeguards were worn during childbirth assistance.

### 4. Data analysis

First, we computed descriptive statistics for

each question item. Next, we calculated the Spearman's rank coefficient to determine the relevance of eyeguards use during childbirth assistance and other variables. The other variables were the following five items that define behavioral intent in behavioral planning theory: personal factors, organizational factors, attitudes toward eyeguards use, subjective norms for eyeguards use, and perceived behavioral control over eyeguards use.

To clarify variables that directly affect actual eyeguards use rather than just affecting the behavioral intent, we performed multiple regression analysis using the stepwise method; eyeguards use was considered the dependent variable and the variable correlating to the use was considered the dependent variable. Before conducting these tests, the Shapiro-Wilk test was used to confirm that the data did not significantly follow a normal distribution ( $p < 0.00$ ). The significance level for all tests was  $p < 0.05$ . IBM SPSS Statistics ver. 26 (IBM Japan) was used for all statistical analyses.

### 5. Ethical considerations

We explained the study's purpose, significance, necessity, and ethical considerations in the research cooperation request letter to allow research subjects to make an informed decision about study participation. To maintain participant anonymity, the respondents placed their completed survey in a reply envelope themselves and mailed it back to the researchers.

This study was conducted after obtaining approval from the Ethics Review Committee of the Faculty of Nursing, Toho University (approval number: 24016).

### Results

Of the 1254 distributed surveys, 687 were collected (response rate: 54.8%). Of these, 2 respondents with inconsistent responses and 20 with unanswered questions regarding PPE

Table 1. The basic attributes of the midwives

		n = 665	
Item	Category	n	%
Age <sup>1)</sup>	years old	37.2 ± 9.4	(22-68)
Age classification	under30	184	27.7
	30 ~ 39	217	32.6
	40 ~ 49	172	25.9
	50 ~ 59	83	12.5
	over60	3	0.5
	no answer	6	0.9
Midwifery experience <sup>1)</sup>	years	11.6 ± 8.4	(1-35)
Number of childbirth assistance (1 year) <sup>1)</sup>	case	28.7 ± 23.4	(0-152)

1) mean ± SD (range)

対象者の基本的属性を表示。年齢は平均 37.2 歳 (SD 9.4, range 22-68), 助産師経験年数は平均 11.6 年 (SD 8.4, range 1-35), 最近 1 年間の分娩介助件数は平均 28.7 件 (SD 23.4, range 0-152) であった。

use were excluded. Ultimately, we targeted 665 people for valid analysis. The valid response rate was 96.8%.

### 1. Midwife attributes

Table 1 shows the basic attributes of the midwives. The average midwife age was 37.2 years (SD: 9.4, range: 22–68), the average years of midwifery experience was 11.6 years (SD: 8.4, range: 1–35), and the average number of childbirth assistance cases in the previous year was 28.7 (SD: 23.4, range: 0–152).

### 2. Descriptive statistical results on the rate of eyeguards use during childbirth assistance and related factors

Table 2 shows the descriptive statistical results of the eyeguards use and related factors. Regarding personal factors, 612 respondents (92.0%) had attended infection-related education and training, and 158 (23.8%) had contributed to their hospital's ICT activities. In addition, 360 midwives (54.1%) had experienced fear of infection during childbirth assistance.

Regarding blood and body fluid exposure, 642 (96.5%) midwives reported that their skin and mucous membranes had been exposed to body fluids (blood and amniotic fluid) during childbirth assistance. In terms of the part that was exposed (multiple possible answers), hand and finger exposure was the highest (439,

66.0%), followed by arm (436, 65.6%) and lower limb (325, 48.9%) exposure. Focusing on the face, the midwives reported the following exposure experiences: exposure to the eyes (138, 20.8%), around the mouth and oral cavity (198, 29.8%), and on the face other than the eyes and mouth (318, 47.8%). Regarding exposure frequency, 20 (3.1%) midwives said that they were frequently exposed, 300 (46.7%) were occasionally exposed, and 321 (50.0%) were rarely exposed.

