
SHORT PAPERS

Feasibility of an Assessment Tool for Detection of Post-intensive Care Syndrome

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Abstract Post-intensive care syndrome (PICS) refers to a decline of physical and cognitive functions and symptoms of mental health disorder that persist from the time intensive care is received to well after discharge in critically ill patients. PICS may have a significant impact both on the daily lives and quality of life (QOL) of patients and their families. Therefore, adoption of prophylactic measures against the development and early detection of PICS by nurses in intensive care units (ICUs) is important. We developed a PICS assessment tool for early detection of PICS by ICU nurses. This study aimed to evaluate the feasibility of the assessment tool. We employed a descriptive research approach. Nurses in ICU who had at least 1 year of work experience (N = 56) evaluated patients' conditions based on their routine observation using the assessment tool. The concordance rate for the results between their evaluation and medical record information was confirmed by interviewing the nurses. In addition, Fisher's exact test was used to evaluate the participants' opinions about the tool's ease of use and usefulness in daily nursing. The mean time to complete the assessment was <10 min. Regardless of their nursing experience in ICUs and their level of understanding of PICS, a majority of participants thought that they could use the assessment tool routinely based on the number of items and quality of information. Our findings suggest the feasibility of using the novel assessment tool for the early detection of PICS.

Key words : intensive care unit, nursing care delivery system, post-intensive care syndrome, patients, assessment tool

Introduction

Critically ill patients suffer from a persistent decline

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in motor function and mental illness after intensive care unit (ICU) discharge; these symptoms can adversely affect quality of life, family integrity, and social outcomes¹⁾. The aging of the society in developed countries underscores the importance of continuous care to treat long-term health problems in patients who are discharged from the ICU²⁾.

Post-intensive care syndrome (PICS) is defined as physical, cognitive, and mental health disorders that

occur during ICU stay or after ICU or hospital discharge²⁾. In Japan, a survey of ICU nurses reported that only approximately half were familiar with PICS³⁾. Moreover, in a survey conducted in an ICU in Japan, approximately 70% of doctors and physiotherapists stated that the term PICS and the concept of disease were well known and used; however, only approximately half of the nurses stated the same⁴⁾. The relatively low percentage was thought to be because most Japanese nurses are required to be generalists⁵⁾; therefore, nurses who undergo regular personnel changes in hospitals and ICUs may not be familiar with PICS. Taken together, ICU nurses may overlook PICS after patients are discharged from the ICU in Japan³⁾. In other countries, patients who have received intensive care continue to receive multidisciplinary support for decreased physical functioning and persistent psychiatric symptoms after discharge from the ICU or hospital^{6,7)}; however, no such system has been established in Japan. Therefore, more ICU nurses need to understand PICS and strive for early detection and prevention.

It is important for nurses to be able to continuously implement measures to prevent PICS. In addition, nurses should assess gaps between the patient's pre-hospitalization and current functional abilities and should support functional reconciliation⁸⁾. One major barrier in the assessment of PICS is the lack of a single validated clinical tool to rapidly assess impairments in all three PICS domains²⁾. The PICS assessment tool was developed under the premise that early identification of PICS is important for all ICU nurses regardless of their nursing experience. This tool was created based on a literature review and enables ICU nurses to detect early PICS symptoms. In addition, its reliability and validity have been established (validity of the tool for the total scale = 0.902, the evaluation yielded a kappa coefficient of 0.58). In addition to confirming of PICS risk, the tool allows nurses to evaluate patients' PICS symptoms through their routine observation⁹⁾. Herein, we report the feasibility of the PICS assessment tool.

Aim

The purpose of this study was to assess critically ill patients using the PICS assessment tool by ICU nurses and to evaluate feasibility of the tool: 1. To confirm whether the patients' symptoms were correctly recorded, 2. To clarify mean time to complete the assessment, and 3. To evaluate the participants' opinions about its ease and usefulness.

Methods

Design

This study employed a descriptive research approach to clarify the feasibility of the PICS assessment tool.

The PICS Assessment Tool

The PICS assessment tool was developed by Ejiri and Shinozaki⁹⁾. This tool can confirm the symptoms of PICS and the function of the patient before admission and provide information on PICS. The use of mechanical ventilators is typically associated with the onset of PICS. In addition, cognitive function and psychiatric symptoms cannot be confirmed when the patient is in deep sedation. Therefore, ICU nurses assessed patients who were given tracheal intubation for more than 48 hours and had a Richmond Agitation and Sedation Scale score of ≥ -2 using the PICS assessment tool.

