



# BMJ Open Clinical practice competencies for standard critical care nursing: consensus statement based on a systematic review and Delphi survey

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## ABSTRACT

**Objectives** A clear development process and scientifically validated clinical practice competencies in standard critical care nursing (SCCN) have not yet been developed in Japan. Thus, this study aimed to develop a consensus-based set of SCCN competencies to provide a framework for critical care nursing education, training and evaluation.

**Design** Multistep, modified Delphi study (a systematic review, focus group interviews, a three-round web-based Delphi survey and an external validation process).

**Participants** A systematic review of 23 studies, focus group interviews by 12 experts, a Delphi survey by 239 critical care experts (physicians, nurses and physical therapists) and an external validation by 5 experts (physicians and nurses).

**Results** A systematic review identified 685 unique competencies. The focus group interviews resulted in the addition of 3 performance indicator items, a synthesis of 2 subdomains and 10 elements. Of the 239 participants, 218 (91.2%), 209 (98.9%) and 201 (96.2%) responded in rounds 1, 2 and 3 of the Delphi survey, respectively. After round 3, 57 items were below the consensus level and were removed in the final round. External validation process feedback was received from experts after two revisions to ensure that the final competencies were valid, applicable, useful and clear. The final set of competencies was classified into 6 domains, 26 subdomains, 99 elements and 525 performance indicators.

**Conclusions** This study found a set of SCCN competencies after a multistep, modified Delphi study. The results of this study are robust, and the competency framework can be used in multiple areas to improve clinical practice, including the assessment, training and certification of standard critical care nurses.

## INTRODUCTION

Critical care nursing deals with specific human responses to actual or potentially life-threatening problems.<sup>1</sup> According to the World Federation of Societies of Intensive and Critical Care Medicine, critical care is

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Contemporary clinical practice competencies developed for standard critical care nursing are highly reliable due to the use of a multistep, modified Delphi study (systematic review, focus group interviews, three rounds of web-based Delphi surveys and external validation process).
- ⇒ Few studies on clinical practice competencies for standard critical care nursing have been reported.
- ⇒ A limitation of the study is that patients and families were not involved, although they are important stakeholders in determining nursing competence.
- ⇒ The lack of a prioritisation or ranking system in expert panels and Delphi rounds is a methodological limitation, which may have resulted in broad and highly detailed competency items.

‘a multidisciplinary and interprofessional specialty dedicated to the comprehensive management of patients having, or at risk of developing, acute, life-threatening organ dysfunction’.<sup>2</sup> In recent years, intensive care medicine has undergone significant changes because of the increasing number of older individuals and complexity and advancements in medical equipment.<sup>2</sup> It also serves the needs of survivors experiencing post-intensive care syndrome.<sup>3</sup> Thus, critical care nurses must have more complex competencies in the intensive care unit (ICU) than non-critical care nurses.

However, the education provided to critical care nurses involves a long-term training process and is unable to meet rapidly increasing demands, such as disasters.<sup>2 4</sup> The shortage of critical care nurses worldwide during the coronavirus disease 2019 (COVID-19) pandemic became a serious issue.<sup>4</sup> In Japan, there is no system to identify

the number of nurses who can provide standard critical care; thus, determining the actual shortage of nurses and from where they should be supplied is impossible.<sup>5</sup> These issues highlight the lack of clinical practice competencies in standard critical care nursing (SCCN) in Japan.

Competencies are generally defined as a combination of knowledge, skills, attitudes and values that support effective and efficient performance in professional or occupational areas.<sup>6,7</sup> A competency framework is a range of required behaviours that provide structural guidelines, which enable admission, development, education, training and evaluation.<sup>7</sup> Therefore, by identifying competencies, SCCN competency helps define and provides a framework for the evaluation of actual knowledge, skills and abilities in the practice of critical care.<sup>8,9</sup> In addition, SCCN competencies lead to the development of a system to register critical care nurses with competence characteristics.<sup>5,7</sup> Several national and international clinical practice competencies for critical care nurses already exist.<sup>8,9</sup> However, a clear development process and scientifically validated competencies have not been previously developed in Japan. In addition, SCCN competency is strongly influenced by sociocultural factors related to healthcare and the era.<sup>10</sup>

