A Qualitative Study of Factors Affecting Sustainable Implementation of a Mechanical Ventilation Weaning Protocol

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Abstract: Use of a protocol for weaning patients from mechanical ventilation improves quality of care and reduces practice variation and cost of care. The introduction of a weaning protocol into practice, however, does not ensure that it will be used sustainably. The objective of this study was to explore healthcare provider perceptions of factors influencing sustained implementation of a mechanical ventilation weaning protocol using a descriptive, qualitative approach with observation of practice, focus group discussion, and in-depth interviews. The participants were 55 healthcare providers working in intensive care units in four tertiary care hospitals. Data were analyzed by thematic analysis. Four themes emerged from the data: *staff attitude and competence, organizational support, multidisciplinary collaboration,* and *implementation feasibility*. The themes provide insight into factors that are expected to promote sustained implementation of a mechanical ventilation weaning protocol. Addressing factors found in this study may help create best practices for sustained implementation of a mechanical ventilation weaning protocol, and perhaps other practice protocols. Research is needed to determine the impact of addressing these factors on sustainability of mechanical ventilation weaning protocols and weaning outcomes.

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Introduction

Use of a mechanical ventilation weaning protocol (MVWP) is expected to improve quality of care[1] and reduce practice variation[2] and cost of care.[3] Several studies have demonstrated such benefits of MVWP use as reduced duration of mechanical ventilation,[4-6] intensive care unit (ICU) and/or hospital length of stay (LOS),[6] complications associated with mechanical ventilation,[7,8] cost of care, and mortality rates.[7] However, introduction of a weaning

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protocol into an ICU is insufficient to ensure that it will be accepted and followed by unit staff.[3] Protocol use is affected by knowledge, skills, attitude and personality of the healthcare providers;[9,10] organizational support in the way of resources, clinical structure, and leadership support;[11] characteristics of the protocol such as clinical utility and ease of updating;[12] and multidisciplinary team collaboration in protocol implementation.[13] The absence of one or more of these factors may result in low utilization of a MVVP and, consequently, less than optimal weaning outcomes.[7]

Similar to findings from other countries, use of a MVWP has been associated with reduced duration of mechanical ventilation, weaning time, and cost of care in Thailand.[14-16] The extent to which barriers and facilitators that impact MVWP use are the same in Thai ICUs as those previously reported[9-18] has not been studied; therefore, Thai healthcare provider perceptions of the factors related to sustainable implementation of MVWP was explored in the present study.

Review of Literature

Sustainability of protocol use is important because healthcare providers increasingly are faced with implementing new practices as evidence and technology changes.[9,17] A review of the literature on implementation and evaluation of practice changes suggested that a variety of factors facilitates initial implementation of a practice change, but the effects are reduced over time.[9] Factors that influence sustainability of a protocol include characteristics of the individual health care providers, the organization, and the protocol.[1,17]

Individual healthcare provider factors that affect sustainability include, education, and attitudes toward protocol use.[10] Nurses have reported that education is important to promote routine protocol use in daily practice.[19] It helps to encourage healthcare providers to be familiar and confident with using the weaning protocol.[5] Continuing education about the weaning protocol is to ensure consistency and sustains the protocol use.[20] Attitudes toward protocol use appear to be shaped by the benefits conferred. Protocol use is more likely to be sustained when healthcare providers perceive benefits of MVWP implementation to themselves, patients, and/or the organization than when benefits are perceived as negligible. Benefits to healthcare providers have been reported as standardized practice[17, 20] and reduced workload.[21] Benefits to patients were cited as reduced complications of mechanical ventilation (e.g., ventilator-associated pneumonia, tracheal stenosis, etc.) and ICU LOS.[7] Benefits to the organization were reduced cost of care and increased ICU bed turnover rates.[21] The authors of a systematic review found that if healthcare providers perceived benefits from protocol use, protocol use was more likely to be sustained.[22]

Many organizational factors have been examined, including leadership support, infrastructure capacity (e.g., resources, policies and procedures, facilities),[10] audit and feedback[7] and reminders,[23] and multidisciplinary teams.[15] Previous studies[6,7, 24] have found that leadership is the most effective strategy to improve the chances of successful ICU protocol use, including both informal and formal leadership. Informal leaders, defined as respected bedside staff or change champions, provide tacit leadership for an ICU culture and are able to engage other staff in practice changes. Formal leaders include persons external to the ICU who create a larger culture of practice values, including use of evidence-based protocols,[10,12] and academic detailing who is someone extended to the practice setting, having knowledge about research, and meets the providers in their settings by provided the information with the intent of protocol practice and may give a feedback.[10] Three types of leadership support for protocol implementation and use have been identified: (i) supporting the organizational vision and plans; (ii) providing staffing, educational

opportunities, and equipment resources; and (iii) embedding the protocol in policy and documentation.[7, 10]