Concerning organizational factors, 74.8% of the midwives indicated that they had eyeguards in the delivery room at their place of employment. However, only 64 (9.7%) of the midwives said that all midwives in the ward use eyeguards, and 205 (30.9%) answered that no one was use eyeguards at work.

Of the respondents, 514 (77.3%) were aware of the need to wear eyeguards in childbirth assistance, and 430 (64.6%) indicated that they could wear eyeguards. However, only 61 (9.2%) of the midwives reported using eyeguards every time, and 406 (61.1%) said they did not wear them at all. These findings indicated that, although attitudes and behavioral control tended to support eyeguards use, the desired use has not been reached.

### 3. Factors affecting eyeguards use during childbirth assistance

Table 2. The descriptive statistical results of the eyeguard use rate and related factors

n = 665

Item	Category	n	%
<b>1 Personal factors</b>			
Experience of attending education on infection	Yes	612	92.0
Experience of playing a role in ICT activities	Yes	158	23.8
Experience of fear of infection during childbirth assistance	Yes	360	54.1
Experience of blood and body fluid exposure	Yes	642	96.5
Exposed part (Multiple answers)	Eye	138	20.8
	Around the mouth / oral cavity	198	29.8
	Face other than eyes and mouth	318	47.8
	Hands and fingers	439	66.0
	Arm	436	65.6
	Head	117	17.6
	Around the neck	166	25.0
	Chest and abdomen	114	17.1
	Lower limbs	325	48.9
	Other	9	1.4
	Frequency of exposure	Frequent exposure	20
Occasionally exposed		300	46.7
Rarely exposed		321	50.0
No answer		1	0.2
<b>2 Organizational factors</b>			
Placement of eye guards in the delivery room	With placement	496	74.8
Frequency that midwives in the same workplace wore them during childbirth assistance	Everyone is wearing	64	9.7
	More than half wear	98	14.8
	Most don't wear	276	41.6
	No one wears	205	30.9
<b>3 Attitude toward eye guards wearing behavior during childbirth assistance</b>			
It's necessary to wear	Strongly agree / Agree	514	77.3
Using reduces assistance technique (dexterity)	Strongly agree / Agree	234	30.8
Comfort is impaired when using	Strongly agree / Agree	514	51.9
My appearance is not good when using	Strongly agree / Agree	203	31.3
Using is rude to the birthing woman	Strongly agree / Agree	254	38.2
<b>4 Subjective norms for eye guard wearing behavior during childbirth assistance</b>			
Ward chief nurse and managers expect to wear	I think so / I think so little	320	48.1
<b>5 A feeling of control over the behavior of wearing an eye guard during childbirth assistance</b>			
I can take the action of wearing an eye guards	I think so / I think so little	430	64.6
<b>6 Eye guards wearing behavior during childbirth assistance</b>			
Eye guard wearing rate <sup>1)</sup> (Answer by percentage)	%	23.4 ± 36.5	(0-100)
Distribution of eye guard wearing rate	100%	61	9.2
	50-99%	120	18.3
	1-49%	78	11.9
	0%	406	61.1

1) mean ± SD (range)

アイガード着用率とその関連要因についての記述統計結果を Table2 に示した。個人的要因について、感染に関連した教育や研修の受講経験は 612 名 (92.0%)、院内における ICT 活動での役割の経験は、158 名 (23.8%) であった。また、これまでの分娩介助で感染の恐怖感を感じたことのある助産師は 360 名 (54.1%) であった。血液体液曝露経験については、「これまでの分娩介助で血液や羊水等の体液が皮膚や粘膜に曝露したことがある」と回答した助産師は 642 名 (96.5%) であった。部位別の曝露経験 (複数回答) では、手指 439 名 (66.0%) が最も多く、次いで腕 436 名 (65.6%)、下肢 325 名 (48.9%) と多かった。顔面部に注目してみると、目への曝露 138 名 (20.8%)、口周辺や口腔内 198 名 (29.8%)、目・口以外の顔面 318 名 (47.8%) に曝露経験があった。曝露する頻度は、減多に曝露しない 321 名 (50.0%) と回答した割合が最も多く、続いて時々曝露する 300 名 (46.7%) であった。20 名 (3.1%) は、頻繁に曝露すると回答した。