Therefore, developing a scientific method for identifying the characteristics of SCCN competencies in Japan is necessary. This study aimed to develop a consensus-based set of SCCN competencies for teaching and learning programmes, and a framework for the evaluation of critical care nursing. The standardised education provided to critical care nurses also presents challenges for several countries because of the differences in the era and healthcare culture.<sup>8,11</sup> Therefore, a detailed description of the design presented in this study and its results and other competencies can be used in several countries as a framework for standardised education of critical care nurses and a resource for future studies.<sup>8,11,12</sup>

## MATERIAL AND METHODS

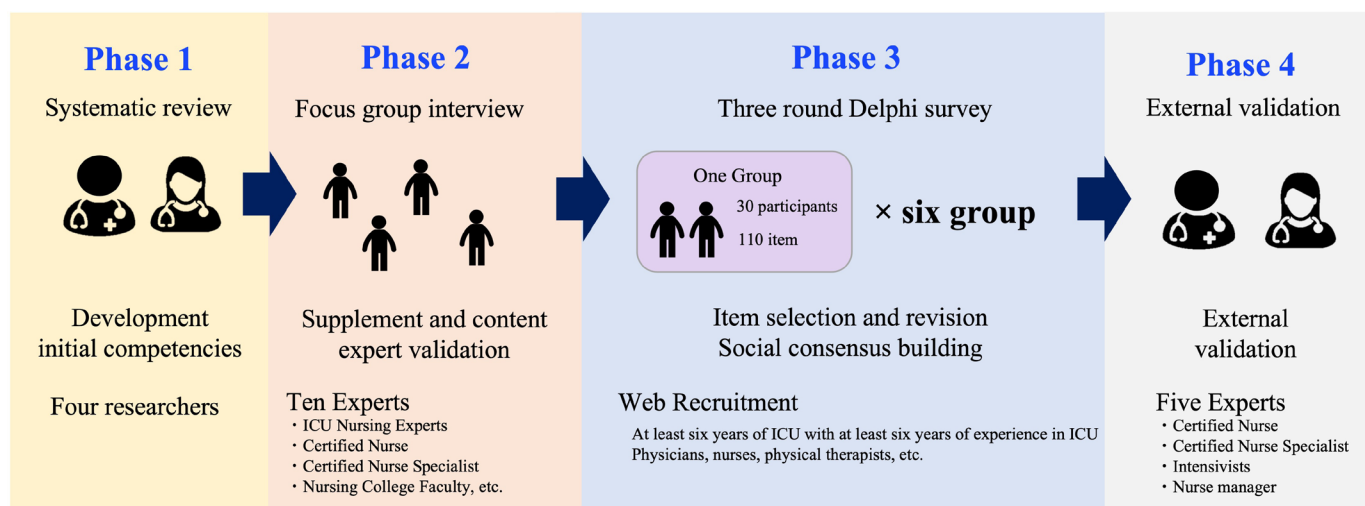
### Study design

This study was conducted as a multistep, modified Delphi study with reference to previous studies.<sup>13</sup> First, a systematic review (SR) was conducted to construct the initial competencies that include related potential competencies. Second, focus group interviews were conducted with expert nurses for supplementary and content expert validation. Third, a modified three-round Delphi survey was performed using an internet-based questionnaire to reach a consensus among critical care nurses. Finally, feedback on the final competencies was obtained from external experts (figure 1).

This study was contracted on behalf of the Committees of Nursing Education and Critical Care Nursing and Working group for Critical Care Nurse Survey Working Group and the AdHoc Committee of Intensive Care Registered Nurse, Japanese Society of Intensive Care Medicine (JSICM).

### Development of initial competencies based on an SR

We conducted an SR according to the detailed methodology presented in online supplemental materials 1–3. The eligibility criterion was competencies related to SCCN. MEDLINE using PubMed, Cumulative Index to Nursing and Allied Health Literature and Iqaku-Chuo-Zasshi (Ichu-shi) databases were manually searched for related studies. Ichu-shi is a Japanese medical database managed by the Japan Medical Abstract Society. Only studies written in Japanese or English were included. Two author groups (HS and TK, AO and JH) independently screened the titles and abstracts for inclusion eligibility. After screening, two authors independently assessed the full text to identify eligible literature. Disagreements were resolved through a discussion. Subsequently, one of the authors (TK) extracted the competencies from the eligible literature. We translated all competencies into Japanese and reviewed this competency set as the initial



**Figure 1** Overall research methods. The overall research methods of the study are shown: A consensus-based set of standard critical care nursing competencies was developed in four stages. ICU, intensive care unit.

competencies for duplication, overlap and clarity. Subsequently, the research team classified the words or phrases extracted from the literature into different themes and abstraction levels, such as nursing practice and communication. The researchers ultimately classified the domains, subdomains, elements and performance indicators at four abstraction levels.

