

## A Study on Facial Expressions when Nursing Students Care for Patients

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**Abstract**— The aim of this study was to clarify what kind of their facial expression nursing students selected; be it dependent on their patients' situations and the nursing care. Furthermore, educational needs concerning facial expressions are examined. In accordance with P. Ekman's facial expression analyses, photographs of 10 types of facial expressions were taken and the emotional components perceived therein analyzed. Using the 10 expressions, several aspects were studied. Twenty-seven students responded to questions. Results revealed students may misunderstand the expression of fear as one of disgust or sadness. Furthermore, they tend to think that the expressions of surprise, fear, disgust, anger, and sadness are inappropriate facial expressions when talking to a patient or conducting a physical assessment. Twenty students responded to educational needs regarding facial expressions. Their remarks included “lessons on how to make facial expressions corresponding to situations in simulations and actual practices are desirable” and “effectiveness of facial expressions.” In addition, having the students' own facial expressions mechanically analyzed or evaluated by others may offer them an opportunity to learn how to express emotions appropriately. As these aspects are in accordance with the students' educational needs, an early introduction to the education on facial expressions is desirable.

**Keywords**-facial expression; nursing student; physical assessment; communication.

### I. INTRODUCTION

Because it is a requirement for nurses to understand their patients' needs and respond accurately, proficient communication skills are indispensable for their profession [1]. However, in the actual education practices for nurses in Japan, a deterioration in the nursing students' ability to sympathize as well as other interpersonal abilities has been evident; thus, it is difficult for students to build a mutual understanding with their patients through their nursing practices [2]. In addition, a survey on university students' communication skills from the perspective of social skills revealed that the emotional sensibility of nursing students, which is required to understand nonverbal information, is poorer than that of students who have specialized in care for people who have disabilities. Furthermore, their ability to control their emotions, which is required to keep their emotional sensibility in check, is higher than that of pedagogic students [3]. Although the impact of the facial expressions of nurses [4], physical therapists [5], and pharmacists [6] on their patients has been reported, no study has revealed how nursing students choose their facial expressions; be it based on their patients' situations or events. There has also been no clear indication on the need for education with reference to facial expressions. In view of these circumstances, the aim of the present study

was to clarify what kind of their facial expression nursing students selected; be it dependent on their patients' situations and/or nursing events. Furthermore, educational needs with reference to facial expressions are examined.

In Section 2, the method employed in the study is explained. In Section 3, the results of the feelings analysis of 10 kinds of expressions, which were developed for this investigation, are outlined. In addition, facial expressions when a nursing student provides care for a patient are described. A brief discussion is offered in Section 4; conclusions and recommendations for future research are presented in Section 5.

### II. METHOD

In accordance with P. Ekman's facial expression analyses [7], photographs of 10 types of facial expressions were taken; these are depicted in in Figure 1 (A: blank expression; B-E: four levels of happiness; F: surprise; G: fear; H: disgust; I: anger; J: sadness). The emotional components perceived therein were analyzed. The Emotion API of Microsoft Cognitive Services [8] [9] was employed to analyze facial expressions. The reason for a number of facial expressions showing happiness is nursing students use different degrees of smiling when caring for patients. The degrees of expressing happiness were derived from the researchers' experience.

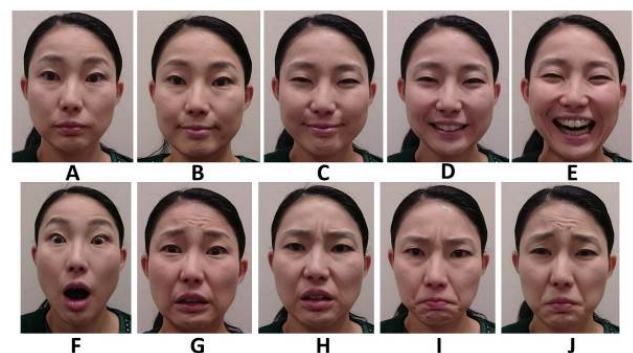


Figure 1. The 10 types of facial expressions: A: blank expression; B-E: four levels of happiness; F: surprise; G: fear; H: disgust; I: anger; J: sadness

