

# TPB Model to Compliance Behavior in VAP Prevention

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## THEORY OF PLANNED BEHAVIOR DEVELOPMENT MODEL TO COMPLIANCE BEHAVIOR IN VAP PREVENTION AT ICU

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### ABSTRACT

Ventilator-Associated Pneumonia (VAP) is the leading cause of death associated with Healthcare-Associated Infections (HCAI) requiring treatment for its specific prevention. The prevention of VAP has not been done optimally thus far, with mistakes being made such as the nurses not doing hand hygiene and/or oral care according to procedure, and head elevation not being done as indicated. This study aims to assess the application of the Theory of Planned Behaviour to nurse compliance behaviour to prevent VAP cases in the ICU of Catholic Hospital Surabaya. The study was explanatory and observational with a cross-sectional approach. The population consisted of associate nurses working in the ICU and a total sample of 30 respondents was obtained through total sampling. The research variables were attitude, age, education, experience, knowledge, attitude towards VAP, subjective norms, perception of control, intention, and the preventive compliance behaviour of VAP. The instruments were in the form of questionnaires and observations. The data was analyzed using bivariate Chi-Square ( $p < 0.05$ ) and Partial Least Square. The results showed that 1) attitude, age and experience were associated with intentional support factors ( $p < 0.05$ ) while education and knowledge were not related to any of the intentional support factors. 2) The intentional support factors are related to intention ( $p < 0.05$ ). 3) Intention is related to VAP prevention compliance behaviour ( $p < 0.05$ ). Nurse's compliance behaviour in VAP prevention should consider their background factors, the support factor of intention, and intention.

Keywords: Compliance Behaviours; Healthcare-Associated Infections; Ventilator-Associated Pneumonia

### ABSTRAK

Ventilator-Associated Pneumonia (VAP) adalah salah satu Healthcare-Associated Infections (HCAI) dan terjadi pada sekitar 10-20% pasien dengan ventilator. VAP adalah penyebab utama kematian di HCAI yang membutuhkan perawatan dalam pencegahannya. Pencegahan VAP belum dilakukan secara optimal, seperti perawat belum melakukan kebersihan tangan dan perawatan mulut sesuai prosedur, peningkatan kepala belum dilakukan sesuai dengan indikasi. Penelitian ini bertujuan untuk menerapkan Theory of Planned Behaviour ke perilaku kepatuhan perawat untuk mencegah kasus VAP di ICU Rumah Sakit Katolik Surabaya. Desain penelitian ini adalah observasional eksplanatif dengan pendekatan cross-sectional. Populasi adalah perawat asosiasi yang bekerja di ICU dengan sampel 30 responden. Teknik pengambilan sampel menggunakan total sampling. Variabel penelitian adalah sikap umum, usia, pendidikan, pengalaman, pengetahuan, sikap terhadap VAP, norma subjektif, persepsi terhadap kontrol, niat, perilaku kepatuhan VAP. Instrumen berupa kuisioner dan observasi. Hasilnya dianalisis dengan Chi-Square ( $p < 0,05$ ) dan Partial Least Square. Penelitian menunjukkan bahwa: 1) sikap, usia dan pengalaman dikaitkan dengan faktor pendukung ( $p < 0,05$ ), sedangkan pendidikan dan pengetahuan tidak berhubungan dengan faktor pendukung. 2) faktor pendukung berhubungan dengan niat ( $p < 0,05$ ). 3) Niat berhubungan dengan perilaku kepatuhan pencegahan VAP ( $p < 0,05$ ). Perilaku kepatuhan perawat dalam pencegahan VAP mempertimbangkan faktor latar belakang mereka, faktor pendukung niat dan niat.

Keywords: Compliance Behaviours; Healthcare-Associated Infections; Ventilator-Associated Pneumonia

## INTRODUCTION

Ventilator-Associated Pneumonia (VAP) is a common feature of Healthcare-Associated Infections (HCAI) and it occurs in about 10 - 20% of patients who use ventilator devices (Heller, Evan, Wilson, & Simpson, 2016). Ventilator-Associated Pneumonia is the leading cause of death amongst all HCAIs with a mortality rate of 13% of patients who are on a ventilator (Law, So, Tang, Yeung, & Lam, 2015). Ventilator-Associated Pneumonia is a nosocomial infection that is commonly found to be associated with one of the major risk factors, which is the use of breathing apparatus in the form of a mechanical ventilator, especially in ICU patients. Ventilator-Associated Pneumonia (VAP) is pneumonia that occurs after 48 hours in patients on mechanical ventilation, either via an endotracheal system or a tracheostomy (Heller et al., 2016).