### Focus group interview

We conducted a focus group interview (FGI) with expert nurses and researchers according to the Benner's clinical skills acquisition model.<sup>14</sup> The FGI was conducted to supplement and validate the initial competencies developed based on the SRs from an expert's perspective. We recruited participants who met both the following criteria using the purposive snowball sampling method to include a diverse range of critical care researchers and experts: (1) critical care nurses who had experience in ICU nursing for >10 years and (2) researchers or expert nurses (certified nurses or nurse specialists who have received formal national critical care education as expert nurses) in the critical care field. The selection was made to ensure a balance between experts and researchers and a broad selection from different regions and institutions in Japan.

In total, 10 participants were recruited for the FGI. The FGI was conducted in two groups, comprising five members per group, for approximately 60 min using Zoom (Zoom Video Communications, San Jose, California, USA). The participants who wanted to join the FGI submitted their personal information through the internet. All the researchers were trained beforehand, and their roles for the day were predetermined. The FGI was recorded using the recording function of Zoom, and the interviews were transcribed. Subsequently, a qualitative analysis of the verbatim transcript was performed in three steps. First, we created a code that was shortened to a point where the meaning of the sentence could be understood. Second, the codes and selected keywords related to clinical practice competencies for SCCN obtained from the FGI were organised. Third, the organised codes and selected keywords from the FGI results were compared with the initial set of competencies obtained in the SR. Competency items for initial competencies were added or revised, as required.

### Three-round Delphi survey

A modified three-round Delphi survey was conducted to attain a consensus on SCCN competencies among healthcare professionals who work in the critical care settings.<sup>15</sup> The invitation was distributed via the mailing lists of the JSICM and Japan Society of Education for Physicians and Trainees in Intensive Care. An invitation was also posted in community mailing lists and social network services, such as the Japan Association of Certified Intensive Care Nurses Twitter and Facebook. According to the Benner's model of clinical skills acquisition,<sup>14</sup> only healthcare professionals who had more than 6 years of experience

working in the ICU were eligible for the modified Delphi survey. Data were collected from 4 December 2021 to 10 February 2022. Owing to the large number of items, the initial competencies were divided into six groups. We planned to include 40 participants in each group, for a total of 240 participants, assuming 10 dropouts in each group in the three rounds.

SurveyMonkey (Momentive, San Mateo, California, USA) web-based survey service was used for all three rounds of the Delphi survey. Participants rated each SCCN competency using a Visual Analogue Scale (VAS) anchored with two descriptors labelled 'not needed at all' at the far left (0) and 'fully needed' at the far right (100), and they wrote free comments. In the first and second rounds, we decided to obtain a consensus for each competency using a median VAS score of >70. In the third round, consensus was obtained based on a median VAS score  $\geq 80$ . A post-meeting to discuss the results of the Delphi round was conducted by the researchers after each Delphi round. In the post-meeting, based on the free comments, revisions or deletions for competency items that did not reach consensus based on the value of VAS were discussed.

### External validation

The pre-final set of competencies was sent to five experts (intensivist, critical care nurse, clinical nurse specialist and nurse manager) to obtain feedback and ensure the validity, applicability, utility and clarity of competencies. These five experts were recruited using purposive sampling. The manuscript was revised based on comments from experts, the revised pre-final set of competencies was re-sent and a consensus was obtained from all experts.

### Patient and public involvement

No patient or the public was directly involved in the development of this Delphi study.

## RESULTS

### Generation of an initial set of relevant SCCN competencies

In total, 685 SCCN competencies were identified in the SR. These competencies were classified into 6 domains, 29 subdomains, 111 elements and 639 performance indicators after removing duplicates (online supplemental materials 4–6). The two FGIs were conducted by 12 experts. One expert withdrew from the interviews. The characteristics of the experts who conducted the FGIs have been presented in online supplemental material 7. The FGI resulted in the addition of 3 performance indicator items, a synthesis of 2 subdomains and 10 elements. Revisions were also made to the SCCN's competency representation by FGIs.

