







## REVIEW ARTICLE

## Postintensive care syndrome family: A comprehensive review

Kasumi Shirasaki<sup>1</sup> | Toru Hifumi<sup>1</sup>  | Nobuto Nakanishi<sup>2</sup>  | Nobuyuki Nosaka<sup>3</sup> |  
 Kyohei Miyamoto<sup>4</sup>  | Miyuki H. Komachi<sup>5</sup> | Junpei Haruna<sup>6</sup>  | Shigeaki Inoue<sup>7</sup>  |  
 Norio Otani<sup>1</sup> 

<sup>1</sup>Department of Emergency and Critical Care Medicine, St. Luke's International Hospital, Tokyo, Japan

<sup>2</sup>Division of Disaster and Emergency Medicine, Department of Surgery Related, Kobe University Graduate School of Medicine, Kobe, Japan

<sup>3</sup>Department of Intensive Care Medicine, Tokyo Medical and Dental University, Tokyo, Japan

<sup>4</sup>Department of Emergency and Critical Care Medicine, Wakayama Medical University, Wakayama, Japan

<sup>5</sup>School of Clinical Medicine, Department of Psychiatry, Child and Adolescent Resilience and Mental Health, University of Cambridge, Cambridge, UK

<sup>6</sup>Department of Intensive Care Medicine, School of Medicine, Sapporo Medical University, Hokkaido, Japan

<sup>7</sup>Department of Emergency and Critical Care Medicine, Wakayama Medical University, Wakayama, Japan

## Correspondence

Toru Hifumi, Department of Emergency and Critical Care Medicine, St. Luke's International Hospital, 9-1 Akashicho, Chuo-ku, Tokyo 104-8560, Japan.  
 Email: [hifumitoru@gmail.com](mailto:hifumitoru@gmail.com)

## Abstract

Families of critically ill patients are predisposed to tremendous burdens when their relatives are admitted to the intensive care unit (ICU). Postintensive care syndrome family (PICS-F) can be described as a devastated life, encompassing psychological, physical, and socioeconomical burdens that begin with the emotional impact experienced by the family when the patient is admitted to the ICU. PICS-F was primarily proposed as a clinically significant psychological impairment, but it needs to be extended beyond the psychological impairment of the family to include physical and socioeconomical impairments in the future. The prevalence of physiological problems including depression, anxiety and post-traumatic syndrome is 20–40%, and that of non-physiological problems including fatigue is 15% at 6 months after the ICU stay. Assessment of PICS-F was frequently conducted at 3- or 6-month points, although the beginning of the evaluation was based on different assessment points among each of the studies. Families of ICU patients need to be given and understand accurate information, such as the patient's diagnosis, planned care, and prognosis. Prevention of PICS-F requires a continuous bundle of multifaceted and/or multidisciplinary interventions including providing a family information leaflet, ICU diary, communication facilitators, supportive grief care, and follow-up, for the patient and families from during the ICU stay to after discharge from the ICU. This is the first comprehensive review of PICS-F to address the concept, risk factors, assessment tools, prevalence, and management to prevent PICS-F to facilitate acute care physicians' understanding of PICS-F.

## KEYWORDS

postintensive care syndrome family, prevention bundle, psychological, resilience

## INTRODUCTION

Families of critically ill patients are predisposed to a tremendous burden when their relatives are admitted to the intensive care unit (ICU).<sup>1–3</sup> This burden has various effects on the patient's family, which is affected by the trajectories of the patient's recovery.<sup>4</sup> The cluster of psychological complications such as anxiety, depression, acute stress disorder, post-traumatic stress disorder (PTSD), and complicated

grief from exposure to critical care in families of patients is primarily called postintensive care syndrome family (PICS-F),<sup>5,6</sup> and it might affect the family's ability to support the recovery of ICU patients.<sup>7</sup>

Recently, narrative reviews of PICS including PICS-F have been published; however, they were apparently focused on PICS, and no comprehensive summaries of PICS-F have been published.<sup>8,9</sup> In addition, the description of PICS-F in a previous review was limited to the classic definition of PICS-F, that

Kasumi Shirasaki and Toru Hifumi contributed equally to this work.