Characteristics of the protocol that affect its sustained use include the protocol's complexity; relative advantage (e.g. effectiveness and relevance); and compatibility with the values, contexts, norms, jobs, and perceived needs of its users.[18] Empirical studies have concluded that MVWPs can be implemented safely and effectively, and that evidence-based modifications meet the needs of healthcare providers.[19]

Inter-professional collaboration (i.e., multi-disciplinary team approach) optimizes the active participation of healthcare professionals in clinical decision-making focused on patient needs, while simultaneously promoting respect for team members.[21] In a systematic review,[19] the authors defined inter-professional teamwork as working collaboratively in the provision of integrated and continuous healthcare, and found outcomes from teamwork included improved efficiency and quality of care, cost reductions, and increased job satisfaction of healthcare providers.

Study Aim

Care delivery in the ICU is complex, dynamic, stressful, and subject to time pressures. Thus, factors that affect sustainable MVWP implementation may differ from those in a less intensive environment. The purpose of this study was to explore factors, barriers and facilitators, that influence sustained MVWP implementation as perceived by healthcare providers in Thai ICUs. Naturalistic inquiry was used to achieve the study aim because the approach focuses on studying the phenomenon of interest in its natural state.[26] The ICU, with competing priorities for staff effort, is the context of MVWP use. Understanding that context through qualitative methods is essential to understanding the barriers and facilitators to sustained use of practice protocols.

Methods

Design:

A descriptive, qualitative approach[26] was used.

Sample and Setting:

Participants were recruited from four tertiary care hospitals in Bangkok, Thailand with ICUs that had sustained MVWP implementation for at least two years. Hospital bed capacity varied from 500 to 1,000 beds, the number of ICUs varied from four to six per hospitals, with ICU bed capacity of eight to ten beds. Participants were recruited through purposive and snowball sampling.[20] Forty-three registered nurses who had at least one year of work experience at the bedside with MVWP implementation were recruited for focus group discussion. To supplement data obtained from the focus groups and obtain multidisciplinary and administrative perspectives, twenty participants were purposively recruited for in-depth interviews: eight bedside nurses from the focus groups, four head nurses, four nurse supervisors, and four physicians. Inclusion criteria for the head nurses were: have responsibility for staff continuing education, resources, and supervision. Inclusion criteria for nurse supervisors were: responsible for facilitating communication and collaboration among staff and with other units, monitoring MVWP use, and staff continuing education on MVWP use. The inclusion criterion for physicians was having work experience with MVWP implementation for at least one year in one of the four study hospitals.

Ethical Considerations

Approvals were obtained from the Institutional Review Board of the Faculty of Nursing, Chiang Mai University, and the Principal Director or Dean and the Research Ethics Committee of the hospitals that agreed to serve as study sites. Potential participants were informed about the purpose, methods, potential risks and benefits of participation, and measures to protect confidentiality. They were informed that

participation in the study was voluntary and they could withdraw from the study at any time. Written consent was obtained before data collection and tape-recorded verbal consent was obtained before interview. To minimize loss of confidentiality, participant data were assigned a code number. Audio-taped interviews were kept in a separate locked cabinet; no names were used during the interviews and code numbers or pseudonyms were used to separate transcribed data.

Data Collection

Introductory letters from the Faculty of Nursing, Chiang Mai University, were sent to the director of each hospital to obtain permission for, and cooperation with, the conduct of the study. The principal investigator (PI) subsequently obtained a list of healthcare providers from each hospital; she directly contacted healthcare providers, reviewed the study procedures, and obtained informed consent for study participation. Participants were recruited between August 2013 and May 2014.

Practice Observations. The PI observed mechanical ventilation weaning practice at each study site between 7:00 AM and 4:00 PM; each observation lasted 4 – 6 hours. The purposes of the observations were to develop relationships with staff to enhance recruitment of study participants and provide context for understanding and facilitating focus group discussions.