組織的要因について、勤務先において分娩室にアイガードの配置が有ると回答した者は 74.8% であったが、勤務先の助産師がアイガードを全員着用していると回答したものは 64 名 (9.7%) と少なく、誰も着用していないと回答したものは 205 名 (30.9%) であった。

分娩介助場面でのアイガードの必要性を認識している者は 514 名 (77.3%)、自分はアイガード着用行動がとれると回答した者は 430 名 (64.6%) であったが、実際にアイガードを必ず着用している (着用率 100%) の者は、わずか 61 名 (9.2%) であり、全く着用しない (着用率 0%) の者は 406 名 (61.1%) であった。着用行動に対する態度やコントロール感はあるものの、着用行動に至っていない割合が多いことが明らかになった。

We calculated the correlation coefficient between the eyeguards use and other items (Table 3). The item with the strongest correlation was midwives use eyeguards in the workplace (Spearman's rank correlation coefficient (rs): 0.71), followed by the recognition that the manager, such as the chief nurse expected to use eyeguards (subjective norms) (rs: 0.58).

We performed a multiple regression analysis via the stepwise method using the variable correlated with the eyeguards use as the independent variable. The results are shown in Table 4. There were no highly correlated variable combinations in the multiple regression equation. The variance inflation factor ranged from 1.41 to 1.81, and multicollinearity was not observed. The test result of the analysis of variance was  $p < 0.001$ , and the regression equation was a significantly useful result. The analysis indicated that four factors were related to eyeguards use: the midwife at work wears an eyeguards (organizational factor); I can use the eyeguards when assisting with childbirth (behavioral control); midwives must wear eyeguards (attitude toward behavior); and administrators, such as chief nurses, are expected to use eyeguards (subjective norms). Of these four items, the item with the greatest impact was the midwife at work wears eyeguards (standardization coefficient  $\beta : 0.57$ ).

## Discussion

### 1. Exposure to blood and body fluids during childbirth assistance and eyeguards use

The survey responses indicated that 96.5% of the midwives had experienced blood and fluid exposure during childbirth assistance. In previous studies, the proportion of midwives reporting direct exposure to blood and body fluids during childbirth assistance varied, with studies reporting these proportions to be 65%,<sup>5)</sup> 90%,<sup>14)</sup> and 100%.<sup>6)</sup> However, our study found that most midwives were exposed during childbirth

assistance. With regard to the reason for the difference in the frequency of exposure in previous studies, the study by Loewen et.al<sup>5)</sup> surveyed 2963 certified nurse-midwives in the U.S. about whether they had been exposed to blood and body fluids in the last 6 months. In this study, midwives and nurses were surveyed, which may have influenced the 65% of those who had experienced exposure. Boey et.al<sup>6)</sup> and Kurumatani et.al<sup>14)</sup> surveyed midwives assisting childbirth who may have influenced the exposure experience. The frequency of exposure among those who had been exposed tended to be relatively lower than that reported in a previous study.<sup>6)</sup> A study conducted in 2003 by Boey et.al<sup>6)</sup> that included 83 midwives in the UK was reported at a time when the use of personal protective equipment, including eyeguards, was not yet established as standard precautions, which may have affected the frequency of exposure. However, our study also inferred that approximately 50% of the midwives had been in a situation where their exposure experience, including both frequent and occasional exposures, was repeated at some interval. Of the midwives, 47.8% had experienced exposure to the face other than the eyes and mouth, 20.8% exposure to the eyes, and 29.8% exposure to the area around the mouth and oral cavity. Loewen et al. reported<sup>5)</sup> that 50.7% had face exposure and 16.8% had eye exposure, but the results of this study showed that more midwives had experienced eye exposure. Regarding eyeguards use (Table 2), 406 midwives (61.1%) reported not using them at all. From this finding, it was inferred that there were certain midwives who did not use eyeguards to protect their eyes from exposure and were thus exposed to blood and body fluids. Boey et al. reported<sup>6)</sup> three reasons for why midwives did not use eyeguards: they felt discomfort using them, they felt that it affected their relationships with birthing women, and they were confused about compliance. In this study, attitudes toward eyeguards use (using