### Three-round Delphi survey

The demographic characteristics of the participants are presented in [table 1](#). Among the registered professionals, 53.6% were women and the median (IQR) healthcare work

**Table 1** Characteristics of the participants in the three-round Delphi survey

Characteristics	Registration of interest	Round 1	Round 2	Round 3
	(n=239)	(n=218)	(n=209)	(n=201)
Female, n (%)	128 (53.6)	116 (53.2)	112 (53.6)	107 (53.2)
Years of experience (years), median (IQR)	15 (11–20)	15 (11–20)	15 (11–20)	16 (11–20)
Years of ICU experience (years), median (IQR)	10 (8–13)	10.5 (8–13)	11 (8–13)	11 (8–13)
Setting or institution, n (%)				
Hospital	224 (93.7)	203 (93.1)	194 (92.8)	186 (92.5)
University	10 (4.1)	10 (4.6)	10 (4.8)	10 (5.0)
Others	5 (2.1)	5 (2.3)	5 (2.4)	5 (2.5)
Position, n (%)				
Nurse	232 (97.1)	211 (96.8)	202 (96.7)	194 (96.5)
CNS*†	34 (14.7)	30 (14.2)	27 (13.4)	24 (12.4)
CN*‡	70 (30.2)	61 (28.9)	60 (29.7)	58 (29.9)
Physical therapist	4 (1.7)	4 (1.8)	4 (1.9)	4 (2.0)
Physician	3 (1.2)	3 (1.4)	3 (1.4)	3 (1.5)

\*Duplicate responses available, percentage of total nurses.  
†CNS is an advanced practiced nurse who completed a graduate master's programme and accreditation by the Japanese Nursing Association.  
‡CN is an expert nurse who completed half a year of formal education and accreditation by the Japanese Nursing Association.  
CN, certified nurse; CNS, certified nurse specialist; ICU, intensive care unit.

and ICU work experiences were 15 (11–20) and 10 (8–13) years, respectively. Of the 239 professionals who registered, 218 (91.2% of registered professionals), 209 (98.9% of round 1 participants) and 201 (96.2% of round 2 participants) responded in rounds 1, 2 and 3 of the Delphi survey, respectively. The withdrawal rates between enrolment and each round were <10% each (table 1 and figure 2).

After round 1, 89 items were below the consensus level (VAS <70) or required revision based on the free comments. After discussions among the researchers, 22 items were deleted and 67 items were revised. In addition, a new item was added based on the free comments. After round 2, 17 items were below the consensus level (VAS <70) or required revision based on the free comments. After discussions among the researchers, 8 items were deleted and 9 items were revised. In addition, a new item was added based on the free comments. After round 3, 57 items were below the consensus level (VAS <70) and were deleted in the final round. When the entire document was rechecked, 17 items were additionally deleted because they were duplicates. After discussions among the researchers, based on the free comments, 2 items needed revision and 1 item was added. Figure 2 illustrates the results of the modified Delphi survey. Online supplemental file 8 presents the detailed results for each round. No revisions were made to the domain subdomain elements.