We removed help for eating and oral care items, which can be confirmed by the medical record, to reduce the burden on the nurse, and classified the items related to manual muscle testing. As a result, the number of items to be checked by nurses on the basis of patient information and risks was six for the initial assessment and 29, including subitems, for each symptom assessment. Thus, we identified a total of 35 items for the tool. We also proposed 43 items, including those that indicated the risk at hospital admission and treatment, the prevention of the development of PICS, and the prevention of deterioration, and those necessary for ward transfer.

Initial assessment items, such as a decline in physical

function or a history of mental illness, were checked by ICU nurses following hospitalization. Symptom assessment of physical, cognitive, and mental health disorder items, including delirium, manual muscle test (MMT), or anxiety, were performed at 9 a.m. and 9 p.m. every day. As symptoms change over time, nurses needed to continually observe and check patients.

Participants

This study enrolled nurses who worked for more than 1 year in the general ICU of three general hospitals in Japan that provided cooperative consent. Two of the hospitals were in urban areas and one was in a rural area. One hospital was a public hospital and two were private. The hospitals had 468-606 beds. We assumed that nurses that have experience of working in ICUs of more than 1 year have better observation skills than those with less experience; therefore, we believed that such nurses could evaluate the hospitalized patients' conditions using the PICS assessment tool.

Data Collection

We collected data in September and October 2020. First, participants were instructed to use the PICS assessment tool by a researcher. Second, the conditions and symptoms of critically ill patients were assessed based on their routine observation using the PICS assessment tool at 9 a.m. and 9 p.m. Moreover, basic attributes (patients and nurses), time to complete the PICS assessment tool, and nurses' opinion about this tool were collected.

The concordance rate was confirmed between the medical record information and the PICS assessment tool after the patient was discharged from the ICU. Relevant information was obtained by interview through study collaborators and nurses if the items described in the tool were not found in the medical record.

Inclusion and Exclusion Criteria for Patients

Eight patients who met the following criteria were included in the study: Japanese adult patients with tracheal intubation for ≥ 48 h who were not categorized as unarousable as defined by the Richmond Agitation and Sedation Scale and without neurosurgical diseases. Any patient otherwise deemed unfit to participate,

such as those with a history of trouble with healthcare professionals, by the ICU head nurse and study collaborator were excluded from the study.

Data Analysis

The concordance rate between the PICS assessment tool and the medical record was confirmed as a confirmation of whether the patients' symptoms were correctly recorded.

We compared the understanding of PICS based on nursing experience in two ICU groups (< 5 years, $N = 28$ vs. > 5 years, $N = 28$), number of items and information of the PICS assessment tool, and results of daily usage experience in the ICU setting. Fisher's exact test was used to evaluate the participants' opinions about its ease and usefulness in ICU daily nursing to verify its feasibility.

Ethical Considerations and Conflicts of Interest

Privacy protection, strict information management, and strict voluntary participation in the study were guaranteed to the participants as ethical considerations. This research was performed after obtaining approval of the Research Ethics Committee of XXX University (2019N-018). Furthermore, approval was obtained from the Institutional Review Board of the study site, which provided cooperative consent.

Results

Participants' Characteristics

In the present study, 59 nurses participated, of whom three participants had missing data; thus, we analyzed 56 nurses who were working in an ICU with an average experience in ICUs of 4.9 (± 3.5) years. There were 47 females (83.9%) and nine males (16.1%) (Table 1). Each ICU nurse routinely observed eight critically ill patients, and the observation results were evaluated using the PICS assessment tool.

Concordance between the PICS Assessment Tool and Medical Record/Information Obtained from the Participants

The concordance rate between the nurses' evaluation using the PICS assessment tool and the medical record was confirmed (Table 2).

The concordance rate between the nurses' evaluation

Table 1. Background of the study participants

		N=56	
		No. of nurses	%
Women		47	83.9
Men		9	16.1
Mean number of years of experience in nursing (SD)	10.2 (\pm 6.0) years		
Mean number of years of experience in ICU nursing (SD)	4.9 (\pm 3.5) years		
Experience in ICU nursing < 5 years		28	50.0
	\geq 5years	28	50.0

using the PICS assessment tool and the medical record for “Difficulty in keeping the sitting position” and “Dyspnea” was 66.6%. The concordance rate for mental health disorders items was approximately 60%.