Table 3. The correlation coefficient between the eyeguard use rate and other items

other items		correlation coefficient	<i>p</i>
Attribute	Age	-0.07	0.13
	Midwifery experience	-0.04	0.28
	Number of childbirth assistance (1 year)	0.07	0.09
Personal factors	Experience of attending education on infection	0.01	0.76
	Experience of playing a role in ICT activities	0.08*	0.03
	Experience of blood and body fluid exposure	0.09*	0.03
	Exposed part(eye)	0.05	0.24
	Frequency of exposure	0.10**	0.01
	Experience of fear of infection during childbirth assistance	0.05	0.19
Organizational factors	Placement of eye guards in the delivery room	0.39**	0.00
	Frequency that midwives in the same workplace wore them	0.71**	0.00
Attitude toward wearing eye guards	Necessity of eyeguard use	0.50**	0.00
	Assistive technology of eyeguard use	0.14**	0.00
	Self-comfort of eyeguard use	0.06	0.11
	Effect on appearance of eyeguard use	0.13**	0.00
	Effect of eyeguard use on relationship with birthing woman	0.25**	0.00
Subjective norms	Ward chief nurse and managers expect to wear	0.58**	0.00
A feeling of control	I can take the action of wearing an eye guard	0.53**	0.00

spearman's rank coefficient \**p* < 0.05 \*\**p* < 0.01

アイガード着用率と、その他の項目の相関係数を表示した。最も強い相関を認めた項目は、「勤務先の助産師がアイガードを着用している」であった (*rs*=0.71)。次に相関が強かった変数は、「師長等の管理者からアイガード着用を期待されている」ことへの認識であった (*rs*=0.58)

Table 4. Factors related to eye guard wear rate

	B <sup>1)</sup>	SE	95%	CI	$\beta$ <sup>2)</sup>	<i>p</i>	VIF
(constant)	-60.98	3.78	-68.40	-53.56		0.00	
Frequency that midwives in the same workplace wore them (Organizational factors)	22.62	1.35	19.97	25.27	0.57	0.00	1.82
I can take the action of wearing an eye guards (A feeling of control over the behavior)	6.20	1.10	4.04	8.37	0.17	0.00	1.41
It is necessary to wear an eyeguard in the childbirth assistance (Attitude toward wearing eye guards)	4.97	1.29	2.44	7.51	0.12	0.00	1.41
Ward chief nurse and managers expect to wear eyeguards (Subjective norms)	2.15	0.98	0.23	4.06	0.07	0.03	1.78

n=614 (Only targets with no missing values in all variables)

ANOVA *p* < 0.001 ; R<sup>2</sup>=0.61, AdjustedR<sup>2</sup> = 0.61 ; Durbin-Watson ratio = 1.53

1)non-standardized coefficients 2)standardized coefficients

アイガード着用率と相関を認めた変数を独立変数とした重回帰分析をステップワイズ法で実施した結果を表示。重回帰式の中には相関の高い変数の組み合わせは存在しなかった。また、Variance Inflation Factor (VIF)は1.41～1.81の範囲にあり、多重共線性は認められなかった。分散分析の検定結果は*p*<0.001であり、回帰式は有意に役立つ結果であった。

