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# FACTORS INFLUENCING HAND HYGIENE COMPLIANCE ON PARAMEDIC IN IMPLEMENTING MULTIMODAL HAND HYGIENE IMPROVEMENT STRATEGY

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## ABSTRACT

Hand hygiene is the best way to reduce Healthcare Associated Infections (HAIs). According to the WHO hand hygiene compliance paramedics worldwide for less than <50%. This study aims to determine some of the factors that influence hand hygiene compliance behavior on paramedics before and after implementation of Multimodal Hand Hygiene Improvement Strategy. This research method is Pre Experimental design with one group pretest-posttest design. The sampling technique used purposive sampling. Total sample of 40 people. Measuring devices in the form of questionnaires and observation. The results showed a relationship between knowledge, attitudes, subjective norms, perceived behavior control, perceived susceptibility, perceived severity, perceived benefits and perceived barriers to hand hygiene compliance before and after the implementation of Multimodal Hand Hygiene Improvement Strategy except for age and gender. There is a significant difference before and after implementation of Multimodal Hand Hygiene Improvement Strategy of the knowledge, attitudes, subjective norms, perceived behavior control, perceived susceptibility, perceived severity, perceived benefits except perceived barrier and hand hygiene compliance. Knowledge is the most influential variable on hand hygiene compliance.

**KEYWORDS:** Hand hygiene compliance, Multimodal Hand Hygiene Improvement Strategy

## INTRODUCTION

World Health Organization (WHO) in Shinde and Mohite<sup>1</sup> states that Healthcare Associated Infections (HAIs) is a major public health problem in many countries. The incidence HAIs in developing countries is estimated to range between 5.7 up to 19.1% with an average of 10.1%. The incidence of wound infection is a case HAIs most common in middle income countries and low with a ratio of 1.2 up to 23.6 per 100 surgical procedures, or approximately 11.8%.<sup>2</sup> According to the WHO<sup>3</sup> hand hygiene is one of the effective measures to break the chain of transmission infection. According to experts in Creedon<sup>4</sup> hand hygiene compliance paramedics score rarely exceeds 50%. In developing countries, a failure in the implementation of hand hygiene is triggered by a shortage of funds to provide the necessary facilities. But when the existing funds, the next obstacle is of most concern is the behavior of the paramedics that are not in accordance with the procedure. Based on the preliminary study on February 16<sup>th</sup>, 2015, found a lack facilities to support the implementation of the hand hygiene like a broken sink, lack of hand rub and tissue fluids and the lack of socialization as well as education and training, including infection prevention and control hand hygiene. Therefore, the researchers want to implement Multimodal Hand Hygiene Improvement Strategy of WHO to improve compliance with hand hygiene in the paramedics. The aims of this study was to determine some of the factors that influence compliance behavior in the hand hygiene paramedics before and after implementation of the Multimodal Hand Hygiene Improvement Strategy in Inpatient Ratu Zalecha Hospital 2015.

## METHODS

The research design was pre experimental with one group pretest-posttest design. The population in this study are all nurses in the ICU, nursery, and surgery room in Ratu Zalecha Martapura Hospital as many as 73

people. The sampling technique used purposive sampling. Exclusion criteria of this research are nurse or midwife willing to become respondents in the research and educated diploma nursing or midwifery. The inclusion criteria of this study are; nurse or midwife will not or are taking time off and have not been trained hand hygiene. Based on these criteria the number of samples to 40 people. The dependent variable in this study is the compliance behavior hand hygiene while independent variables were age, sex, knowledge, attitudes, subjective norms, perceived behavior control, perceived susceptibility, perceived severity, perceived barriers and perceived benefits. The instrument used was a questionnaire and a check list hand hygiene compliance either handrub and handwash and My Five For Hand Hygiene Moment. Validity and reliability using Pearson Product Moment Correlation technique and Cronbach's Alpha. The trial questionnaire was conducted weeks to August 2nd, 2015. The results of validity and reliability of the whole question is valid and reliable for arithmetic and  $r$  alpha  $r > r$  table is 0.444. Intervention is the implementation strategy of multimodal hand hygiene improvement comprising: a) education and training on hand hygiene; b) reminders in the workplace in the form of posters 6 hand hygiene measures and Five For Hand Hygiene Moment c) changes in the system by ensuring facilities such as alcohol-based handrub liquids, antiseptic soap and tissue in each room. Data analysis consisted of univariate, bivariate and multivariate. Limitations of this study is the number of respondents by sex in this study are not as large so that the difference in hand hygiene compliance among paramedics men and women can not be known. Intervention and observations made in a short time. Another variable that may affect such experience, workload, role models, motivation, feedback, workload, working time can not be observed.