Using the 10 expressions, the items thus listed were studied. To assess their adequacy, the facial expressions were rated by means of seven levels; Level 1 denoted “not

adequate at all,” while Level 7 signified it was “very adequate.” The items are as follows:

- How nursing students recognize emotions behind the 10 facial expressions;
- Adequacy of facial expressions when talking with a patient by showing a smile, blank expression, worry, agony or anger;
- Adequacy of facial expressions when conducting a physical assessment of a patient by showing a smile, blank expression, worry, agony or anger;
- Adequacy of facial expressions when communicating a problematic or non-problematic test result.
- Past experience in facial expression training and the emotion felt on that occasion; and
- Educational needs regarding facial expressions.

### III. RESULT

#### A. The analysis of the 10 facial expressions

The analysis of the 10 facial expressions prepared for this study mainly detected components associated with a lack of emotion in Expressions A and B, happiness in C, D and E, surprise in F, sadness in G, I and J, and a lack of emotion in H (Table I). The expressions of fear, disgust, and anger included a great deal sorrow and expressionless components.

TABLE I. THE ANALYSIS OF THE 10 FACIAL EXPRESSIONS EMPLOYING THE EMOTION API OF MICROSOFT COGNITIVE SERVICES

Emotions expressed <sup>a</sup>		Analysis items of emotions <sup>b</sup>							
		Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise	Neutral
A	Neutral	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.82
B	Happiness	0.00	0.01	0.00	0.00	0.07	0.00	0.00	0.92
C	Happiness	0.00	0.00	0.00	0.00	0.84	0.00	0.00	0.16
D	Happiness	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
E	Happiness	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
F	Surprise	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
G	Fear	0.00	0.00	0.02	0.05	0.00	0.77	0.02	0.14
H	disgust	0.02	0.01	0.04	0.01	0.00	0.40	0.01	0.51
I	anger	0.01	0.00	0.00	0.00	0.00	0.93	0.00	0.06
J	sadness	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.01

a. Emotions expressed by facial expression.

b. Total of 8 items sums to 1. Because it rounds off, the total may not be 1 in some cases.

#### B. Emotions that nursing students feel from 10 facial expressions

Six 1<sup>st</sup>-year students, twelve 2<sup>nd</sup>-year students, and nine 4<sup>th</sup>-year students responded to the questions. With reference

to Expression A, the majority, namely, 81.5% identified it as “others.” Of these, 15 students chose “indifference and lack of emotion.” Regarding Expression B, 51.9% identified it as “others” while 40.7% associated it with “happiness.” Other responses included “smile” and “tense smile.” Expression C was linked to “happiness” by 85.2% of the respondents. Expressions D and E were perceived by 92.6% of the students as “happiness.” Other responses included expressions that indicated fun and a lack of animosity against someone else. Expression F was associated by 100% of the respondents with “surprise.” Expression G was identified with disgust, fear, and sadness by 44.4%, 33.3% and 14.8%, respectively. Expression H was associated with disgust by 88.9% of the respondents. In Expression I, 92.6% perceived anger while 92.6% perceived sadness in Expression J.

#### C. Facial expressions that nursing students select for communication and care

When caring for patients who displayed various facial expressions, the expression selected by the nursing student is presented in Tables II and III. To assess their adequacy, the expressions were rated by means of seven levels; Level 1 signified "not adequate at all," while Level 7 meant “very adequate.” The extent to which nursing students thought their expressions were appropriate is indicated in the table by the average value. Nursing students should consider the following when speaking with patients who have various expressions.

TABLE II. APPROPRIATENESS OF FACIAL EXPRESSION WHEN TALKING

Facial expressions of nurse		Facial expressions of patients				
		Smiling	Expressio nless	Worried face	Suffering	Angry
A	Neutral	2.3	3.8	3.3	3.4	4.6
B	Happiness	4.3	5.3	4.7	3.6	3.6
C	Happiness	6.2	5.9	4.6	2.9	3.0
D	Happiness	6.6	5.2	3.9	2.6	2.0
E	Happiness	5.9	3.7	2.4	1.9	1.7
F	Surprise	2.6	2.4	2.1	2.0	2.3
G	Fear	1.6	1.9	2.1	2.9	2.7
H	disgust	1.3	1.6	1.5	1.7	1.8
I	anger	1.4	1.5	1.5	1.9	1.9
J	sadness	1.5	1.8	2.9	3.7	3.1

Nursing students chose a facial expression that they consider appropriate for patients expressing a certain emotion. The average value of the 7-level Likert scale is shown.