Ventilator-Associated Pneumonia is a life-threatening complication for every patient treated in ICU chambers, especially those using tracheal and/or ventilator hoses. According to VAP incidence reports, it is required that preventive action to be done in one of two ways: either non-pharmacologically or pharmacologically. (Todi, 2012) mentions four types of bundles that can be used in critical care practice areas including the VAP bundle, the Central Line bundle, the Sepsis Resuscitation bundle and the Sepsis Management bundle. VAP prevention can be done especially non-pharmacologically through the application of the VAP bundle. The application of the VAP bundle is highly dependent on the nurse's compliance. According to (Todi, 2012), the VAP bundle component includes a 45° head elevation whenever possible, to ensure a stable client hemodynamic status. Otherwise, consider maintaining a head position over 30°. There is also the daily evaluation of extubation readiness, the use of an endotracheal tube with subglottic secretion drainage, early oral care and decontamination with chlorhexidine and using safe enteral nutrition 24 - 48 hours after admission to the ICU. However, a preliminary study showed that 75% of

nurses did not perform the VAP bundle correctly, particularly concerning hand hygiene. The VAP procedure and its successful application is strongly related to the nurse's daily habits.

The Theory of Planned Behaviour according to (Ajzen, 2005) states that a person can perform or not perform a behaviour depending on the person's intentions. The intention to conduct a particular behaviour is supported by one's belief in the behaviour. Confidence is gained by being given the knowledge, skills, and experience necessary to carry out the behaviour. It is necessary to develop TPB in the ICU nursing environment to understand the difference when compared to the nurse's behaviour in another environment. The strong intention of a nurse will improve their compliance when carrying out the procedure. This study was conducted in order to analyze the relationship between knowledge, family support and social support with self-efficacy, and self-care in mind concerning the behaviour related to the patients with pulmonary tuberculosis.

## METHOD

The design used in this research was explanative observational. This research was conducted in order to get a picture of the causal relationship between the independent variables and the dependent variable. The approach used was cross-sectional because the independent variables and the dependent variable were observed simultaneously. The data was collected using a questionnaire for the intention, subjective norms and perceived behaviour control variables. The compliance behaviour variable data was gathered by observing every respondent on three different shifts. The statistical analysis was done using Chi Square and then the structural equation model analysis was done using Partial Least Square. The population consisted of associate nurses working in ICU Catholic Hospital Surabaya. The inclusion criteria were as follows: associate nurses and years of services > 1 year. The sampling technique used was total sampling with 30 respondents.

This research was conducted at



ICU Catholic Hospital Surabaya. The total bed capacity in the ICU is 12 beds with the number of nurses totaling as many as 34 people. The hospital has 13 ventilator units. The prevention and control of nosocomial infections in the ICU ward is coordinated by the hospital IPCIPC (Infection Prevention and Control) team assisted by the IPCLN (Infection

Prevention and Control Nurse) team in each unit. There are three IPCLN personnel in the ICU ward.

This study conducted a health research ethical test with the Health Research Ethics Commission of the Faculty of Nursing, Airlangga University number 314-KEPK on January 23rd, 2017.

**RESULT**

Table 1. Correlational Analysis of Attitude with Intention Supporting Factors

Attitude	VAP Behaviour						Subjective Norms						PBC					
	Category						Category						Category					
	Good		Less		Total		Good		Less		Total		Good		Less		Total	
Category	f	%	f	%	n	%	f	%	f	%	n	%	f	%	f	%	N	%
Good	14	73.7	5	26.3	19	100	16	84.2	3	15.8	19	100	17	89.5	2	10.5	19	100
Less	4	36.4	7	63.6	11	100	4	36.4	7	63.6	11	100	3	27.3	8	72.7	11	100
Total	18	36.4	12	40	30	100	20	66.7	10	33.3	30	100	20	66.7	10	33.3	30	100
Fisher's Exact Test 0.045						Fisher's Exact Test 0.005						Fisher's Exact Test 0.000						

Table 1 can be explained that attitude was related significantly to a prevention attitude towards VAP

behaviour, subjective norm, and perceived behaviour control.