**RESULT****Univariate analysis:-****Table 4.1. Frequency Distribution of Respondents by Independent and Dependent Variable**

Variable	Before		After	
	N	%	N	%
<b>Age</b>				
Early adulthood	32	80	32	80
Middle adulthood	8	20	8	20
<b>Gender</b>				
Male	14	35	14	35
Female	26	65	26	65
<b>Knowledge</b>				
Poor	27	67.5	12	30
Good	13	32.5	28	70
<b>Attitude</b>				
Poor	21	52.5	11	27.5
Good	19	47.5	29	72.5
<b>Subjective norms</b>				
Poor	18	45	8	20
Good	22	55	32	80
<b>Perceived Behavior Control</b>				
Poor	19	47.5	8	20
Good	21	52.5	32	80
<b>Perceived Susceptibility</b>				
Poor	21	52.5	12	30
Good	19	47.5	28	70
<b>Perceived Severity</b>				
Poor	16	40	10	25
Good	24	60	30	75
<b>Perceived Barrier</b>				
Poor	15	37.5	14	35
Good	25	62.5	26	65
<b>Perceived Benefit</b>				
Poor	14	35	10	25
Good	26	65	30	75
<b>Hand Hygiene Compliance</b>				
Disobedient	25	62.5	12	30
Obedient	15	37.5	28	70

**Analysis Bivariat:-**

**Table 4.2. The Relationship of Age and Gender on Hand Hygiene Compliance on Paramedics Before and After Implementation of Strategy Multimodal Hand Hygiene Improvement in Ratu Zalecha Hospital Martapura 2015**

Variable	Hand Hygiene Compliance				Total	%	p-value	OR (CI95%)
	Disobedient (%)	Obedient (%)						
<b>Age</b>								
<b>Before</b>								
Early adulthood	21	65.6	11	34.4	32	100	0.444	-
Middle adulthood	4	50	4	50	8	100		
<b>After</b>								
Early adulthood	10	31.3	22	68.8	32	100	1.000	-
Middle adulthood	2	25	6	75	8	100		
<b>Gender</b>								
<b>Before</b>								
Male	9	64.3	5	35.7	14	100	1.000	-
Female	16	61.5	10	38.5	26	100		
<b>After</b>								
Male	6	42.9	8	57.1	14	100	0.281	-
Female	6	23.1	20	76.9	26	100		

**Table 4.3. Relations Knowledge, Attitude, Subjective Norm and Perceived Behavior Control with Hand Hygiene Compliance on a Paramedic Before and After Implementation of Strategy Multimodal Hand Hygiene Improvement in Ratu Zalecha Hospital Martapura 2015**