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is psychological impairments in families of ICU patients,<sup>5</sup> but impairments of families usually develop beyond the psychological to affect quality of life, such as physical and socioeconomical impairments.<sup>4,10,11</sup> Thus, there is a strong need for a comprehensive review of PICS-F to support families and improve recovery of ICU patients through family support.

The aim of this review was to clarify the concept, risk factors, assessment tools, prevalence, management to prevent PICS-F, and facilitate acute care physicians' understanding of PICS-F.

## CONCEPTUALIZATION

PICS-F was primarily proposed as clinically significant psychological impairments including anxiety, depression, post-traumatic stress disorder (PTSD), and complicated grief that developed in families of critically ill patients admitted to the ICU.<sup>6</sup> In addition to the psychiatric impairments, families actually experience physical impairments such as fatigue and sleep disturbances during the post-ICU period,<sup>12,13</sup> and household financial insecurity due to the impact of patient care on their socioeconomic activities, such as sick leave, as well as work restrictions<sup>14,15</sup> (Figure 1).

PICS-F is triggered by the emotional burden of patient admission to the ICU, and a thorough understanding of the mechanism should be useful in overviewing the subsequent course of the disease. Families of critically ill patients experience significant and lasting effects not only on their mental health, but also on their physical and social wellbeing, and the family health condition may inversely impact the patient's recovery.<sup>4</sup> The entire trajectory of disease recovery of patients causes a wide range of family burden affecting their physical,

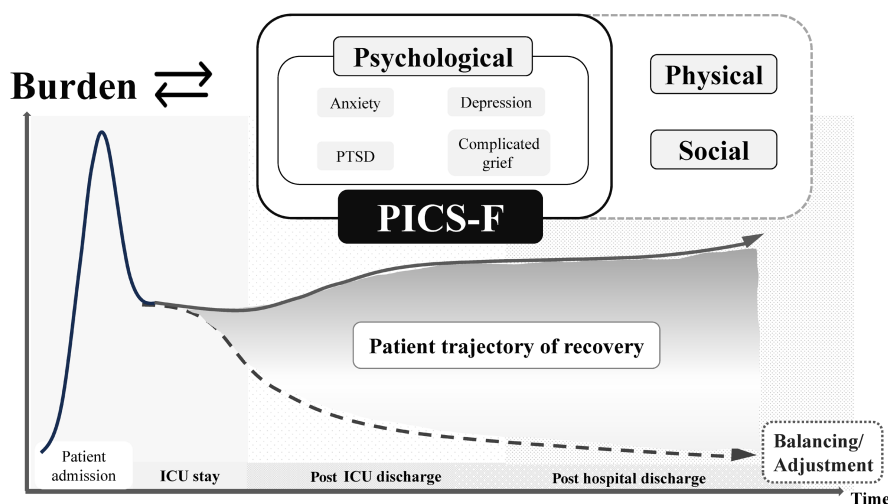
socioeconomical, and emotional domains.<sup>4</sup> Recently, Kang<sup>3</sup> presented a comprehensive concept of PICS-F as “being devastated by the critical illness journey in the family”. PICS-F is largely associated with the decline of the family's quality of life as a result of a vicious cycle involving deteriorating physical health, rising psychological distress, social withdrawal, and family crisis. Furthermore, developing PICS-F itself leads to an additional burden on the family.

In summary, PICS-F can be described as a devastated life, encompassing psychological, physical, and socioeconomical burdens that begin with the emotional impact experienced by the family when the patient is admitted to the ICU. It is important to emphasize that PICS-F needs to be extended beyond the psychological impairments of the families to include physical and socioeconomical impairments in the future.

## RISK FACTORS FOR PSYCHOLOGICAL DISORDERS

Risk factors for PICS-F (psychological disorders) were broadly categorized into patient-related factors, family-related factors, and protective factors. These risk factors are summarized in Table 1 for each period of PICS-F assessment. The timing of PICS-F evaluation is based on different assessment points, such as after ICU admission, after ICU discharge, and after hospital discharge. Therefore, in this review, although the assessment points are different, “months after ICU discharge” is generally used.