Table 2. Correlational Analysis of Age with Intention Supporting Factors

Age	VAP Behaviour						Subjective Norms						PBC					
	Category						Category						Category					
	Good		Less		Total		Good		Less		Total		Good		Less		Total	
Category	f	%	f	%	n	%	f	%	f	%	n	%	f	%	f	%	N	%
20-40 Th	10	45.5	12	54.5	22	100	12	54.5	10	45.5	22	100	13	60.1	9	40.9	22	100
41-60 Th	8	100	0	0	8	100	8	100	0	0	8	100	7	87.3	1	12.5	8	100
Total	18	60	12	40	30	100	20	66.7	10	33.3	30	100	20	66.7	10	33.3	30	100
Fisher's Exact Test 0.010						Fisher's Exact Test 0.029						Fisher's Exact Test 0.210						

Table 2 can be explained that age related to VAP behavior, subjective norms

and not significantly correlated with perceived behaviour control.

Table 3. Correlational Analysis of Education with Intention Supporting Factors

Education	VAP Behaviour						Subjective Norms						PBC					
	Category						Category						Category					
	Good		Less		Total		Good		Less		Total		Good		Less		Total	
Category	f	%	f	%	n	%	f	%	f	%	n	%	f	%	f	%	N	%
Diploma	12	52.2	11	47.8	23	100	13	56.5	10	43.5	23	100	15	65.2	8	34.8	23	100
Bachelor	6	85.7	1	14.3	7	100	7	100	0	0	7	100	5	71.4	2	28.6	7	100
Total	18	60	12	40	30	100	20	66.7	10	33.3	30	100	20	66.7	10	33.3	30	100
Fisher's Exact Test 0.193						Fisher's Exact Test 0.064						Fisher's Exact Test 1.000						

Table 3 explains that education is not significantly related to VAP behavior,

subjective norms, and perceived behaviour control.

Table 4. Correlational Analysis of Experience with Intention Supporting Factors

Experience	VAP Behaviour						Subjective Norms						PBC					
	Category						Category						Category					
	Good		Less		Total		Good		Less		Total		Good		Less		Total	
Category	f	%	f	%	n	%	f	%	f	%	n	%	f	%	f	%	N	%
Good	11	91.7	1	8.3	12	100	12	100	0	0	12	100	11	91.7	1	8.1	12	100
Less	7	38.9	11	61.1	18	100	8	44.4	10	55.6	18	100	9	50	9	50	18	100

Total	18	60	12	40	30	100	20	66.7	10	33.3	30	100	20	66.7	10	33.3	30	100
	Fisher's Exact Test 0.007						Fisher's Exact Test 0.002						Fisher's Exact Test 0.024					

Table 4 explains that experience is significantly related to VAP behavior, subjective norms, and perceived behavior

control. Fisher's exact test 0.024 (t-statistic <0,05) means that there is a proven hypothesis.

Table 5. Correlational Analysis of Knowledge with Intention Supporting Factors

Knowledge Category	VAP Behaviour						Subjective Norms						PBC					
	Category			Category			Category			Category			Category					
	Good	Less	Total	Good	Less	Total	Good	Less	Total	Good	Less	Total						
	f	%	n	f	%	n	f	%	n	f	%	n	f	%	n			
Good	13	76.5	17	13	76.5	17	13	76.5	17	13	76.5	17	13	76.5	17			
Less	5	38.5	13	7	53.8	10	6	46.2	13	7	53.8	10	6	46.2	13			
Total	18	60	30	20	66.7	30	20	66.7	30	20	66.7	30	20	66.7	30			
	Fisher's Exact Test 0.061						Fisher's Exact Test 0.225						Fisher's Exact Test 0.255					

Table 5 explains that knowledge is not significantly related to VAP behavior,

subjective norms, and perceived behaviour control.

Table 6. Correlational Analysis of Intention Supporting Factors with Intention

Intention Supporting Factors	Category	Intention				Total	
		Good		Less		n	%
		f	%	f	%		
Attitude toward VAP Prevention	Good	16	88.9	2	11.1	18	100
	Less	6	50	6	50	12	100
	Total	22	75.3	8	26.7	30	100
Fisher's Exact Test		0.034					
Normative Belief	Good	18	90	2	10	20	100
	Less	4	40	6	60	10	100
	Total	22	73.3	8	26.7	30	100
Fisher's Exact Test		0.007					
PBC	Good	20	100	0	0	20	100
	Less	2	20	8	80	10	100
	Total	22	73.3	8	26.7	30	100
Fisher's Exact Test		0.000					

Table 6 explains that the intention of the nurses to do VAP prevention is in the range of good criteria (73.3%). It is dominated by perceived behaviour control

(66,7%), followed by subjective norm, which was good (60%), and attitude against VAP, which was good (53,3%).