Variable	Hand Hygiene Compliance				Total	%	p-value	OR (CI95%)
	Disobedient (%)	Obedient (%)						
<b>Knowledge</b>								
<b>Before</b>								
Poor	19	70.4	8	29.6	27	100	0.175	-
Good	6	46.2	7	53.8	13	100		
<b>After</b>								
Poor	8	66.7	4	33.3	12	100	0.002	12.000
Good	4	14.3	24	85.7	28	100		
<b>Attitude</b>								
<b>Before</b>								
Poor	14	66.7	7	33.3	21	100	0.745	-
Good	11	57.9	8	42.1	19	100		
<b>After</b>								
Poor	7	63.6	4	36.4	11	100	0.008	8.400
Good	5	17.2	24	82.8	29	100		
<b>Subjective norms</b>								
<b>Before</b>								
Poor	14	77.8	4	22.2	18	100	0.104	-
Good	11	50	11	50	22	100		
<b>After</b>								
Poor	5	62.5	3	37.5	8	100	0.039	5.952
Good	7	21.9	25	78.1	32	100		
<b>Perceived Behavior Control</b>								
<b>Before</b>								
Poor	13	68.4	6	31.6	19	100	0.527	-
Good	12	57.1	9	42.9	21	100		
<b>After</b>								
Poor	5	62.5	3	37.5	8	100	0.039	5.952
Good	7	21.9	25	78.1	32	100		

**Table 4.4. Relationships Perceived Susceptibility, Perceived Severity, Perceived Barrier and Perceived Benefit with Hand Hygiene Compliance in Paramedic Before and After the Implementation of Strategy Multimodal Hand Hygiene in Ratu Zalecha Hospital Martapura 2015**

Variable	Hand Hygiene Compliance				p-value	OR (CI95%)		
	Disobedient (%)	Obedient (%)	Total	%				
<b>Perceived Susceptibility</b>								
<b>Before</b>								
Poor	17	81	4	19	21	100	0.013	5.844
Good	8	42.1	11	57.9	19	100		
<b>After</b>								
Poor	7	58.3	5	41.7	12	100	0.021	6.440
Good	5	17.9	23	82.1	28	100		
<b>Perceived Severity</b>								
<b>Before</b>								
Poor	13	81.3	3	18.8	16	100	0.056	4.333
Good	12	50	12	50	24	100		
<b>After</b>								
Poor	6	60	4	40	10	100	0.041	6.000
Good	6	17.9	24	82.1	28	100		
<b>Perceived Barrier</b>								
<b>Before</b>								
Poor	12	80	3	20	15	100	0.101	-
Good	13	52	12	48	25	100		
<b>After</b>								
Poor	8	57.1	6	42.9	14	100	0.011	7.333
Good	4	15.4	22	84.6	26	100		
<b>Perceived Benefit</b>								
<b>Before</b>								
Poor	10	71.4	4	28.6	14	100	0.502	-
Good	15	57.7	11	42.3	26	100		
<b>After</b>								
Poor	6	60	4	40	10	100	0.041	6.000
Good	6	20	24	80	26	100		

### Multivariate Analysis

**Table 4.5. Multivariate Analysis of Several Factors That Influence Hand Hygiene Compliance After Implementation of Strategy Multimodal Hand Hygiene Improvement on Ratu Zalecha Hospital Martapura 2015**

Variable	Koef.Regresi	Std. Error	t value	P Value
Constant	-0823	0.411	-2.004	0,053
Knowledge	.500	0.173	2,885	0.007
Attitude	0,201	0,154	1.331	0,199
Subjective norms	0,201	0,118	1.699	0.099
Perceived Severity	.110	.058	1,911	0.065
Perceived Susceptibility	.213	0.107	1.985	0.055
R	.778			
R Square	0.606	F Count	10.439	
Adjusted R Square	0,548	probability F	0000	

Variable knowledge have the greatest regression coefficient, meaning that the variable knowledge is the most dominant variable in influencing hand hygiene compliance compared to other variables. Based on the value of Adjusted R Square ( $R^2$ ) obtained coefficient of determination  $R^2$  is 0.606. This shows the percentage of variation of the dependent variable that can be explained by the independent variables of 60.6%. While the remaining 39.4% is influenced by other independent variables outside the research model.