分析の結果より、アイガード着用行動に関連する要因は、「勤務先の助産師がアイガードを着用している (組織的要因)」、「分娩介助時にアイガードを使用することは自分にはできる (行動コントロール感)」、「助産師は必ずアイガードを着用する必要がある (行動に対する態度)」、「師長等管理者からアイガードを使用することを期待されている (主観的規範)」の4項目であった。この中でも最も影響度が大きかった項目は、「勤務先の助産師がアイガードを着用している」(標準化係数  $\beta$  =0.57)であった。

them is rude to patients, decreases assistance skills, and results in a poor appearance) were significantly correlated with use. However, no correlation was found with reports of discomfort caused by using eyeguards (Table 3). However, 51.9% of the midwives responded that they felt uncomfortable, which was similar to the results of the study by Boey et al.<sup>6)</sup> Therefore, to promote the use of eyeguards, developing products that are comfortable for use and devising ways of using them are essential.

Several factors make protecting the face important for midwives. The palpebral conjunctiva is a thin membrane—dense with capillaries—that covers the inside of the eyelid and faces the outside world. In addition, the nasal and oral cavities are mucous membranes that offer weaker protection against exposure to the outside world compared with unblemished skin. Furthermore, in a study<sup>9)</sup> that showed that 100% (n = 70) of face shields worn by midwives during childbirth assistance tested positive for blood using luminol, blood exposure was observed even when the face shield was worn for only 11 min (average: 41.5 min, SD: 30.5, range: 11–141). These results confirm the need for facial protection to be worn at all times during childbirth assistance. We suggest that sharing such blood exposure risk information with midwives worldwide could help encourage them to wear eyeguards during childbirth assistance.

## **2. Consideration of measures to promote eyeguards use during childbirth assistance**

The following four factors were related to eyeguards use during childbirth assistance: an organizational factor (midwives use eyeguards in the workplace), an attitude toward their use (midwives need to wear eyeguards), a subjective norms (midwives expected to wear eyeguards by the chief nurses), and a feeling of control about their use (I can use eyeguards when assisting with delivery). The organizational

factor was the most influential factor among this survey sample. We suggest that the factors determining midwives' behavioral intention to wear eyeguards can also influence their actual use.

While about 80% of the midwives in this survey recognized that eyeguards are required when working in childbirth assistance where blood and body fluids are expected to scatter, only 61 (9.2%)—less than 10%—reported always use them when assisting with childbirth. In fact, more than half of the midwives (406, 61.1%) reported not using them at all. This result indicates that, while correct knowledge of standard precautions is associated with desirable attitudes, it does not ensure compliance in practice.<sup>15)</sup> In other words, knowledge of standard preventive measures does not necessarily lead to their actual use.<sup>16)</sup>

Midwives who perceive that using eyeguards is rude to birthing women and may be detrimental to their appearance and midwifery skills are strongly reluctant to wear them. We believe that it is essential for the organization or management to provide extrinsic motivation to midwives with such attitudes so as to encourage them to use eyeguards. The fact that using eyeguards was expected by the management influenced wearing behavior. This can be viewed as organizational control over safety that influences healthcare workers' compliance with infection control measures.<sup>17)</sup> It has also been reported that having PPE ready in the delivery room can increase its utilization.<sup>17)</sup> Therefore, in addition to unilateral goal setting by administrators, proactive efforts to create an environment where midwives themselves are comfortable wearing PPE can be considered to promote the use of eyeguards.

Regarding the relationship between the organizational climate and healthcare workers' exposure to blood and body fluids, three organizational climate factors are reported to be related to a high risk of blood and body fluid exposure:<sup>18)</sup> there is little support from

the manager, there is no leadership from the manager, and there is low awareness among nursing management. Conversely, seven organizational climate factors have been associated with a low risk of worker exposure to blood and body fluids<sup>18)</sup>: there is support from the manager, frequent feedback/training, nurses are actively participating in hospital operations, there is a nursing base that enhances the quality of care, the relationship between nurses and doctors is good, managers recommend that staff pay attention to health and safety, and high business management ability. From these results, we can infer that organizational culture elements—such as manager support, leadership, feedback, and training—are extremely important for promoting individual safety behavior and accident prevention. The views and policies of the management of the organization regarding the use of eyeguards are influential in making the midwives working in the organization use them. This suggests that to promote eyeguards use behavior, an organized occupational infection control program that considers the opinions of midwives actually working in the organization is crucial.