The students' tendency when talking to a patient with a beaming smile was to “beam in the same way” or “not to overly smile.” When a patient had a blank expression, the students tried to “smile,” “make a kind smile because the patient might be worried or nervous,” or “change facial expressions along with the conversation.” When a patient had a worried expression, the students focused on “keeping a worried face in the same way” or “smiling.” When the

patient displayed a painful expression, the students tried to “keeping a worried face” or “a smile that keeps the patient from feeling pain.” When the patient displayed an angry expression, the students tried to have “a serious look” and “not an angry face,” but “smile.”

TABLE III. APPROPRIATENESS OF FACIAL EXPRESSION WHEN UNDERGOING A PHYSICAL ASSESSMENT

Facial expressions of nurse	Facial expressions of patients				
	Smiling	Expressi onless	Worried face	Suffering	Angry
A Neutral	3.4	3.9	3.3	3.4	3.9
B Happiness	4.7	5.5	5.0	3.9	3.6
C Happiness	6.1	6.2	5.3	3.6	3.4
D Happiness	5.9	5.4	4.3	2.9	2.9
E Happiness	5.0	3.6	2.8	1.9	1.9
F Surprise	2.0	1.9	1.8	1.8	1.8
G Fear	1.5	1.7	2.0	2.8	2.4
H disgust	1.3	1.4	1.3	1.6	1.7
I anger	1.3	1.4	1.3	1.7	1.9
J sadness	1.5	1.6	2.0	2.9	2.6

Nursing students chose a facial expression that they consider appropriate for patients expressing a certain emotion. The average value of the 7-level Likert scale is shown

The facial expressions that nursing students chose when conducting a physical assessment of patients are as follows. The students' tendency when talking to a patient with a beaming smile was to “beam in the same way” or “seriously.” When a patient had a blank expression, the students tried to “smile,” and display “a facial expression that relieves the patient,” or a “gentle expression.” The students focused on “keeping a worried face in the same way” or “a facial expression that relieves the patient when the patient had a worried expression. When the patient’s facial expression was one of pain, the students tried to “keep a worried face” or “a facial expression that relieves the patient,” or “expressions in which seriousness is conveyed to patients.” When a patient had an angry expression, the students tried to have “a serious look,” “not an angry face,” and “a facial expression that conveyed worry.”

D. Facial expression when conveying test results

The facial expressions when conveying test results are presented in Table IV. When the students informed a patient that there was no problem, they chose to wear a “smile,” “bright expression” or “assuring expression.” When they informed a patient that there was a problem, they opted to have a “serious expression,” “smile,” or “nervous expression.”

E. The degree of self-confidence of students who make appropriate facial expressions, and learning needs

The level of confidence the nursing students had in making an adequate expression was 4.5. The averages per year were 4.6, 3.9, and 5.3 among the 1<sup>st</sup>-year, 2<sup>nd</sup> year, and 3<sup>rd</sup> year students, respectively. There were seven students in the school who received training on facial expressions. The

level of satisfaction they experienced from the training was 6.4, their level of delight was 4.5, and level of sadness was 1.9.

TABLE IV. THE FACIAL EXPRESSIONS WHEN CONVEYING TEST RESULTS

Facial expressions of nurse	No problem	Have a problem
A Neutral	3.1	4.7
B Happiness	5.1	4.2
C Happiness	6.4	2.8
D Happiness	5.9	2.1
E Happiness	4.0	1.4
F Surprise	1.6	1.6
G Fear	1.4	2.2
H disgust	1.3	1.7
I anger	1.3	1.7
J sadness	1.3	2.6

Nursing students chose a facial expression that they consider appropriate for patients expressing a certain emotion. The average value of the 7-level Likert scale is shown.