## DISCUSSION

### The Relationship Between Age With Hand Hygiene Compliance on Paramedics Before and After Implementation of Strategy Multimodal Hand Hygiene:-

Noncompliance hand hygiene in middle age respondents likely due to they are accustomed to routine work without doing hand hygiene so that it becomes a habit. This condition causes them to be resistant to any change. According to Erasmus<sup>5</sup> paramedics early adulthood to make their colleagues who are more mature as a reference work. If the senior paramedic disobedient with hand hygiene practices so they tend to mimic the behavior.

The results showed no significant correlation between age with hand hygiene compliance before and after the intervention. Paramedics age does not always describe their experiences related hand hygiene and HAIs. The results are consistent with the theory advanced by some researchers who claim that age does not affect the actions of a person because of factors such as a person's attitude intermediaries and other factors that affect a person's will.<sup>6</sup> The results in line with research Philomene<sup>7</sup>, Snow *et al*<sup>8</sup>, Quiros Lin & Larson<sup>9</sup>, Sax *et al*<sup>10</sup>, Tai *et al*<sup>11</sup>, Mitchell<sup>12</sup>, Al Khawadeh *et al*<sup>13</sup>, the results of this study contradicts the studies conducted Al Hussami<sup>14</sup>, Ryan<sup>15</sup>.

### Relationships Between Sex with Hand Hygiene Compliance Before and After Implementation of Strategy Multimodal Hand Hygiene Improvement:-

Although it has been exposed to information about hand hygiene but when observation respondents still found women respondent who wear a ring when performing hand hygiene practices. In the male respondents disobedience perform hand hygiene due to improper practices. The bivariate analysis both before and after implementation of Strategy Multimodal Hand Hygiene Improvement showed no significant relationship between sex with hand hygiene compliance. According to Ajzen (1985) in Hassan *et al*<sup>16</sup> demographic characteristics and personality have not a direct effect on a person's behavior. The results are consistent with research Van de Mortel<sup>17</sup>, Korniewicz & El-Masri<sup>18</sup>, Mitchell<sup>19</sup>, Mortada & Zalat<sup>20</sup>, Philomene<sup>7</sup> and

Foote<sup>21</sup> and Al Khalwadeh<sup>13</sup>, Snow *et al*<sup>8</sup>, Al-Hussami *et al*<sup>14</sup>. The results of different studies indicated Sax *et al*<sup>10</sup>.

### Relationships Between Knowledge with Hand Hygiene Compliance on Paramedics Before and After Implementation of Strategy Multimodal Hand Hygiene:-

The results of the study before implementation Strategy Multimodal Hand Hygiene Improvement showed no significant correlation between knowledge with hand hygiene compliance. After application of the Strategy Multimodal Hand Hygiene Improvement bivariate analysis results show the different things that there is a significant relationship between knowledge with hand hygiene compliance.

One component of the Multimodal Strategy of the WHO Hand Hygiene Improvement of education and training. Information that continuous and sustainable to the paramedics will influence behavior change. Good knowledge of hand hygiene practices in accordance with WHO guidelines and compliance are essential to reduce the number HAIs. Compliance behavior based knowledge will be more durable than behavior based knowledge. The results of this study are consistent with results from studies conducted Creedon<sup>4</sup>, Foote<sup>21</sup>, Al Khawadeh *et al*<sup>13</sup>, Rezaee *et al*<sup>22</sup>. Green (1980) in Notoatmodjo<sup>23</sup> states that there is a positive relationship between the knowledge acquired someone to behavioral change. Knowledge and compliance of good hand washing practices in accordance with WHO guidelines on health workers are essential for reducing HAIs. Paramedics who already have knowledge of the importance of hand hygiene in preventing the incidence of HAIs would be subservient to the practice. The results of this study differ from research by Ward<sup>24</sup>, Situngkir<sup>25</sup>, Rabbani *et al*<sup>26</sup>, Cole<sup>27</sup>, De Wandel *et al*<sup>28</sup>, Huis *et al*<sup>29</sup> high level of knowledge, influence social or moral perception, consciousness, traffic control measures and their facilities do not always lead to increased adherence to hand hygiene.