The global pandemic caused by the outbreak of the new coronavirus disease 2019 (COVID-19) since December 2019 has had a remarkable impact on infection control among healthcare workers. Umazume et al. reported that in April 2020, there were 199 facilities (72.6%) where midwives were using goggles or face shields to assist in the delivery of pregnant women without symptoms of COVID-19<sup>19)</sup>. This observation was made during the first wave of COVID-19. Because this study was conducted in 2013, it is likely that the use of eyeguards by midwives has increased to a great extent now. However, even when COVID-19 was prevalent, not all midwives chose to use eye protection during birth assistance. Therefore, we believe that the results of this study have some significance in strengthening our efforts to promote the use of

eyeguards by midwives.

### **Conclusion**

This study elucidated about the blood exposure experience of midwives during childbirth assistance and the factors related to eyeguards use during these times. We found that 642 (96.5%) of the midwives had experienced blood and body fluid exposure during labor assistance and that 20.8% of the midwives had experienced eye exposure. However, only 9.2% of all midwives always wear eyeguards. On the other hand, more than half of the midwives (61.1%) did not wear eyeguards at all during childbirth assistance. To promote the use of eyeguards and to reinforce awareness of the need to ensure that eyeguards are worn, information on the risks of blood exposure needs to be shared among midwives.

The organizational factor, “midwives use eyeguards in the workplace,” had the strongest impact on the use of eyeguards. The three other relevant factors were as follows: I can use the eyeguards when assisting with childbirth (behavior control feeling); midwives must wear the eyeguards (attitude toward behavior), and the managers, such as the chief nurses, are expected to use eyeguards (subjective norms). It is suggested that, to promote eyeguards use, facilities must foster an organizational culture that promotes the behavior among all midwives, and managers (e.g., chief nurses) should show leadership by using eyeguards themselves.

### **Conflict of interest**

There are no conflicts of interest to declare at the time of submission of this manuscript.