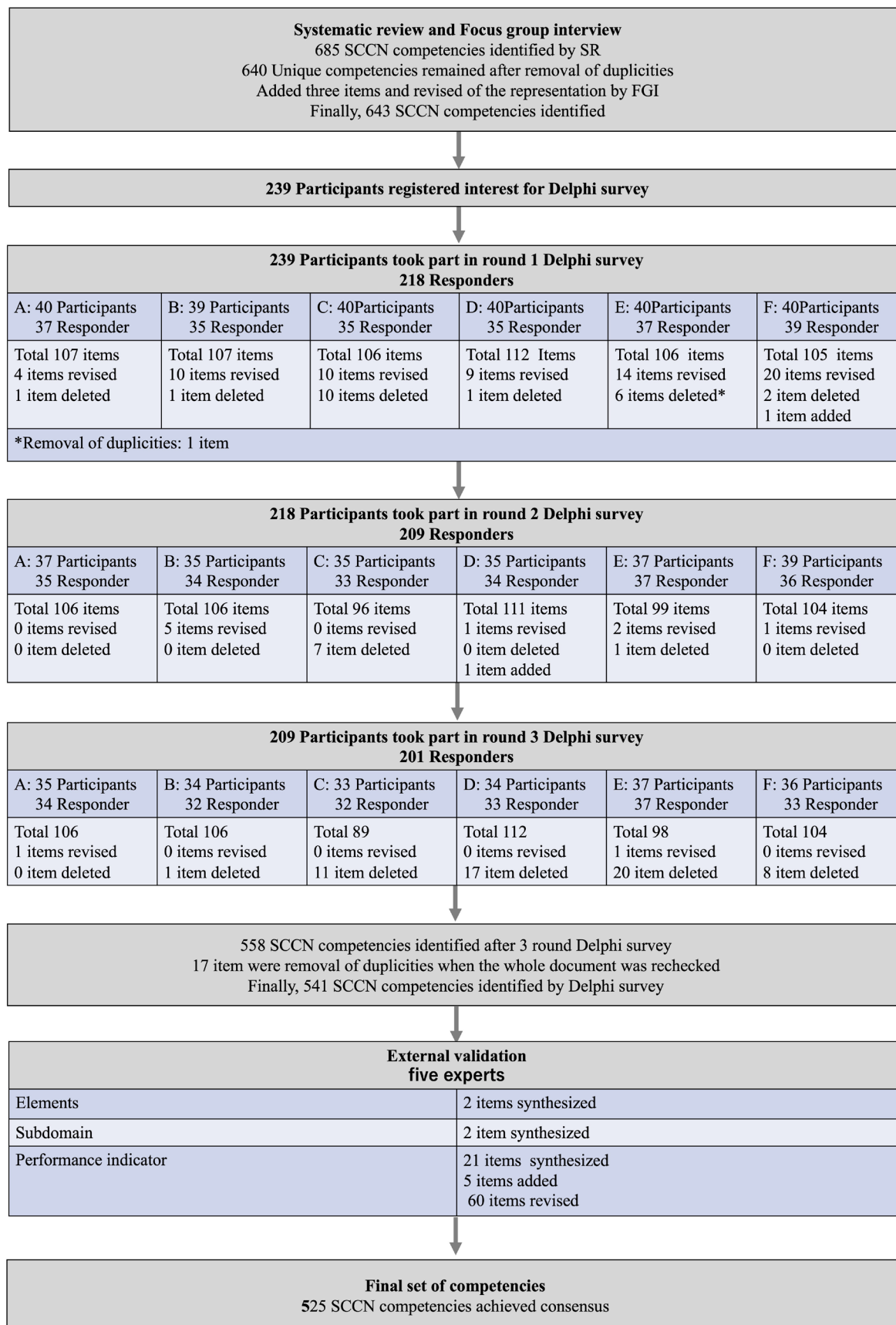
### External validation

Based on the expert comments, 21 performance indicator items were generated, 5 performance indicator items were added and 60 performance indicator items were revised for representation; one subdomain and two elements

were generated after discussion among the researchers. Feedback was received from experts after two revisions to ensure that the final competencies were valid, applicable, useful and clear. After three rounds of the Delphi survey and external validation by experts, the final set of competencies was classified into 6 domains, 26 subdomains, 99 elements and 525 performance indicators.

### Final SCCN competencies

A summary of the overall results is shown in figure 2 and table 2, and details of the final SCCN competencies are shown in online supplemental materials 9, 10. Domain 1 required critical care nurses to understand each organ's anatomy and physiology and the techniques and knowledge required for physical assessment. Domain 2 required critical care nurses to develop a series of nursing processes for critically ill patients and provide nursing care that considers the mental and psychological aspects of patients and their families. Domain 3 required critical care nurses to support patients and families in decision-making and practice in compliance with ethical principles and laws. Domain 4 required critical care nurses to acquire new knowledge, skills and practices based on evidence to constantly improve the quality and safety of nursing care. Domain 5 required critical care nurses to manage their unit's work environment and collaborate with other healthcare providers. Finally, domain 6 required critical care nurses to reflect introspectively on practice and keep learning to change their behaviours.



**Figure 2** Flow diagram for development of competencies. The number of competencies obtained after the systematic review and subsequent stages is shown in the figure. The number of competencies revised, deleted or added to each group in the three Delphi rounds is indicated. The number of participants that dropped out in each round is shown. FGI, focus group interview; SCCN, standard critical care nursing; SR, systematic review.