Focus Groups Discussion. Two focus groups were conducted in each of the four study hospitals, with five to seven bedside nurses in each group, for a total of eight focus group discussions. The PI targeted bedside nurses for focus group discussions because nurses are the healthcare providers who actually implement the MVWP. Open-ended questions (Table 1) were used to facilitate participant expression of thoughts and opinions. The interview guide questions were followed by more specific questions or probing statements like: 'I'm a bit unclear about that explanation...,' 'Please give me more some examples...,' '...What does it mean?," 'Why do you think so?" Each focus group discussion lasted 60-90 minutes.

Interviews. In-depth interviews were conducted with bedside nurses, head nurses, nurse supervisors, and physicians. Each interview lasted 50-90 minutes and was held in a quiet location of the participant's choice (e.g., private room in the ICU). The same interview guide (Table 1) used for the focus groups was used for the interviews, and interviews were audio tape-recorded. After the PI transcribed and reviewed the interview data, a second interview was scheduled to follow up on comments, ask new questions, and/or seek participant feedback on interpretation of the data from the first interview. The transcribed verbatim were verified for accuracy by two researchers. Field notes were written by the PI as soon as possible, and less than 24 hours, after the unit practice observations, focus group discussions, and interviews to capture context, social interactions, and observational details.

Table 1. Questions on the Interview Guide for Focus Groups and Individual In-depth Interviews.

1. What do you think about mechanical ventilation weaning protocols (MVWP) in the ICU?
2. What factors influence sustainability of MVWP implementation?
3. Do you face any challenges with MVWP implementation?
4. How do you work with nurses and physicians for sustainable MVWP implementation?

Data Analysis

After verbatim transcription of the focus group and interview recordings by the PI, the other two researchers verified the accuracy of transcription. Thematic analysis was used to analyze the data and classify words or statements used by healthcare providers during focus group discussions and in-depth interviews. The researchers reflected on the interactions and discussion from the focus groups, transcriptions from audio-taped interviews, and investigator field notes. The approach of Braun and Clarke[28] was used, which consists of six phases of analysis: familiarizing self with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report.

Several strategies were used to enhance trustworthiness of the data analysis, with trustworthiness defined as credibility, accuracy, transferability, and dependability of the study findings.[27] Credibility of study findings was enhanced by using multiple methods of data collection (methodological triangulation) and comparing data sources in order to ensure accurate findings. Member-checking (i.e., participants asked to validate the investigator's interpretation of the data) and peer debriefing were used to confirm credibility. The findings also were shared with co-authors for verifying the accuracy of interpretation. Detailed descriptions were developed to help the reader understand the study context and participants in order to evaluate transferability of the findings to other contexts and participants. An audit trail of the data collection process, complete record of raw data, audiotapes and transcripts, and decisions made was created for evaluation of dependability; advisory committee members served as auditors of the research process and end-product.

Results

Demographic characteristics of the study participants are summarized in Table 2. The sample was predominantly female and 50 years of age or younger; all but one participant had at least a bachelor degree; and over half of the sample worked with medical ICU patients. Four themes emerged from healthcare providers' perceptions of sustainable MVWP implementation (Table 3): *staff attitude and competence, organizational support, multidisciplinary collaboration,* and *implementation feasibility*

Table 2. Demographic characteristics of study participants (N = 55).

Characteristics	Nurse (n = 51)		Physician (n = 4)	
	N	%	N	%
Gender				
Female	52	100	1	25
Male	-	-	3	75
Age (years)				
20-30	21	41.18	1	25
31-40	13	25.49	2	50
41-50	11	21.57	1	25
51-60	6	11.76	-	-
Range	22 - 60	-	28-50	-

Table 2. Demographic characteristics of study participants (N = 55) (cont.)

Characteristics	Nurse (n = 51)		Physician (n = 4)	
	N	%	N	%
Position (Nurses)				
Nurse practitioner	17	33.34	-	-
Advanced practice nurse	4	7.84	-	-
Critical care staff nurse	22	43,14	-	-
Head nurse of ICU	4	7.84	-	-
Nurse supervisor	4	7.84	-	-
Physician)	-	-	-	
Critical care physician	-	-	1	25
Physician (Head of ICU)	-	-	2	50
Medical resident	-	-	1	25
Work Role				
Practitioner	42	82.35	4	100
Administrator	8	15.69	-	-
Educator	1	1.96	-	-
Level of Education				
Bachelor's Degree	41	80.39	-	-
Master's Degree	9		-	-
Medical science	-		4	100
Other (Certificate of critical care nursing)	1		-	-
Type of Work Unit				
Medical ICU	26	50.98	3	75
General ICU	3	5.88	-	-
Medical coronary care unit	2	3.92	-	-
Surgical ICU	6	11.76	-	-
Med-surgical ICU	1	1.97	-	-
Emergency medical ICU	11	21.57	1	25
Others (nurse department)	2	3.92	-	-
Years of Experience				
1-5	12	23.53	2	50
6-10	18	35.29	-	-
11-15	7	13.73	2	50
16-20	5	9.80	-	-
> 20	9	17.65	-	-