Table 7. Correlational Analysis of Intention with Compliance Behaviour

Intention Category	Compliance Behaviour				Total		
	Good		Less		n	%	
	f	%	f	%			
Good	15	68.2	7	31.8	22	100	
Less	1	12.5	7	87.5	8	100	
Total	16	53.3	14	46.7	30	100	
Fisher's Exact Test		0,034					

Table 7 explains that for good intentions, only 50% of nurses behave well in terms of preventing VAP. There is still a good intention in the nurses who tend to behave less well (23.3%). Those with poor intentions who also behave poorly when

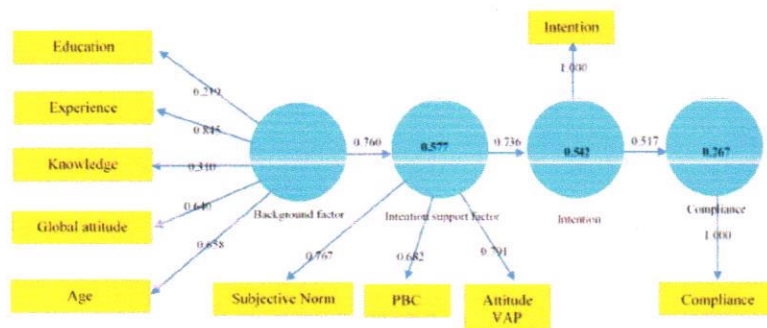
preventing VAP are high (23.3%), Intention proved to be significantly related to compliance behaviour in VAP prevention. Fisher's exact test result was 0,012 (p <0,05), which means that the hypothesis was proven.



Figure 1 explains that each variable had a relationship with VAP prevention obedience, which is shown by the t-statistic score of more than 1,96. The direct and indirect effect calculation of each of the variables were as follows: the relation of intention to obedience was 0.517, the relation of the additional intention factor to obedience was 0.381, and the relation of the background factors

to obedience was 0.209. This means that only intention has a direct effect on VAP prevention obedience. The results showed that the background factors and additional intention factors had an impact on nurse obedience after it was influenced by intention. It can be concluded that nurse behaviour in obeying the VAP prevention bundle is influenced by intention.

Figure 1. Theory of Planned Behaviour Path Model of the ICU Nurses



**DISCUSSION**

The nurse's attitude was good for 73,7 %. They also have good behaviour towards VAP prevention. Although there are a small number of nurses who have a good attitude, there is still bad behaviour towards VAP prevention. A theoretical model of Theory of Planned Behaviour (Various Behaviour) that contains various variables (Ajzen, 2005) is Background (background factors). This includes personal factors, one of which is the attitude of a person related to something. Based on the results of the research, nurses who have a good attitude were not entirely positive related to their behaviour in preventing VAP. This is because the condition of the ICU patients who are being treated is hard to predict (Ban, 2011).

The subjective norm is one's belief in another's approval of an action (Ajzen, 2005). Subjective norms are those who are considered to play a role in one's behaviour and who have hope in that person. This is in addition to the extent to which they desire to live up to that expectation. Two factors that influence

normative belief include the individual's beliefs. This refers to thinking that he should or should not engage in a behaviour and their motivation to comply, namely related to the individual motivation to meet the norm of the referral. According to (Burns, 2010), one of the attitudes that can affect adherence is the cultural norm that explains why a person fails to obey. A nurse working in an emergency department needs strong motivation. This motivation can also be influenced by the people around them. One effort that can improve motivation is the supervision system (Futaci, 2015).

Attitude has a significant correlation with perceived behavioural control in preventing VAP. According to (Ajzen, 2005), if the individual has the facility and time to perform or behave, then the individual estimates his or her ability and whether or not he has the ability to carry out the behaviour. In this case, this condition is called "perceptions of control" (perceived behavioural control) (Heller et al., 2016). Attitudes toward behaviour are influenced by the belief that the behaviour will lead to the desired outcome. Patients

treated in the ICU are in a critical condition requiring maximum care, so nurses working in the ICU are required to be prompt and precise. This is an element of behaviour control.

Age is significantly associated with VAP prevention attitude (Ajzen, 2005). In the Theory of Planned Behaviour, there are various background variables, one of which is age. Growing in age increases one's ability to make decisions, to exercise emotional control, to think rationally and to tolerate another's point of view (Martini, 2007). The nurses were mostly in the age range of 20 - 40 years old. Almost half had an attitude that is less focused on preventing VAP. In this study, it can be clearly seen that the more mature a person is, the better their attitude is in terms of preventing VAP (Jam, 2012).