Risk factors of patients associated with PICS-F < 3 months after ICU discharge included younger age,<sup>16–19</sup> older age,<sup>20</sup> male sex,<sup>21</sup> and lower educational level<sup>22</sup> as demographic characteristics. Clinical characteristics of patients included



**FIGURE 1** Conceptual diagram of PICS-F. The horizontal axis shows the passage of time, and the vertical axis shows the amount of burden on the family. PICS-F is triggered by the emotional burden experienced by the family when the patient is admitted to the ICU, which leads to the physical and socioeconomic burden. Furthermore, in the subsequent course, various factors, such as the patient's medical condition, the family's environment, and financial burden, are intricately related to the development of PICS-F if families cannot adjust to these burdens. Psychological symptoms, which are classic symptoms of PICS-F, are circled by solid lines, whereas physical and social problems, which are being expanded upon today as a new concept of PICS-F, are circled by dotted lines. PICS-F sometimes develops during a patient's ICU admission, and these symptoms may continue long after ICU discharge if families cannot adjust to the burden.

**TABLE 1** Risk factors for psychological disorders.

Patient	Family	Protective factors
ICU admission – <3 months after ICU discharge		
Demographic characteristics Younger, <sup>16–19</sup> Older, <sup>20</sup> Male, <sup>21</sup> Education level $\geq$ 12th grade, <sup>21</sup> Lower education or socioeconomic status <sup>22</sup> , Absence of chronic disease, <sup>16</sup> Clinical characteristics Severity of illness, <sup>17,20</sup> Delirium, <sup>23</sup> Anxiety or depression, <sup>18</sup> ICU length of stay, <sup>24–28</sup> Prolonged mechanical ventilation, <sup>29</sup> Presence of cancer metastasis, <sup>29</sup> Trauma diagnosis, <sup>30</sup> >3 day in ICU <sup>25</sup> Post-hospital characteristics Death, <sup>17,31,32</sup> Readmission in the 2 months postdischarge, <sup>33</sup> Residing in institution post-ICU <sup>33</sup>	Demographic characteristics Younger, <sup>34,35</sup> Female, <sup>16,27–29,31,33,36</sup> Parent, <sup>19</sup> Spouse, <sup>16,17,26</sup> Child, <sup>30,32,35</sup> White, <sup>37</sup> Financial insufficiency, <sup>24</sup> Lower educational level, <sup>22,30</sup> Higher educational level, <sup>27</sup> Lower socioeconomic status, <sup>26,35,38</sup> Pain medication use, <sup>24</sup> Poor health status at enrollment, <sup>33</sup> Living alone, <sup>36</sup> Rural residence, <sup>28</sup> Perceived contradictions in the information provided by caregiver's <sup>16</sup> Religious and spiritual beliefs Catholic religion, <sup>29</sup> Religious beliefs <sup>35</sup>	Communication and information Unsatisfactory communication in ICU, <sup>17,28</sup> Unsatisfactory communication with physician, <sup>36</sup> Help being received by general practitioner, <sup>16</sup> No regular nurse-physician meetings, <sup>16</sup> No dedicated family meeting room, <sup>16</sup> Role incongruence in decision-making, <sup>31</sup> Insufficient information about disease, prognosis, and treatment, <sup>20,39</sup> Contradictions in the information given <sup>16</sup> , Desire for help from a psychologist <sup>16</sup> Family's experience at patient's death Present at death, <sup>36</sup> Difficult experience with dying and death <sup>23</sup> Resilience High resilience score <sup>40</sup> Caregiver support Participate in care, <sup>41</sup> Higher level of caregiving to patient, <sup>42</sup> Caregiver strain high, <sup>43</sup> Paid help for caregiver <sup>44</sup> Environment No waiting room, <sup>16</sup> More than one bed per room <sup>17</sup>
3–6 months after ICU discharge		
Demographic characteristics Congestive heart failure, <sup>17</sup> Cancer <sup>17</sup> Clinical characteristics Surgical procedure, <sup>17</sup> Severity of illness, <sup>17</sup> Poor neurological outcome, <sup>45</sup> Post-hospital characteristics Death <sup>17,45</sup>	Demographic characteristics Female, <sup>17,46</sup> Parent, <sup>17</sup> Child, <sup>17</sup> Hispanic, <sup>46</sup> Unemployment, <sup>45</sup> Lower educational level, <sup>46</sup> Used psychiatric medication <sup>45,46</sup>	Communication and information Unsatisfactory communication in ICU, <sup>17</sup> Sharing in decisions in the ICU, <sup>17</sup> Involvement in ICU decisions, <sup>17</sup> Feeling that information was incomplete, <sup>17</sup> Family meeting conducted, <sup>47</sup> Time delay to get information from ICU staff, <sup>45</sup> Low perceived satisfaction with patient relationship, <sup>48</sup> Caregiver support Paid help for caregiver <sup>44</sup> Family's experience at patient's death End-of-life decision-making, <sup>17</sup> Difficult experience with dying and death, <sup>49</sup> Witnessing cardiopulmonary resuscitation <sup>45</sup>
6 months after ICU discharge		
Demographic characteristics Male <sup>21</sup> Clinical characteristics Tracheostomy, <sup>21</sup> Post-hospital characteristics Residing in institution post-ICU, <sup>50</sup> Functional dependency, <sup>21</sup> Poor health post-ICU, <sup>50</sup> Higher depression score, Higher anxiety score, Higher PTSD score at 6 months, <sup>51</sup> Increased PTSD, <sup>52</sup> Higher PTSD score, <sup>52</sup> Increased anxiety, depression, PTSD <sup>53</sup>	Demographic characteristics Younger, <sup>11,54</sup> Older, <sup>44</sup> Female, <sup>36,55</sup> Parent, <sup>54</sup> Family surrogates, <sup>47</sup> Sick leave, <sup>54</sup> Comorbidity, <sup>54</sup> Recent personal experience of serious physical illness, <sup>55</sup> Living alone <sup>36</sup>	Communication Poor communication between physicians and relatives, <sup>36</sup> Refusal of treatment by the patient, patient died while intubated <sup>36</sup> Family's experience at patient's death Present at death, <sup>36</sup> Relatives did not say goodbye to the patient <sup>36</sup> Caregiver support Paid help for caregiver, <sup>44</sup> Less social support <sup>11</sup> Caregiver mastery Less personal growth for caregiver, <sup>11</sup> Less sense of control over life, <sup>11</sup> Low level of hope <sup>54</sup>