Table 3. Factors related to sustainable implementation of MVWP: Themes and sub-themes

Theme	Sub-theme
Staff attitude and competence	• Positive attitude
	• Adequate knowledge
	• Essential clinical skills
Organizational support	• Leadership encouragement
	• Supportive environment
Multidisciplinary collaboration	• Respect, knowledge, and proficiency within
	• multidisciplinary team
	• Sharing roles and responsibilities
Implementation Feasibility	• Involvement in protocol development
	• Practically useful
	• Review and update based on evidence

Theme 1: Staff Attitude and Competence

Staff attitude and competence was expressed as an essential factor for sustained MVWP use. Most participants mentioned that healthcare providers need a positive attitude, adequate knowledge, and essential clinical skills to promote sustainable MVWP implementation.

Positive attitude. The participants described a positive attitude toward MVWP implementation as perceiving usefulness of a MVWP and its benefits for patients, staff, and/or the organization. They described benefits to patients as reductions in such physical complications as ventilator-associated pneumonia (VAP), tracheal stenosis, reintubation, and overall morbidity; and such psychosocial complications as suffering, pain, discomfort, and prolonged ICU length of stay. As one head nurse said:

> *When we wean using the weaning protocol, it reduces complications such as VAP, immobility, muscle atrophy, and tracheal stenosis as well as the psychological complications such as suffering and pain.* (ID, Head Nurse, H4)

Participants mentioned usefulness of MVWP implementation to staff as consistent practice and pride in subsequent patient outcomes. With the different educational backgrounds, experiences, and competence levels of healthcare providers, patients will experience variable levels of care; MVWP use decreases variations in practice and biases of human decision-making, so that the quality of care is more standardized. For example:

> *The protocol is good in that it helps us to know whether the patients are ready for weaning, so we do not have to use our opinion, or each one's proficiency. The differences among healthcare providers depend on their personal experience.* (FDG 1, Nurse 2, H4)

Participants described usefulness to the organization largely in economic terms. Some participants stated that MVWP implementation could help the organization reduce expenses from medical equipment and drug use, which are associated with mechanical ventilation. Moreover, it would be easier to manage ICU beds with MVWP use because weaned patients are extubated shortly after weaning and can be considered for unit transfer after extubation.

> *It helps the organization reduce expenses when we wean a patient from mechanical ventilation and extubate as soon as possible. This process reduces use of medical equipment and antibiotic drugs which are expensive. This also helps economize expenses for the organization.* (ID, Nurse, H1)

Adequate knowledge. Adequate knowledge emerged in several forms: knowledge about the weaning process and the MVWP, more general knowledge of the patient's condition and the underlying pathophysiology, and keeping up with current evidence that provides the scientific basis for the MVWP. Participants believed that such knowledge helps them wean patients in an appropriate, safe, and timely way. Participants stated that nurses have to search for new knowledge, not only about patient care but also about respiratory and ventilator care as such knowledge constantly changes. Participants said:

> *If you know about the underlying disease of the patient, such as COPD, you should decrease the oxygen concentration when you need to wean those patients.... I think that knowing the pathophysiology of the patient is important."* (ID, Nurse1, H1)

> *Having sufficient knowledge of the weaning protocol and procedures are important for us because we should practice based on the protocol from the first step of the weaning process to the last. If the nurses have this, they will improve the quality of care provided to the patients.* (FGD2, Nurse5, H3)

> *We must continue developing our knowledge because weaning approaches are always changing and being adapted over time. Like our unit, we do have training, not only internal but also external training.* (FGD1, Nurse 4, H1)

Essential clinical skills. Some practitioners believed that healthcare providers should have essential clinical skills to implement MVWP such as adjusting the ventilator mode; lung auscultation; and interpreting tests such as arterial blood gases, electrolytes, and chest X-rays. They should be able to measure criteria for use of the weaning protocol and monitor the patient's hemodynamic (blood pressure, EKG, pulse oxygen saturation) and respiratory status. Participants believed that if they have the clinical skills, they will be respected and have responsibility commensurate with other healthcare team members.