### Relationship Between Attitude With Hand Hygiene Compliance on Paramedics Before and After Implementation of Strategy Multimodal Hand Hygiene:-

The results of the study before implementation strategy Multimodal Hand Hygiene Improvement showed no significant relationship between attitudes towards hand hygiene compliance. After application of the strategy Multimodal Hand Hygiene Improvement of the results of the analysis showed a significant relationship between attitudes towards hand hygiene compliance.

The results are consistent with research Quiros *et al*<sup>9</sup> that shows a strong correlation between a positive attitude towards compliance paramedics Hand Hygiene. The same is shown



Philomene<sup>7</sup> which shows that hand hygiene compliance is done via method *Self Reported* by nursing students positively correlated with attitude. According Ekwere TA & Okafor IP<sup>30</sup> attitude toward hand hygiene positively influence Hand hygiene practices.

#### **Relationship Between Subjective Norm With Hand Hygiene Compliance on Paramedics Before and After Implementation of Strategy Multimodal Hand Hygiene:-**

Statistical test results before the implementation of Strategy Multimodal Hand Hygiene Improvement showed no significant relationship between subjective norms and hand hygiene compliance. After the application of the strategy Multimodal Hand Hygiene Improvement found a significant relationship between subjective norms and hand hygiene compliance.

Individuals tend to behave according to what others expected to do. Someone who is in a social environment tend to behave the same with peers or others, as well as with a paramedic. Praise or positive feedback from senior staff or colleagues can trigger a more positive attitude than a paramedic on the behavior of the Hygiene Hand.<sup>31</sup> The belief that supervisors and hospital administrators expect adherence to the practice of hygienist hand and pressure from peers as well as the presence of role model reportedly has a big effect on the attitude towards hygiene Hand paramedics.<sup>32</sup>

The results of this study are consistent with Sax *et al*<sup>10</sup>, Hassan *et al*<sup>16</sup>, Mc Laws *et al*<sup>33</sup>. According Kortteisto *et al*<sup>34</sup> that subjective norm is the strongest factor. Paramedics who feel their subjective norm has no intention to comply with hand hygiene than paramedics who do not feel their subjective norms. Subjective norm is a model that has a positive role.<sup>35</sup> According to Lankford *et al* (2001) in Kamunge<sup>36</sup> found that compliance with hand hygiene of health workers is influenced role model. Focus Group Discussion (FGD) conducted Pittet *et al*<sup>37</sup> showed that hand hygiene practices conducted paramedics influenced by co-workers and vice versa. According to Sax *et al*<sup>10</sup>, Snow *et al*<sup>8</sup>, Tai *et al*<sup>11</sup>, and Ryan<sup>15</sup> that hand hygiene compliance levels tend to be higher paramedic supervisor or co-workers if they have a hand hygiene compliance. This is due to the close relationship and cooperation often compared with the head of the room. Pessoa-Silva<sup>31</sup> found that the intention to perform hand hygiene among paramedics at the neonatal unit influenced the opinion of others. According to White<sup>38</sup> paramedics considers coworkers as references to the most outstanding performance in support of hand hygiene. Other references are supervisors, patients, and representatives of the Infection Prevention and control team in the hospital. Research Snow *et al*<sup>8</sup> found that the

strongest predictor of a student as a mentor in hand hygiene practices.

#### **Relationship Between Perceived Behavior Control With Hand Hygiene Compliance on Paramedics Before and After Implementation of Strategy Multimodal Hand Hygiene:-**

Statistical test results before and after implementation of Strategy Multimodal Hand Hygiene Improvement find a significant association between perceived behavior control with hand hygiene compliance. Someone who feels able and successfully perform a particular practice tends to repeat the behavior. The ability to perform a behavior is certainly supported by the availability of facilities, knowledge and a positive attitude.