Abbreviations: ICU, intensive care unit; PTSD, post-traumatic stress disorder.

severity of illness,<sup>17,20</sup> delirium,<sup>23</sup> and prolonged ICU stay<sup>24–28</sup> and mechanical ventilation.<sup>29</sup>

Regarding family factors, demographic characteristics of family associated with increased risk of PICS-F consistently included younger age,<sup>11,34,35,54</sup> female sex,<sup>16,17,27–29,31,33,36,46,49,55</sup> and parental status<sup>17,19,54</sup> across all time periods. Higher or lower educational level,<sup>22,27,30</sup> financial insufficiency,<sup>24</sup> lower socioeconomic status,<sup>26,35,38</sup>

living alone,<sup>36</sup> and religious beliefs<sup>29,35</sup> were associated with an increased risk of PICS-F <3 months after ICU discharge.

Regarding protective factors, throughout all time periods, unsatisfactory communication with physicians and nurses,<sup>16,17,28,36</sup> and provision of information were associated with increased PICS-F.<sup>16,17,20,39,45</sup> In addition, higher family resilience was associated with lower PICS-F symptoms <3 months after ICU discharge.<sup>40</sup> At 3–6 months after ICU discharge, difficult experience with death and

dying,<sup>49</sup> and witnessing cardiopulmonary resuscitation<sup>45</sup> were family experience at the time of the patient's death that were characteristic risk factor for PICS-F. Involvement in decision-making in the ICU was also a common risk factor for PICS-F < 6 months after ICU discharge.<sup>17,31</sup> The PICS-F protective factors more than 6 months after ICU discharge were related to the level of mastery as a caregiver; less personal growth for the caregiver,<sup>11</sup> less sense of control over life,<sup>11</sup> and low level of hope,<sup>54</sup> were associated with increased risk factors for PICS-F.