> *The staff in this place can adjust the ventilator because there is support for medical equipment training like the ventilator, so after that they will come and teach us how to adjust it. When the physician is assessing the patient, if we find that the patient is ready to wean, we will adjust the ventilator.* (FGD, Nurse 3, H2)

> *The practitioner needs to have skill with lung sound assessment and interpretation of chest x-ray, blood gas, and electrolyte results.* (ID, Head Nurse, H1)

Theme 2: Organizational Support

Participants stated that organizational support is a key factor that influences sustained use of the MVWP, including leadership encouragement and a supportive environment. They believed that if leadership did not consider implementation of MVWP important, practitioners would not either.

Leadership encouragement. Leadership encouragement encompasses the broad staff-assistive activities of educating, consulting, and coaching healthcare providers with MVWP implementation; role modeling; and monitoring MVWP implementation. Participants stated that new nurses receive coaching from the leaders who have more experience, knowledge, and expertise in weaning patients. Healthcare provider development is important for correct and complete implementation of all steps of the MVWP. Participants' thoughts are illustrated below:

> *The leader arranges academic conferences each year on the respiratory tract that has a session on the weaning protocol as well. As a result, it encourages us to not forget using the weaning protocol.* (ID, Nurse2, H3)

Coaches will train the new nurse, consult on every process, and also teach and give suggestions for protocol implementation. Coaches will educate at the bedside, or sometimes they will teach in the classroom. The coach and new nurse will cooperate on the same case. (ID, Nurse2, H1)

Sometimes the physician does not consider weaning, so we have to remind the physician that weaning readiness needs to be assessed, or that the patient needs additional intervention(s) to facilitate weaning. This patient does not have good nutrition, this patient has excessive secretions and needs a physical therapy consult to help with secretion drainage, which could enhance weaning success. Through coordination of care, leader nurses are very helpful in preventing weaning delay or failure and reintubation. (ID, Head nurse, H4)

Participants articulated the importance of embedding the MVWP in practice through organizational policy. When the MVWP was integrated into a policy, participants advocated wide and frequent distribution of the policy because of healthcare provider rotation through the ICU and novice nurses who need to understand consistent implementation of the policy.

After presentation during a conference, physicians and nurses decide we will implement the protocol. Then we communicate the decision in the division conference so everyone in the group receives the same information. We will notify new team members that we do have a weaning process in the hospital. (ID, Head nurse, H3)

Participants stated that audit and monitoring were essential to assess the knowledge and skills of healthcare providers. Regular audit and monitoring by leadership helps to identify gaps in MVWP implementation for quality improvement. Several approaches were used for audit and monitoring including observation, asking questions, documentation checks, and shift reports.

We closely observe nurses' practice. We monitor the patients and reconcile our observations with the nurses' assessment and evaluation during use of the weaning protocol. (ID, Head nurse, H3)

Supportive environment. Most participants stated that a supportive environment is important, including human resource management and mobilization of equipment and supplies. Human resource management addresses preparation of healthcare providers with the knowledge and skills needed to implement and sustain use of the MVWP. Moreover, participants said that evaluation of nurse performance related to MVWP implementation should be done before the nurse could wean an ICU patient from the ventilator; evaluation ensures that nurses have the requisite knowledge and skills to implement the MVWP.

Funding is an important resource. Funding was deemed important for healthcare providers to share experiences with successful MVWP implementation through presentations and to support time to do the development work for protocol implementation and revision.

For your knowledge and skills at this level, you are able to pass though evaluation of novice level. If you pass competency evaluation, it means that you are able to provide weaning for the patients. (FGD1, Nurse3, H1)

In case of asking for sending the nurses to development training, the administrator will approve, and may also help fund the training, so they will give the opportunity. (FGD1, Nurse 4, H1)

Leadership needs to provide support for time. Nurses have already taken care of patients, so why must they do development work without salary support?.(FGD1 Nurse 4, H1)

Participants perceived the mobilization of equipment and supplies was important support. Two

participants expressed that there should be enough equipment and supplies to practice the skills needed to implement the MVWP; such items include mechanical ventilators, oxygenation equipment, spirometers, and pressure meters. For example:

> *Provide devices like spirometers and pressure gauges that can be used to implement the MVWP and also to teach nurses how to use them. If the nurses are trained in use of weaning equipment, they will use the equipment proficiently and without hesitation.* (ID, Supervisor Nurse, H1)

Theme 3: Multidisciplinary Collaboration

Participants stated that multidisciplinary collaboration is an agreement to practice together as a team focused on sustainable MVWP implementation. Multidisciplinary collaboration includes respect, knowledge, and proficiency of team members, and sharing roles and responsibilities. Participants stated that physicians trust the nurses by letting nurses implement weaning using the MVWP to assess the patient's readiness to wean and adjust ventilator modes. The physicians respect nurses' weaning activities and trust the decisions the nurses make.

> *Physicians have requested that patients receiving mechanical ventilation on the general ward move to the ICU for weaning. The physician needs the patient to wean in the ICU because they respect the knowledge and skills of the ICU nurses.* (ID, Nurse 1, H4)

> *Physicians believe that providing authority to nurses allows the nurse to implement MVWP completely...from the beginning of assessment until extubation. Physician acceptance of the nurses' capabilities yields job satisfaction for the nurses.* (ID, Head nurse, H2)

Participants discussed sharing roles and responsibilities as having discussions and making decisions as a team and reviewing the weaning protocol together. The multidisciplinary team learns together by using the weaning protocol to solve weaning problems.

> *In cases of problems with weaning, we evaluate the problems against the MVWP. The premise is that we will follow the weaning protocol or learn together by using the weaning protocol as a basis to solve the problem.* (ID, Physician, H1)

Theme 4: Implementation Feasibility

Most participants addressed the feasibility of MVWP implementation in terms of involvement with protocol development; practicality, or clinical utility, of the MVWP; and protocol updates based on new evidence. Participants thought that these factors are important for sustained MVWP implementation. Some participants expressed that involvement needs to be multidisciplinary so that all team members develop a sense of ownership of the MVWP.

> *We developed the mechanical ventilation weaning protocol by setting up a group for working in the manner of continuous outcome practice to improve the quality of practice. It derived from our daily work. The head nurse, scholar nurse, practitioner nurse, and a physician joined together to develop the MVWP in order to resolve problems and create practice guidance for the unit.* (ID, Nurse, H1)

Participants described the importance of a practical MVWP that is simple and clinically useful. They perceived the MVWP currently in use as easy to use, flexible, and clear in specification of each step of the weaning process and criteria for decision making.

> *This weaning protocol was developed to be short and simple to use. The steps of the procedure are easy and short.... do this and the patient will pass weaning, do this and the patient can be extubated.* (FGD2, Nurse 2, H1)

> *When we use the protocol, we have to adapt to our patients as much as possible. The protocol*

may not be followed all the steps, it depends on each patient. The weaning protocol is used the maim concept but in the detail it has to be adjusted to meet with the patients.(ID, Physician, H3)

Reviewing evidence and updating the MVWP as needed was perceived by participants as crucial because knowledge about respiratory and ventilator management is always changing. Some participants suggested that the MVWP should be revised every 5 years to maintain evidence-based practice.

Although the protocol is best for us, we have to step up development for better care. The current protocol is already good, but if it has not changed, it seems to be dead. It has to be updated. Even if this one is good, you must take what is the dominant better. It gets reviewed every five years to update this protocol to a new one. (FGD2, Nurse1, H1)

Discussion

The findings of this study indicate that most participants, regardless of discipline or role, perceived that sustainable MVWP implementation involves multiple factors that generally match the findings of previous studies conducted in different countries and cultures. The themes of staff attitude and competence, organizational support, multidisciplinary collaboration, and implementation feasibility are broad in scope and general (i.e., factors would apply to any practice protocol). In this respect, the findings may reflect the tertiary hospital ICU culture in urban Thailand as much as barriers and facilitators of sustained MVWP use. Indeed, the culture of a hospital is the underlying basis of healthcare system improvement initiatives, such as the Magnet Recognition Program in the United States.[27]

Kulier and colleadges[29] pointed out that awareness is the first step in the process of adopting a protocol. Awareness may motivate health care providers to seek the knowledge and skills necessary for MVWP implementation.[30] Participants in the present study were made aware of the MVWP through hospital policy, education, and leadership monitoring.