**Table 2** Final set of competencies

Domain	Subdomain	Element	Performance indicator	
1. Therapeutic management of disease and clinical decision-making	1.1.	Respiratory system	4 items	25 items
	1.2.	Cardiovascular system	5 items	34 items
	1.3.	Gastrointestinal system and nutrition	6 items	31 items
	1.4.	Renal system	4 items	17 items
	1.5.	Endocrine and metabolic systems	4 items	13 items
	1.6.	Cerebral nervous system	4 items	26 items
	1.7.	Skin/musculoskeletal system	4 items	15 items
	1.8.	Infectious diseases, blood and immune system	4 items	25 items
	1.9.	Other diseases	4 items	15 items
	1.10.	Treatment equipment management	11 items	70 items
	1.11.	Organ transplantation	2 items	5 items
This domain includes the following examples:				
1.1.	– Element: observation, monitoring and assessment of the respiratory system. – Performance indicator: assessing the results of blood gas analysis.			
1.9.	– Element: nursing practice for resuscitation and sudden changes. – Performance indicator: recognising and assessing critically ill patients who deteriorate rapidly and managing them to stabilise their conditions.			
2. Caring	2.1.	Nursing diagnosis and planning	4 items	10 items
	2.2.	Relief of discomfort symptoms	6 items	11 items
	2.3.	Rehabilitation of critically ill patients/PICS	3 items	15 items
	2.4.	End-of-life care	4 items	16 items
	2.5.	Provision of an ICU environment to promote healing	2 items	12 items
This domain includes the following examples:				
2.1.	– Element: development of appropriate care plans for critically ill patients. – Performance indicator: identifying and prioritising evidence-based interventions to promote and restore health and prevent further disease and disability.			
2.3.	– Element: nursing practice for maintenance and recovery of physical function. – Performance indicator: implementing practices to maintain motor function and improve activities of daily living in critically ill patients.			
3. Advocacy and moral agency	3.1.	Support decision-making	1 item	6 items
	3.2.	Ethical practice	2 items	19 items
	3.3.	Patient and family communication	2 items	11 items
This domain includes the following example:				
3.2.	– Element: practice based on ethical principles and compliance with the law. – Performance indicator: embracing equality and diversity and respecting without discrimination of age, sex, religion, sexual orientation, race, disability, sentiments and social status.			
4. Evidence-based practice	4.1.	Quality assurance and improvement of care (PDCA)	2 items	9 items
This domain includes the following example:				
4.1.	– Element: quality assessment and improvement activities. – Performance indicator: implementing practices to improve care processes and outcomes based on evidence, expertise and patient preferences.			
5. Collaboration and management ability	5.1.	Unit management	3 items	11 items
	5.2.	Team management	4 items	42 items
	5.3.	Medical safety	4 items	23 items
	5.4.	In-hospital and out-of-hospital patient transport	4 items	34 items
This domain includes the following examples:				

Continued

**Table 2** Continued

Domain	Subdomain	Element	Performance indicator	
5.2.	– Element: membership and followership.			
	– Performance indicator: recognising, respecting and promoting collaboration with team members.			
5.3.	– Element: safety culture and incident reporting.			
	– Performance indicator: understanding and complying with local and national regulations and laws regarding the prevention, reporting and monitoring of adverse events, including medication errors, adverse events and equipment malfunctions.			
6.	Education and self-development ability	6.1. Self-development	2 items	13 items
		6.2. Education	4 items	17 items
This competency includes the following example:				
6.1.	– Element: introspective practice.			
	– Performance indicator: reflecting on nursing practice based on an introspective and self-aware approach.			
6 Domains*	26 subdomains*	99 elements*	525 items*	

\*Total number of each item.  
ICU, intensive care unit; PDCA, plan-do-check-assessment; PICS, post-intensive care syndrome.

## DISCUSSION

In this study, the expert panel reached consensus on the importance of 541/643 competencies for SCCN, after a three-round Delphi survey. Subsequent revisions through external validity assessment resulted in 525 competencies. Finally, the developed clinical practice competencies for SCCN were categorised into six domains: therapeutic management and clinical judgement; caring, advocacy and moral agency; evidence-based practice; collaboration and management ability; and educational and self-development ability.

When the competency frameworks implemented in this study were compared with those of developed countries, the six domains generally overlapped with the existing competency frameworks that assessed SCCN characteristics. An SR was used to develop the main framework based on previous studies, which was then adjusted to fit the national legislation and the needs of patients' families. Therefore, the domains were categorised as cultivating caring, advocacy, altruism and humanity and patient treatment management, physical assessment and clinical judgement, as in other countries.<sup>8 16</sup> With respect to differences, there were differences in the level of practice by law and in the performance indicator level according to the needs of the population. Multicultural considerations are common in critical care nursing practice in developed countries. In contrast, most Japanese patients are homogeneous<sup>10</sup>; thus, cultural considerations are less prioritised.