Age is significantly associated with normative belief in VAP prevention. Normative belief is one's belief in another's approval of an action (Ajzen, 2005) or the individual's perception of another person and whether or not they support the action. The theoretical results of a person's ability and skills are often associated with age, so that the more aged a person is, the more mature their understanding of the problem (Kiyoshi, 2014). The older they are, the more mature and stronger a person will be. They will also be more substantial in their thinking and work (Koenig & Koenig, 2018).

Age is not significantly associated with perceived behavioural control in VAP prevention. Regarding the beliefs that the individual does or does not carry out a particular behaviour, the individual has the facility and time to do the behaviour. The individual then assesses his or her ability and whether or not they have the ability to carry out the behaviour (Ajzen, 2005). This condition is named "perceived behavioural control". The intention to conduct a behaviour is the tendency where there is a personal choice to do or not to do the work (Futaci, 2015).

Education is not significantly related to attitudes in VAP prevention. In this study, diploma nurses or Bachelor's nurses still behaved less well in terms of VAP prevention (Ajzen, 2005), which

incorporates three background factors, namely personal, social, and information. Education includes the social factors. One's education theoretically will affect a person's response to upcoming objects. People with a higher level of education will be more rational and open to accepting something new and they will be more adaptable to change (Law et al., 2015). It is predicted that in the ICU, nurses are required to be skilled and to work quickly (Potter, 2009). This is because actions in the ICU lead to more collaborative actions. Education is not significantly related to normative belief. (Ajzen, 2005) states that normative belief in general can be determined by the perceived specific expectations of a person. This is a reference (suggestion) to the people around him and to their motivation to follow the reference or suggestion. (Best et al., 2018b) mentions that education is a conscious and planned effort to create an atmosphere of learning and a learning process where someone can actively develop their potential to have spiritual strength in terms of religion, self-control, personality, intelligence, noble character, and gain the skills needed by him, other people and the nation. Theoretically, the high education of a nurse can improve their compliance when carrying out their obligations, to the extent that their education is an active form of education (Skaggs, Daniels, Hodge, & DeCamp, 2018a). In addition, the culture that is to be read from them is still lacking, so they always need to be reminded by their superiors or peers to read the SPO completely (Bergomi, Scudeller, Pintaldi, & Dal Molin, 2018).

Experience is significantly related to the attitude towards VAP. This incorporates three background factors, namely personal, social, and information. Experience is included in the information factor. According to (Notoatmodjo, 2010), experience is a good teacher. This is a source of knowledge and it is also a way to gain the truth of that knowledge. Research by (Luna, 2015) showed that an experienced nurse has a VAP prevention attitude that is better than those with less experience. It takes a positive commitment from the team to prevent VAP (Law et al.,



2015).

Experience is significantly related to normative belief. Research shows that good experiences dominate against good normative belief. Less experience indicates a lesser normative belief. Planned behavioural theory mentions the beliefs affecting the attitudes toward certain behaviours, such as normative belief and their control of their lived behaviours (Glanz, Rimer, & Viswanath, 2015). Beliefs about what behaviours are normative (expected by others) and the motivation to act in accordance with those normative expectations provides a normative belief in the individual.

According to (Glanz et al., 2015), behaviour control is determined by past experience and the individual assessment of how difficult or easy it is to perform the behaviour. The behaviour control of nurses working in the ICU can be influenced by many things, such as the ICU situation, the patient's condition and the environment. The existing facilities can also be a constraining factor in compliance behaviour in VAP prevention (Lyerla, Cynthia, Dorothy, Debra, & Lisa, 2010). These obstacles make them less controllable when behaving because of the demands of the situation. Experts argue that under these circumstances, commitment and intention are still needed from within. A reward can be given to the nurses who remain obedient in any situation. There are also sanctions for non-compliant nurses (Skaggs, Daniels, Hodge, & DeCamp, 2018b).

Attitude is influenced by many components, and one of them is cognition/knowledge (Azwar, 2008). The study conducted by (Luna, 2015) states that nurses with good knowledge of attitudes towards VAP prevention are also good. Based on the data above, good knowledge should involve a good attitude when behaving. However, this was not so in this study. Although the knowledge is good, the behaviour is still not good when preventing VAP. The data of the research shows that the respondents who have good knowledge but less experience have an attitude towards VAP that is also low.