The results of this study are consistent with Sax *et al*<sup>10</sup>, Hassan *et al*<sup>16</sup>, Tai *et al*<sup>11</sup>, Kortteisto *et al*<sup>34</sup>, Philomene.<sup>7</sup> According to Pessoa-Silva<sup>31</sup> perceived behavior control and subjective norm is the most prominent predictor of intention to comply with hand hygiene practices are good. According DERSCH<sup>35</sup> perceived behavior control associated with the ability to know what to do in certain circumstances, which is based on education and training. Research Mc Laws *et al*<sup>33</sup>, Al Hussami *et al*<sup>14</sup> and Al Khalwadeh<sup>13</sup> conducted on nursing students showed perceived behavior control and intention were significant predictors of hygienic hand behavior. Perceived behavior control is a predictor of the most prominent of its intention to comply with hand hygiene practices good.<sup>31</sup>

#### **Relationship Between Perceived Susceptibility With Hand Hygiene Compliance on Paramedics Before and After Implementation of Strategy Multimodal Hand Hygiene:-**

Statistical test results before and after implementation of Strategy Multimodal Hand Hygiene Improvement show a statistically significant relationship between perceived susceptibility with hand hygiene compliance. In this study, respondents were given the intervention in the form knowledge of HAIs. It aims to sensitize the paramedics that they are very vulnerable to HAIs events. Individual perceived susceptibility to poor health condition or a disease varies. The results of this study indicate a relationship between perceived susceptibility with hand hygiene compliance. The higher the perceived risk, the higher the chances of someone engaging in behaviors that lower the risk. The results are consistent with research Maskerine & Loeb<sup>39</sup>, Ghanbari *et al*<sup>40</sup>, Carpenter<sup>41</sup> and Mortada & Zalut<sup>20</sup>. According to Kurniawan *et al*<sup>42</sup>, perceived susceptibility on paramedic most dominant influence in the application of standard precautions. Another study conducted by Silva *et al*<sup>43</sup> also concludes that if individuals feel a susceptibility to a disease, the related potential to participate in preventive health



behaviors. According Maskerine & Loeb<sup>39</sup>, Carpenter<sup>41</sup> and Lee *et al*<sup>44</sup>, health officials will adhere to the hand hygiene if they believe that they are susceptible to certain infections and will acquire or pass it on to someone else if it does not. Instead paramedics who do not consider themselves vulnerable to HAIs events would not act to make prevention by applying standard precautions. Redding & Rossi in Orji *et al*<sup>45</sup>, generally people often underestimate their vulnerability to disease.

#### **Relationship Between Perceived Severity With Hand Hygiene Compliance on Paramedics Before and After Implementation of Strategy Multimodal Hand Hygiene:-**

Results of bivariate analysis showed a statistically significant relationship between perceived severity with hand hygiene compliance on paramedics before and after implementation of Strategy Multimodal Hand Hygiene Improvement. Paramedics will obedient to perform hand hygiene if they know the severity caused HAIs.

The results are consistent with research conducted Mortada & Zalat<sup>20</sup>, Lee *et al*.<sup>44</sup> According to Kurniawan *et al*<sup>42</sup> perceived severity of paramedic most dominant influence in the application of standard precautions. The results of this study differs indicated by Lau *et al*<sup>46</sup> and Erasmus<sup>5</sup> where there is no relationship between perceived severity standard precautions behavior.

#### **Relationship Between Perceived Barriers With Hand Hygiene Compliance on Paramedics Before and After Implementation of Strategy Multimodal Hand Hygiene:-**

According to Rosenstock (1974) in Carpenter<sup>41</sup> when people believe to an act that is considered effective in reducing a negative impact but at the same time also see that this action is not uncomfortable, expensive, painful, and or challenge, then it is likely they are to adopt measures prevention-step most likely not happen. The negative aspects of an action is an obstacle in the act. If the benefits of a high action and resistance is weak, then an action is possible and vice versa. According Nazary *et al*<sup>47</sup> the paramedics access to facilities can improve hand hygiene compliance. According to Creedon *et al*<sup>4</sup> easy access to obtain liquid hand rub causes the practice of hand antisepsis increased by 20%. The results of this study conflict with Hossein<sup>48</sup> which only half of the health workers who are committed to doing hand hygiene if all the facilities are provided.