Of note, most participants expressed a positive attitude toward MVWP implementation, citing benefits for patients, staff, and the organization. The benefits cited for patients are consistent with positive patient outcomes of MVWP implementation cited in the literature.[4,14,15] The use of a weaning protocol can ensure that patients are managed consistently during the weaning period, thereby reducing error and undesirable variation; and improve patient safety by reducing weaning delays.[3,6,31] It is reasonable to assume that if healthcare providers find the MVWP useful, implementation will be sustained. In contrast, a negative attitude toward the protocol may be expected to obstruct protocol implementation.[31]

In this study, the benefits of MVWP implementation to healthcare providers were reducing practice variation in weaning and taking pride in the patient outcomes achieved. Others have suggested that protocols reduce the gap between best evidence and best practice and improve the quality of care.[32] The author of a systematic review focusing on sustainability of health-related projects concluded that, if staff members perceive benefits to themselves and/or patients, the innovation was more likely to be sustained.[22]

Moreover, study participants perceived that MVWP implementation was useful to the organization by reducing the cost of care and increasing the turnover rate of ICU beds. This finding is consistent with previous studies that reported MVWP implementation decreased healthcare costs without jeopardizing patient safety.[3]

Most study participants articulated that the practitioner should have the knowledge and skills to implement the MVWP. The knowledge went beyond that technically needed to implement a MVWP, and

included the pathophysiology of diseases and new evidence that may indicate the need for protocol changes. Furthermore, the MVWP should be distributed to all healthcare providers who are new or rotate through the ICU. Significantly, the education has to be continuing education because the evidence basis for the MVWP changes.[7] This finding is congruent with the suggestion of Blackwood and colleagues [4] that education is a cornerstone of improvement of protocol implementation and must be promoted among healthcare providers at all levels of experience. As an added benefit for sustainable MVWP implementation, education reinforces awareness of the protocol and provides an opportunity for protocol updates.[18]

Our findings indicate that leadership support within the organization is a key factor of sustainable protocol implementation, which is consistent with the findings of others.[12] Leadership support in the present study encompassed policy making, education, clinical consultation for problems with MVWP implementation in practice, and audit and monitoring to indicate gaps in care. The audit and monitoring information provided essential information for quality improvement. All components of organizational support articulated by participants in the present study have been advocated by others, albeit the importance of clinical consultation to resolve bedside problems with MVWP implementation has received less attention,[10] and may reflect different roles of nurse supervisors in different countries.

Essential resources to sustain MVWP implementation include adequate staffing, staff training, equipment, computer technology, and information systems.[33] MVWP implementation requires frequent assessment of the patient, ventilator adjustment, and team communication regarding decisions to advance or delay weaning toward extubation. Clearly, the process will be abandoned or delayed in times of short staffing. Staff training is critical to successful and sustained MVWP use.[9] As indicated by study participants, a plethora of concepts and technical skills are needed beyond the confines of the MVWP itself. The training needs to be ongoing, albeit periodic, to ensure both that the MVWP remains evidence-based and staff are competent with execution of the current protocol.[23] Computer technology and information systems are important for patient care quality assurance and improvement.[7]

Staff development affects multidisciplinary collaboration. As expressed by the study participants, multidisciplinary collaboration requires respect for the knowledge and skill proficiency of other team members, including decision − making skills. Multidisciplinary collaboration is particularly important in the ICU[13] where patient care is subject to time-sensitive pressures. As found in the present study and research by others,[3] competent nurses facilitate collaboration because physicians trust the decision-making ability of those nurses.

The involvement of key stakeholders − clinicians from several disciplines − through all stages of protocol development, dissemination, implementation, and evaluation creates ownership of the MVWP and vested interest in its implementation, resulting in sustained use.[41] Several empirical studies support the relation between multidisciplinary team and MVWP adherence.[6,13,23] Our study results support findings that factors related to protocol sustainability include multidisciplinary collaboration, particularly in the stages of MVWP development and implementation.

Limitations

This study has several limitations. It was conducted with healthcare providers in tertiary hospitals of a large city and, thus, may not reflect the perceptions of healthcare providers who work in small hospitals or rural areas. Healthcare providers were asked to participate in this study by the head nurse, which may have produced biased expressions of perceptions; this limitation was tempered by complete confidentiality

of the informants. Finally, student participants were healthcare providers with > 1 year experience with MVWP implementation from ICUs that had sustained MVWP implementation for ≥ 2 years; thus, facilitators of sustained protocol use may be expected to dominate the healthcare provider perceptions. A greater focus on barriers may be found from healthcare providers with < 1 year experience with MVMP and/or those in ICUs that have not been successful with sustained MVWP use.