The results of this study are highly trustworthy. Delphi results are evaluated with respect to trustworthiness rather than validity, as in quantitative surveys. Trustworthiness encompasses 'sub-concepts' that consist of the components of credibility, transferability, confirmability and dependability.<sup>17 18</sup> Previous studies have developed a set of standard critical care competencies, but they did not use an SR to support the Delphi survey.<sup>8 9 16</sup> The credibility of the findings was also confirmed by using previous

relevant studies and by the number and expertise of the panellists, who represented various professional groups in critical care. The confirmability of the findings was verified using a replicated study design, as all data were obtained from identifiable sources.<sup>18</sup> The dependability of the findings indicated the repeatability of the results in other studies and confirmed a detailed description of the study design.<sup>17 18</sup> The findings of this study were robust, with low attrition rates and were from experts across several regions in Japan. The attrition rate at each stage of the Delphi survey is a hindrance.<sup>19</sup> In this study, a high response rate was achieved, with an attrition rate of <10% in the three rounds. In addition, the experts recruited for this study were active in various areas of critical care and were able to ensure that the competency framework constructed was comprehensive and specific to SCCN practices.

Therefore, the results of this study are robust, and the competency framework can be used in multiple areas to improve clinical practice, including the assessment of competency and competent level certification of critical care nurses. During the COVID-19 pandemic, the number of competent nurses who could provide intensive care nursing care was unknown in Japan.<sup>5</sup> Therefore, it was difficult to respond to the problem of critical care nurse shortage during the pandemic. In the future, nursing associations and academic societies will be able to use the results of this study to assess competency and certify the competent level of critical care nurses. If a system for education, assessment and certification of nurses who can provide standardised critical care nursing care is implemented based on these competencies, a system that can respond to unknown disasters, such as the COVID-19 pandemic, where nurses are in shortage, can be designed in the future.

This study may contribute to the standardisation of education in critical care nursing in Japan. Several countries in Europe and the USA have systems for educating

and evaluating the competencies of clinical nurse specialists and critical care nurses.<sup>8</sup> The frameworks of these systems are also based on the identification of competencies.<sup>8 9 16</sup> In addition, previous studies have reported that higher level of competencies among critical care nurses established using competency-based certification systems is associated with lower complications and infection rates.<sup>20 21</sup> However, the education of general nurses working in the critical care field, being entrusted to each hospital in Japan, is not standardised. Using competencies for standard Japanese critical care nurses and developing educational programmes may lead to improvements in the quality of critical care, and subsequently the patient's outcomes in Japan.

### Strengths and limitations

A key strength of this study is the SR and Delphi survey approach used to achieve national consensus on a contemporary set of SCCN competencies. However, our study has some limitations. First, although the participants in the Delphi survey were selected to represent a multiplicity of health professions and expertise, they may not adequately represent the full range of views held by professionals. In addition, patients and families were not involved in this study, although they are important stakeholders in determining nursing competence. The competency in which consensus was reached in this study is the necessity to consider cultural influences on patient attitude toward health, illness, compliance and care.<sup>10</sup> A more comprehensive research design that involves patients and families is required in the future. Second, the methodological limitation of the lack of a prioritisation or ranking system in expert panels and Delphi rounds may be the reason for the broad and highly detailed competency items, reflecting the scope of work that a standard critical care nurse is expected to accomplish. Therefore, the competency framework may ultimately need to be shortened to improve its learning curve and applicability in clinical practice, in conjunction with professional needs. Moreover, a prioritisation or ranking system in expert panels and Delphi rounds should be added to the study methodology in future studies.

### Clinical implications and further research

The competency framework in which consensus was achieved in this study can be used in multiple areas to improve clinical practice, including the assessment, training and certification of standard critical care nurses. A previous study suggested that nurses with more clinical experience and higher educational level had significantly better critical thinking and intuitive decision-making skills than less experienced and less educated nurses.<sup>22</sup> Therefore, in future studies, changes in these skills and patient outcomes should be measured before and after the implementation of a system for competency-based education, and certification programmes should be investigated. By contrast, we view this set of standard critical care competencies as a dynamic set that reflects the current state of

healthcare. As the field matures, new competencies will need to be added and others need to be removed. Therefore, this set of competencies should be revised regularly. The detailed methodology presented will be a useful reference for future studies. In addition, future studies based on several study designs are also required, as indicated by the limitations. Moreover, further studies will be required to create excerpted versions (eg, informing educational programmes and performance evaluations) from the current set of competencies that are more amenable to knowledge mobilisation/use.

### CONCLUSION

This study established a set of SCCN competencies and categorised them into 6 domains, 26 subdomains, 99 elements and 525 performance indicators after a multi-step, modified Delphi study. The results of this study are robust, and the competency framework can be used in multiple areas to improve clinical practice, including the assessment, training and certification of standard critical care nurses.