According Ariyaratne *et al*<sup>49</sup> most paramedics felt the lack of time as barriers to hand hygiene but the obstacle is addressed by using gloves not to practice techniques of effective hand hygiene. Research Pessoa-Silva *et al*<sup>31</sup> showed that

the shortage of paramedics cause a high workload and this is contributing to disobedient on hand hygiene practices. This study also showed a significant reduction of nosocomial infection rates when paramedics reduced workload.<sup>50</sup>

#### **Relationship Between Perceived Benefit With Hand Hygiene Compliance on Paramedics Before and After Implementation of Strategy Multimodal Hand Hygiene**

Statistical test results showed a statistically significant relationship between perceived benefit with hand hygiene compliance on paramedics before and after implementation of Strategy Multimodal Hand Hygiene Improvement. Hand hygiene compliance in paramedical influenced by a belief in the benefits of the practice itself. If a person believes and will feel the benefits of hand hygiene meal will adopt the behavior and vice versa.

The results are consistent with research Sax *et al*<sup>10</sup>, da Silva *et al*<sup>43</sup>, Ghanbari *et al*<sup>40</sup>, Mortada & Zalat<sup>20</sup>. According to Kurniawan<sup>42</sup> there is a significant relationship between perceived benefit with paramedics compliance in applying standard precautions. Hand hygiene is the most influential aspect in<sup>43</sup> infection control, infection control can help reduce the prevalence of MRSA. According to paramedics, patient protection is the most prominent benefits of hand hygiene practices.<sup>38</sup> Health workers will recognize and perform hand hygiene practices as a personal duty for their own health benefits. Most paramedics stressed the need for self-protection from pathogens for patients and their families as a major accelerator of their hand hygiene practices.<sup>50</sup> Prevention of cross infection is the main advantage of hand hygiene compliance.<sup>5</sup> The results of this study are not consistent with research Jang.<sup>51</sup>

#### **Effect of Knowledge, Attitude, Subjective Norm, Perceived Susceptibility and Perceived Severity of With Hand Hygiene Compliance on Paramedics Before and After Implementation of Strategy Multimodal Hand Hygiene**

After observing the results of the bivariate analysis and multivariate analysis of the development of this research is that hand hygiene compliance on paramedics strongly influenced by the level of knowledge without ignoring other factors such as attitudes, subjective norms, perceived behavioral control, perceived susceptibility, perceived severity, perceived benefits and perceived barriers.

Knowledge is a factor that affects the person's behavior changes. Based on their knowledge, someone will figure out the benefits and take an attitude to perform an action. O'Brien *et al*<sup>52</sup> stated that the right knowledge is the starting point to improve the practice and inculcate the

right attitude for the prevention of infection. The level of knowledge of the individual influence on attitudes toward a behavior. Someone with high knowledge will be a behavior will have a positive attitude toward a behavior and tends to be obedient in applying the behavior.

According to Al Khalwadeh<sup>13</sup>, Al Hussami *et al*<sup>14</sup>, Mc Laws *et al*<sup>33</sup> that personal attitude and responsible is a significant predictor of intentions. Attitudes can be improved by increasing one's knowledge through educational programs. An individual with perceived susceptibility and perceived severity is high against a disease tend to have a strong knowledge. These conditions explain the variation of individual's perception of a disease. Knowledge of the disease has the potential to modify the perceptions of individuals (Haefner & Kirsch, 1970) in Glanz K *et al*<sup>53</sup>.

### Conclusion

The results showed a relationship between knowledge, attitudes, subjective norms, perceived behavior control, perceived susceptibility, perceived severity and perceived barriers and perceived benefits of compliance with hand hygiene before and after implementation of Strategy Multimodal Improved hygiene Hands except for age and sex. Knowledge is variable the most dominant in influencing hand hygiene compliance without ignoring other factors.

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