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### References

- 1) Siegel JD, Rhinehart E, Jackson M, et al.: Healthcare Infection Control Practices Advisory Committee 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, June 2007.
- 2) Ippolito G, Puro V, Petrosillo N, et al.: Simultaneous infection with HIV and hepatitis C virus following occupational conjunctival blood exposure. *JAMA*. **280**: 28, 1998.
- 3) Hosoglu S, Celen MK, Akalin S, et al.: Transmission of hepatitis C by blood splash into conjunctiva in a nurse. *Am J Infect Control*. **31**: 502-504, 2003.
- 4) A Vincent, M Cohen, C Bernet, et.al.: Accidental exposure to blood by midwives in French maternity units. Results of the national surveillance 2003. *J Gynecol Obstet Biol Reprod*. **35**: 247-256, 2006.
- 5) Loewen NL, Dhillon GL, Willy ME, et al.: Use of precautions by nurse-midwives to prevent occupational infections with HIV and other blood-borne diseases. *J Nurse Midwifery*. **34**: 309-317, 1989.
- 6) Boey VM, Phipps FM : It's a bloody risk. Midwives' attitudes, perceptions and practices regarding wearing goggles on delivery suite. *The practising midwife*. **6**: 28-33, 2003.
- 7) Panlilio AL, Welch BA, Bell DM, et al.: Blood and amniotic fluid contact sustained by obstetric personnel during deliveries. *Am J Obstet Gynecol*. **167**: 703-708, 1992.
- 8) Kabukoba JJ, Young P: Midwifery and body fluid contamination. *BMJ* **305**: 226, 1992.
- 9) Kusumi H, Endo E : Validation of the Risks of Blood Exposure to the Midwife's Face During Childbirth Assistance. *Japanese Journal of Environmental Infections*. **34**: 40-44, 2019.
- 10) Levin PF: Test of the Fishbein and Ajzen models as predictors of health care workers' glove use. *Res Nurs Health*. **22**: 295-307, 1999.
- 11) Gershon RR, Vlahov D, Felknor SA, et al.: Compliance with universal precautions among health care workers at three regional hospitals. *Am J Infect Control*. **23**: 225-236, 1995.
- 12) Ueki R, Yonezawa H, Hasegawa T, et al.: A Study of Nurse's Intention to Wear Gloves in different Situations with Potential for Blood Exposure and Analysis of Influence Factors. *Japanese Journal of Environmental Infections*. **23**: 181-186, 2008.
- 13) Nukita H, Taniguchi C, Emisu F : Relationship between individual attributes of midwives in perinatal care and the use of gloves. *J.Jpn.Acad. Midwif*. **23**: 208-216, 2009.
- 14) Kurumatani N, Matsukura K, Boku C, et.al.: Exposure to blood during midwifery operations-a questionnaire study. *Japanese Journal of Public Health*. **42**: 542-551, 1995.
- 15) Askarian M, Shiraly R, McLaws ML : Knowledge, attitudes, and practices of contact precautions among Iranian nurses. *Am J Infect Control*. **33**: 486-488, 2005.
- 16) J.G. Turner : AIDS-related knowledge, attitudes, and risk for HIV infection among nurses. *Annual Review of Nursing Research*. **11**: 205-224, 1993.
- 17) Green-McKenzie J, Gershon RR, Karkashian C: Infection control practices among correctional healthcare workers: effect of management attitudes and availability of protective equipment and engineering controls. *Infect Control Hosp Epidemiol*. **22**: 555-559, 2001.
- 18) Aminaka M, Nishioka M : Literature Review of the Effects of Organizational Climate on Blood and Body Fluid Exposure to Healthcare Workers. *J Nurs Studies NCNJ*. **19**: 20-28, 2020.
- 19) Umazume T, Miyagi E, Haruyama Y, et.al.: Survey on the use of personal protective equipment and COVID-19 testing of pregnant women in Japan. *J Obstet Gynaecol Res*. **46**: 1933-1939, 2020

## 分娩介助時における助産師のアイガード着用行動に関連する要因

楠見ひとみ, 上野美紀

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**要旨：**本研究は、分娩介助時のアイガード着用行動に関連する要因を明らかにすることを目的として、助産師 1254 名（有効回答 665 名）を対象に、分娩介助時における助産師の血液・体液曝露経験と、アイガード着用行動に関連する要因を調査した。その結果、96.5%の助産師はこれまでに血液・体液曝露の経験があった。さらに曝露経験のある助産師の 20.8%は、眼瞼結膜への曝露の経験があった。しかし 61.1%の助産師は、分娩介助時にアイガードを全く着用しておらず、必ず着用する者は 9.2%であった。

助産師のアイガード着用行動を従属変数とする重回帰分析の結果、アイガード着用行動には、「勤務先の助産師がアイガードを着用している（組織的要因）」が最も強く影響しており、「分娩介助時にアイガードを使用することは自分にはできる（行動コントロール感）」、「助産師は必ずアイガードを着用する必要がある（行動に対する態度）」、「師長等管理者からアイガードを使用することを期待されている（主観的規範）」が関連していた。

アイガード着用の推進には、所属施設における助産師全体の着用の行動化を促進する組織風土と、師長等管理者の着用に対する指導力の発揮が重要であることが示唆された。

**索引用語：** 職業感染予防 / 血液体液曝露 / アイガード /  
個人防護具 / 分娩介助 / 標準予防策 / 計画的行動理論