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**Competing interests** None declared.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Consent obtained directly from patient(s).

**Ethics approval** This study was approved by the Research Ethics Committee of Sapporo City University (approval number: 2135-1). For the focus group interview, Delphi survey and external validation, consent was obtained from potential participants through the internet format after the participants received adequate explanation of the study. Participants gave informed consent to participate in the study before taking part.

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**Data availability statement** All data relevant to the study are included in the article or uploaded as supplementary information.

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## REFERENCES

- Bell L, Nurses, A.A.o.C.-C. *AACN scope and standards for acute and critical care nursing practice*. American Association of Critical-Care Nurses, 2015.
- Marshall JC, Bosco L, Adhikari NK, *et al*. What is an intensive care unit? A report of the task force of the world federation of societies of intensive and critical care medicine. *J Crit Care* 2017;37:270–6.
- Eaton TL, McPeake J, Rogan J, *et al*. Caring for survivors of critical illness: current practices and the role of the nurse in intensive care unit aftercare. *Am J Crit Care* 2019;28:481–5.
- Mhawish HA, Rasheed AM. Staffing critical care with nurses amid the COVID-19 crisis: strategies and plans. *Int Nurs Rev* 2022;69:369–74.
- Unoki T, Kawai Y, Hamamoto M, *et al*. Workforce and task sharing of nurses in the Japanese intensive care unit-cross-sectional postal survey. *Healthcare (Base)* 2021;9:1017
- Moynihan S, Paakkari L, Välimaa R, *et al*. Teacher competencies in health education: results of a Delphi study. *PLoS One* 2015;10:e0143703
- Liu Y, Aunguroch Y. Current literature review of registered nurses' competency in the global community. *J Nurs Scholar* 2018;50:191–9.
- Deacon KS, Baldwin A, Donnelly KA, *et al*. The National competency framework for registered nurses in adult critical care: an overview. *J Intensive Care Soc* 2017;18:149–56.
- Bench S, Crowe D, Day T, *et al*. Developing a competency framework for critical care to match patient need. *Intensive Crit Care Nurs* 2003;19:136–42.
- Dobrowolska B, Gutysz-Wojnicka A, Ozga D, *et al*. European intensive care nurses' cultural competency: an international cross-sectional survey. *Intensive Crit Care Nurs* 2020;60:102892.
- Kamel SS, Samah F, Randa M I. Self-assessment competency tool for nurses working in critical care units: development and psychometric evaluation. *Life Sci J* 2011;8:156–64.
- Watts MD. Certification and clinical ladder as the impetus for professional development. *Crit Care Nurs Q* 2010;33:52–9.
- Albarqouni L, Hoffmann T, Straus S, *et al*. Core competencies in evidence-based practice for health professionals: consensus statement based on a systematic review and Delphi survey. *JAMA Netw Open* 2018;1:e180281.
- Benner P. From novice to expert: excellence and power in clinical nursing practice. *Am J Nurs* 1984;84:1480.
- Jünger S, Payne SA, Brine J, *et al*. Guidance on conducting and reporting Delphi studies (CREDES) in palliative care: recommendations based on a methodological systematic review. *Palliat Med* 2017;31:684–706.
- DeGrande H, Liu F, Greene P, *et al*. Developing professional competence among critical care nurses: an integrative review of literature. *Intensive Crit Care Nurs* 2018;49:65–71.
- Hewitt CM, Roye C, Gebbie KM. Core competency model for the family planning public health nurse. *Public Health Nurs* 2014;31:472–9.
- Zhang X, Meng K, Chen S. Competency framework for specialist critical care nurses: a modified Delphi study. *Nurs Crit Care* 2020;25:45–52.
- Wallengren J. Identification of core competencies for primary care of allergy patients using a modified Delphi technique. *BMC Med Educ* 2011;11:12
- Hickey PA, Gauvreau K, Porter C, *et al*. The impact of critical care nursing certification on pediatric patient outcomes. *Pediatr Crit Care Med* 2018;19:718–24.
- Boev C, Xue Y, Ingersoll GL. Nursing job satisfaction, certification and healthcare-associated infections in critical care. *Intensive Crit Care Nurs* 2015;31:276–84.
- Rababa M, Al-Rawashdeh S. Critical care nurses' critical thinking and decision making related to pain management. *Intensive Crit Care Nurs* 2021;63:103000.