An ICU nurse must have a good level of knowledge about treating patients

that are in a critical condition (Khalil, 2018). The knowledge of the ICU nurses in this study was in the good criteria. The regulations or standards should be known by the nurses who are providing care. Refreshing their knowledge of the latest science is necessary so then it can be known with certainty the correct position for the head elevation, thus facilitating supervision (Harmelink et al., 2017).

Perceived behavioural control is similar to the two previous factors that are influenced by their beliefs. The belief in question is about the presence/absence of factors that inhibit or support behavioural performance (control belief) (Glanz et al., 2015). Regarding the beliefs related to whether the individual has implemented or never exercised a particular behaviour, the individual has the facility and time to perform the behaviour regardless. The individual then estimates his or her ability to carry out the behaviour (Jam, 2012). Attitudes usually provide an assessment (accept/reject) of the object that is faced (Matta, 2014).

Subjective norm is significantly related to the intention of VAP prevention. Subjective norms lack a lesser level of intention. The subjective norm is a person's perception of the social pressure to perform or to not to engage in a behaviour (Best et al., 2018b). If the individual feels that the behaviour is not determined by someone else, then he will ignore the view of people about the behaviour that he did. Normative belief is the individual beliefs related to complying with the directions or suggestions of the people around them when it comes to participating in preventing VAP (Tolentino, DelosReyes, & Shiao, 2007). This is reinforced by the study by (Maradona, 2009) which also shows a similar thing; that there is a positive relationship between normative belief and customer compliance intentions.

The ICU nurses must have positive behaviour control. In the ICU, this support factor has been attempted as much as possible, although there are still obstacles when doing so (Keane, Vallecocchia, Nseir, & Martin-Loeches, 2018). These barriers can be from within the individual or from the outside. Theoretically, environmental



factors play a very important role in the control of behaviour in terms of the prevention of VAP, but it is still not done optimally because it lacks a strong intention in the individuals who carry it out. They argued in the FGDs because the ICU situation requires fast and frequent action resulting from the emergency action status (Kupeli, Salcan, Kuzucu, & Kuyruklyildiz, 2018).

The Theory of Planned Behaviour states that intention is a direct factor of behaviour which means that it can be mentioned that certain individual behaviour will be consistent regardless of the intensity of the behaviour. If there is an intention to behave in a certain way, then the person will do that behaviour (Metersky & Kalil, 2018). Therefore, the intention of an individual can provide an accurate prediction of the behaviour that arises. Intention does not in itself become behaviour because it still depends on the other factors. This includes the individual's perception of their ability to realize the behaviour and any constraints that are expected to inhibit the behaviour (Notoatmodjo, 2010).

According to the nurses; however, they were already doing hand hygiene but only until the third step. They felt that it was too complicated and that it takes a lot of time. They argue that the work must be completed quickly, and so they do not think about the consequences that can occur from the incomplete behaviour. This thought procedure is obviously lacking in good intentions in terms of behaving obediently, so there needs to be a change in compliance especially in the prevention of VAP (Darawad, Sa'aleek, & Shawashi, 2018). In accordance with the theory, it is said that one effort to improve adherence is professional support using techniques to improve the communication between friends. In accordance with the agreed commitment to improving compliance in addition to improving the poor intention reminiscent of their friends, the supervision of their superiors was a reward for those who behave obediently (Azab et al., 2013). Through the presence of intention and good communication, the nurse's compliance behaviour when undergoing the VAP prevention procedure

will also be good.

#### LIMITATION

This study used a cross-sectional design as it only looks at the relationship between the variables. The number of respondents was small and the study was only done in one hospital.

#### CONCLUSION

The Theory of Planned Behaviour (TPB) was found to have a strong relationship with the nurse's work that was focused on preventing the VAP occurrence. The VAP prevention bundle and hand hygiene are non-pharmacological actions which were hard to monitor since they are not included in the medical records. The study showed that every aspect of the nurse was useless if they did not have enough of an intention to perform VAP prevention. To summarize, all nurses must have a strong intention to perform these actions so that VAP can be prevented. The nurses involved in VAP prevention should always behave positively and be guided by the research results, such as performing oral care with a suction toothbrush, maintaining the head elevation according to the marker on the bed, and maintaining their hand hygiene according to SPO. There is a need to conduct research related to applying this model to another ICU facility so it can be known whether the TPB model development of ICU nurses is replicable.

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