Feasibility

The mean time to complete this tool was 8.2 ± 5.0 min. A total of 56 nurses stated that the number of items and quality of information provided by the PICS assessment tool were appropriate. Furthermore, 48 nurses responded that this tool could be routinely used.

The participants were divided into two groups according to their nursing experience in the ICU (either < 5 years or \geq 5 years). They were asked to report their self-assessed level of understanding of PICS and opinions about the PICS assessment tool (Table 3). Only one nurse in the < 5-year group was not aware that patients who were discharged from the ICU may experience impairments of physical and cognitive function and mental health. Moreover, 14 out of 56 nurses were unaware of the fact that such symptoms are called PICS. However, no significant differences were observed between the two groups ($\chi^2 = 1.018$, $p = 1.000$, and $\chi^2 = 0.381$, $p = 0.758$). The current study examined whether the number of items used in the PICS assessment tool was appropriate, whether the nurses could obtain PICS information from the tool, and whether the tool was suitable for routine use. We performed Fisher’s exact test, and the results did not reveal significant differences between the two groups; moreover, the number of items in PICS assessment tool were found to be appropriate for daily use ($\chi^2 = 1.018$,

$p = 1.000$). We also obtained information about PICS using the tool ($\chi^2 = 1.018$, $p = 1.000$); accordingly, the PICS tool is appropriate for daily use in ICU ($\chi^2 = 2.333$, $p = 0.252$).

Discussion

This was the first study to demonstrate the feasibility of a novel assessment tool for the early detection of PICS by ICU nurses. The participants did not have enough understanding of PICS. The assessment results were concordant on many items when they were compared between the PICS assessment tool and medical record or interview. However, we were able to confirm in particular the state of the patient with only PICS assessment tool because there were not medical record and information of mental health disorders items. Therefore, we believe that this tool can record and determine the patients’ PICS symptoms even for nurses who do not fully understand PICS. Approximately 90% of the participants thought that they could use the PICS assessment tool based on the number of items regardless of their nursing experience in the ICU and their level of understanding of PICS. In addition, the time to complete the assessment of patients using this tool was within 10 min and recording PICS symptoms was useful. These results demonstrate the feasibility of the PICS assessment tool.

The concordance rate between items related to decline in physical function and the medical record was low in prehospitalization risk assessments. This discrepancy is attributable to the fact that examples of

Table 2. Concordance between PICS Assessment Tool and Medical Record/Information Obtained from the Participants

	No. of ticks, n	The concordance rate between No. of ticks and information described in the medical record/information obtained from study collaborators and nurses, n (%)
N=56		
A decline in physical function	10	4 (40.0)
A history of mental illness	3	3 (100)
Alcohol abuse	0	—
Comorbidity	17	16 (94.1)
A decline in cognitive function	2	2 (100)
Living alone or lost touch with family	0	—
Absent delirium	48	43 (89.6)
Diagnosis of delirium based on delirium evaluation	7	6 (85.7)
MMT: Wrist joint (left and right)	28	28 (100)
MMT: Elbow joint (left and right)	28	28 (100)
MMT: Shoulder joint (left and right)	26	26 (100)
MMT: Ankle joint (left and right)	28	28 (100)
MMT: Knee joint (left and right)	28	28 (100)
MMT: Hip joint (left and right)	27	27 (100)
Subtotal/Total (left and right)	28	28 (100)
No MMT decline	12	12 (100)
MMT decline	7	6 (85.7)
MRC score (the total score of the right and left joints on MMT) \leq 48	4	4 (100)
Easily fatigued	9	9 (100)
Inability to change the body orientation on the bed	23	23 (100)
Difficulty in keeping the sitting position when a Gatch bed elevates the head or feet	9	6 (66.6)
PaCO ₂ elevation (\geq 40mmHg or \geq baseline)	11	11 (100)
PH: Out of range of 7.30-7.45	12	12 (100)
Tachypnea (\geq 25 bpm)	13	13 (100)
Labored breathing, shallow and irregular breathing	2	2 (100)
Dyspnea	3	2 (66.6)
No depression symptoms	39	27 (69.2)
Feeling blue, unwell, and hopelessness after being admitted to the ICU	7	4 (57.1)
A decline in interest and loss of joy after being admitted to the ICU	4	1 (25)
Reticence, expressionlessness, and an extremely quiet voice	5	0 (0)
Absence of anxiety disorder	35	22 (62.9)
Nervous, anxious, or oversensitive feelings	9	3 (33.3)
Persistent state of anxiety or uncontrolled anxiety	3	2 (66.7)
Sleep disorder	21	20 (95.2)
Able to remember what happened despite being in a state of delirium	0	—