Conclusions and Implications for Nursing Practice

A naturalistic inquiry approach was used to elicit perceptions of healthcare providers related to sustainable MVWP use that emphasized a commitment to studying the topic of interest in its natural state. Staff attitude and competence, organizational support, multidisciplinary collaboration, and feasibility of protocol implementation affect sustained implementation of a MVWP. Staff competence appears to drive multidisciplinary collaboration and organizational support appears to drive staff competence. Nonetheless, the four conceptualized themes appear to be interrelated; it is difficult to envision sustained protocol implementation when deficits exist in any of these areas.

The findings suggest that ICU and hospital leaders should consider the identified factors to sustain use of a MVWP. Preparing nurses and other healthcare providers by providing continuing education about the MVWP is an important strategy to improve staff attitude and competence. Advanced practice nurses, as clinical leaders who have multiple roles (e.g. education, supervision, audit and feedback), may be well suited to navigate sustainable MVWP use. Moreover, these findings may be used to develop a strategy tailored to address factor deficiencies in order to improve the implementation of protocols in clinical practice.

We recommend that future research include a meta-analysis of studies on protocol implementation and sustainability to quantify the effect of barriers and facilitators of clinical protocol implementation. Given the commonalities in factors affecting sustained implementation, it may be possible to combine results from trials of different practice changes.

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การศึกษาเชิงคุณภาพปัจจัยที่มีผลต่อความยั่งยืนของการใช้แนวปฏิบัติการหย่าเครื่องช่วยหายใจ

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บทคัดย่อ: การใช้แนวปฏิบัติการหย่าเครื่องช่วยหายใจช่วยส่งเสริมคุณภาพการดูแลรักษา พยาบาลลดความหลากหลายในการปฏิบัติการพยาบาลและช่วยลดค่าใช้จ่าย ถึงแม้จะมีการนำแนวปฏิบัติการหย่าเครื่องช่วยหายใจมาใช้ในหน่วยงานแต่ก็ไม่สามารถมั่นใจได้ว่าแนวปฏิบัติดังกล่าวจะถูกนำ มาใช้อย่างยั่งยืน การศึกษาเชิงคุณภาพแบบพรรณนาครั้งนี้เพื่อสำรวจการรับรู้เกี่ยวกับปัจจัยที่มีผลต่อความยั่งยืนในการใช้แนวปฏิบัติการหย่าเครื่องช่วยหายใจ โดยการสังเกต การทำกลุ่มสนทนา และการสัมภาษณ์เชิงลึกในพยาบาลและแพทย์ จำนวน 55 ราย ที่ปฏิบัติงานในหออภิบาลผู้ป่วยโรงพยาบาลตติยภูมิ 4 แห่งของประเทศไทย การวิเคราะห์ข้อมูลใช้การวิเคราะห์แก่นสาระ ผลที่ได้แสดงถึงปัจจัยที่เกี่ยวข้องกับความยั่งยืนในการใช้แนวปฏิบัติในการหย่าเครื่องช่วยหายใจ 4 ประเด็นหลัก คือ ทัศนคติและสมรรถนะของผู้ปฏิบัติ การสนับสนุนขององค์กร ความร่วมมือของสหสาขาวิชาชีพ และความเหมาะสมในการนำไปใช้ ปัจจัยที่ได้จากการศึกษาครั้งนี้ช่วยส่งเสริมให้เกิดคุณภาพในการปฏิบัติในการใช้แนวปฏิบัติการหย่าเครื่องช่วยหายใจอย่างยั่งยืนและอาจนำไปใช้กับแนวปฏิบัติอื่นๆ ควรมีการศึกษาวิจัยในเรื่องผลกระทบที่เกิดจากปัจจัยเหล่านี้ต่อความยั่งยืนในการใช้แนวปฏิบัติการหย่าเครื่องช่วยหายใจและผลลัพธ์ในการหย่าเครื่องช่วยหายใจ

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คำสำคัญ: อุปสรรคของการใช้หลักฐานเชิงประจักษ์ หอผู้ป่วยวิกฤต การหย่าเครื่องช่วยหายใจ แนวทางในการปฏิบัติ งานวิจัยเชิงคุณภาพ

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