F. The degree of self-confidence of students who make appropriate facial expressions, and learning needs

The level of confidence the nursing students had in making an adequate expression was 4.5. The averages per year were 4.6, 3.9, and 5.3 among the 1<sup>st</sup>-year, 2<sup>nd</sup> year, and 3<sup>rd</sup> year students, respectively. There were seven students in the school who received training on facial expressions. The level of satisfaction they experienced from the training was 6.4, their level of delight was 4.5, and level of sadness was 1.9.

Three students received instructions on facial expressions during their clinical practice from someone other than a teacher. The level of satisfaction they experienced from the instruction was 7.0, their level of delight was 5.0, and sadness, 3.7.

Twenty students responded on educational needs regarding facial expressions. Their remarks included: “lessons on how to make facial expressions corresponding to situations in simulations and actual practices is desirable,” “effectiveness of facial expressions,” “mutual peer advice because you cannot exactly know what expression you wear unless the other person tells you,” “for the purpose of staying closer to patients’ feelings, it would be more useful if the education focuses on how to express or perceive emotions instead of making facial expressions,” and “it would be great to have an opportunity to teach junior nurses and students the effective facial expressions when dealing with angry patients, emotionless patients, or patients in agony.”

IV. DISCUSSION

Most students perceived happiness in Expressions C and D. While their impressions from Expressions H (disgust) and I (anger) were different from the mechanical analysis

results, the students' evaluation seemed consistent. On the other hand, opinions were divided for Expression G (fear) both in the analyses and among students; this suggested the possibility of mistakenly being perceived as an expression of disgust or sadness. In a survey targeting nurses, the highest mean accuracy rate of recognizing facial emotion was happiness (99.14%) while the lowest accurately recognized facial expression was fear (47.71%) [10]. Students, like nurses, are expected to be able to assess the feelings of happiness accurately. The expression of happiness is considered to be a facial expression that students can understand. The reason for this is that the facial expression of happiness is different from other facial expressions; the footprint of the crow is formed in the corner of the eye and the corners of the mouth are raised.

Nursing students are confused by the expressions of fear and disgust. The reason is that the two facial expressions are similar with regard to wrinkles between the nose and eyebrows. Psychiatrists who treat adults were significantly better at recognizing fearful and disgusted facial emotions than child-adolescent psychiatrists while the latter were better at recognizing angry facial emotions [11]. Even qualified medical personnel suggest that there is a difference in the ability to recognize negative facial expressions. Training to recognize facial expressions is necessary for students. This has already been developed as the Micro Expression Training Tool. However, it is reported that the training effect is low when communication ability is poor [12]. While facial expressions are often judged in combination with other circumstances, this study may provide students with an opportunity to realize that patients' feelings can be misunderstood. Furthermore, having students' own facial expressions mechanically analyzed or evaluated by others may offer an opportunity for them to learn how to express emotions. As these aspects match the students' educational needs, an early introduction of the education on facial expression is desirable.

In having conversations with or conducting physical assessments on patients who display various expressions, such as smile, worry, agony, and anger, it was revealed that students consider it inadequate to have an expression of surprise, fear, disgust, anger or sadness. Furthermore, they responded that a modest smile could be applied to any situation. However, because the students do not have many opportunities to deal with a patient in agony or anger in a nursing practice, their responses may be a result of their lack of experience. This suggests the necessity to create opportunities for students to experience how to deal with patients in agony or anger through simulation education. In communicating a problematic test result to a patient, the students considered it better to have a blank expression or modest smile. This study did not conduct any survey on what kind of facial expressions patients prefer or what kind of expressions skilled nurses consider adequate; ideally, these themes should be studied in the future.

## V. CONCLUSION

This study aims to clarify nursing students choose what kind of their facial expressions depending on their patients' situations and nursing occasions. The results of this study indicate facial expressions that nursing students select when they are with patients. Nursing students thought that a moderate smile could be applied to any situation. However, patients and nurses need to evaluate the actual students' facial expressions.

Currently, there are no systems that students can self-learn about their facial expressions. Therefore, our future work is to develop a system that integrates facial expression analysis system and others evaluation, so that nursing students can learn about communication.

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