MMT, manual muscle test; MRC, Medical Research Council scoring

such physical function impairment were not described, resulting in variations in responses among the nurses. The number of facilities that offer rehabilitation in

the ICU every day is limited in Japan¹⁰⁾. Adding the MMT results in the PICS assessment tool increases the opportunity to confirm these results. In addition, this

Table 3. Results of understanding of post-intensive care syndrome (PICS) based on nursing experience in intensive care units, number of items, and information of PICS assessment tool, and results of daily use

	Experience in ICU nursing		N=56	
	< 5 years n=28 (residual adjustment)	≥ 5 years n=28 (residual adjustment)	χ^2	Fisher's exact <i>p</i>
I know that patients may have physical, cognitive, and mental disorders that occur during ICU stay or after ICU or hospital discharge				
Yes, I know to include reasons and symptoms/ I know	27 (-1.0)	28 (1.0)	1.018	1.000
No	1 (1.0)	0 (-1.0)		
I know that this disorder is called PICS				
Yes, I know very well/ I know	22 (0.6)	20 (-0.6)	0.381	0.758
No	6 (-0.6)	8 (0.6)		
The number of items of PICS assessment tool are appropriate for daily use				
Yes	28 (1.0)	27 (-1.0)	1.018	1.000
No	0 (-1.0)	1 (1.0)		
Information of PICS are obtained from this tool				
Yes	28 (1.0)	27 (-1.0)	1.018	1.000
No	0 (-1.0)	1 (1.0)		
PICS assessment tool can be used daily in the ICU				
Yes	26 (-1.5)	22 (1.5)	2.333	0.252
No	2 (1.5)	6 (-1.5)		

practice is useful for the early detection of ICU-acquired weakness. As delirium assessment is not periodically performed in ICUs in some facilities in Japan¹¹⁾, the PICS assessment tool provides a chance for nurses to evaluate delirium and cognitive disorder twice a day. Kang et al.¹²⁾ reported that 18.5% of critically ill patients passed more than two years after the discharge had depression; therefore, it is necessary for ICU nurses to perform mental observation in addition to physical observation. We were able to confirm mental symptoms that are not reported in medical records using the PICS

assessment tool.

Spies et al.¹³⁾ recently proposed two-step outcome measurement instruments of PICS in outpatient care. Although this assessment is designed for use in the outpatient setting, it will take some time before it is put into general practice in Japan. Wang et al.¹⁴⁾ reported the Healthy Aging Brain Care Monitor Self Report version (HABC-M SR), which is a 27-item questionnaire that evaluates cognitive, functional, and psychological domains. The HABC-M SR can be administered face to face or via phone or internet. Some items of the

HABC-M SR evaluate behavior in daily life and are difficult to use for critically ill patients in an ICU. In some countries multidisciplinary teams continuously support patients who are discharged from the ICU or hospital and treat their persistent decline in motor function and mental illness^{6, 7)}; however, such a system has not been established in Japan. Therefore, early detection of PICS is important for all ICU nurses. Most ICU nurses believe that it is necessary to understand PICS³⁾. By using the PICS assessment tool, even nurses who do not understand PICS can assess PICS from the patient's symptoms. Our findings suggest that this tool is effective.

Study Limitations and Future Tasks

This study evaluated the feasibility of the PICS assessment tool by observing patients in three hospitals. Confirming whether nurses can detect early PICS by evaluating the relationship between the number of checkmarks on the PICS assessment tool and PICS through the completed PICS assessment tool will be required in the future. In addition, developing a tool that enables confirmation of the PICS symptoms of patients being discharged to the general ward or in-care facilities is needed.

Conclusion

This study has established the feasibility of the PICS assessment tool in a population of ICU nurses. This tool was found to be practical and efficient as evidenced by the 8-min evaluation time, suggesting the possibility for routine use.

Relevance for Clinical Practice

We provide the PICS assessment tool for early detection of PICS for ICU nurses in Japan. If patients have symptoms of PICS, they can be given multidisciplinary support at an early stage when ICU nurses use this tool. This tool also contributes to understanding PICS for Japanese ICU nurses. Therefore, this tool contributes to improving the patients' quality of life,

family integrity, and social outcomes.

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Conflict of Interest

We declare that there are no conflicts of interest.

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