Some of these risk factors for PICS-F (psychological disorders) are invariant factors, such as age and gender, but others, such as unsatisfactory communication with physicians and nurses, are factors open to intervention. These protective factors should be the focus of future research, because they may be useful in the prevention of PICS-F. Risk factors for PICS-F other than psychological disorders, such as family physical symptoms and socioeconomic factors, remain unknown and also require further study. Of several risk factors, greater resilience and strong religious beliefs may reduce psychological symptoms; therefore, their details are further showed.

## Resilience

Connor and Davidson reported that resilience suppresses PTSD and defined it as "the quality in individuals that makes them able to weather difficulties well, allowing them to develop from the experience".<sup>56</sup> Resilience is the ability to accept traumatic events or stressful situations positively, and it is one of the psychological factors that protect against psychiatric symptoms such as PICS-F. From around the 1950s, it was noted that some children who had been abused by their parents and lived in a harsh environment grew up to be adults who were healthy and did not suffer from mental illness.<sup>57</sup> The research into the psychological state of these adults was the background to the birth of this concept. After that, the word of resilience began to be used from the 1970s. In the 2000s, research on resilience began to be conducted targeting families of HIV patients<sup>58,59</sup>, dementia patients<sup>60,61</sup>, and families of palliative care patients<sup>62,63</sup> whose medical conditions are difficult to recover from. Several scales for measuring resilience have been developed, and the Conner-Davidson Resilience Scale (CD-RISC) is the scale that has been translated and developed into a Japanese version and used in PICS-F research<sup>56</sup>; it is a scale developed to be able to easily measure resilience in the general population and clinical settings. It consists of 25 items that are self-administered and scored on a 5-point scale (0–4), with higher scores indicating higher resilience. One study has clarified the relationship between PICS-F and resilience using this CD-RISC.<sup>40</sup>

## Religious beliefs

Religious beliefs are considered to be psychological coping, and several studies examined how religious beliefs affect

psychological symptoms and behavioral patterns, targeting people with difficulties.<sup>18,35,64,65</sup> Since the late 2000s, studies clarifying the relationship between psychological states and religious beliefs in people with disease have examined the relationship between families' religious beliefs in patients with advanced cancer and gynecological cancer.<sup>64,65</sup> A study related to PICS-F reported that PICS-F decreased as the degree of family religious belief increased.<sup>35</sup> Since religious beliefs vary widely among religions and races, it is important to understand this when interpreting the results of a PICS-F study.

## ASSESSMENT OF PICS-F

There are no universally accepted tools for assessing PICS-F, and the assessment tools vary widely among studies (Table 2). Both anxiety and depression are commonly assessed using the Hospital Anxiety and Depression Scale (HADS).<sup>76,77</sup> Anxiety is also assessed using Patient Health Questionnaire (PHQ) 9 or PHQ 8, which omits suicide and hurting thought questions from PHQ 9.<sup>67</sup> CES-D (Center for Epidemiologic Studies Depression) is also used to screen for depression.<sup>69</sup> PTSD can be assessed using the Impact of Event Scale (IES) or PTSD checklist (PCL). From the IES, IES-R and IES-6 are used to assess PTSD. The Society of Critical Care Medicine proposed the cutoff values of 1.6 and 1.75, the averages, for the IES-R and IES-6, respectively.<sup>66,78</sup> From the PCL, PCL-5, PCL-S, and PCL-C are used to assess PTSD. It is important to note that PCL-5 is based on DSM-V criteria.

Other than the psychological problems of PICS-F, families experience various difficult situations. It is important to assess various aspects of PICS-F other than psychological problems. The complicated grief following a patient's death is objectively assessed using the Inventory of Complicated Grief (ICG). This hardness can cause sleep disturbance in families. The Pittsburgh Sleep Quality Index (PSQI) can assess sleep quality, latency, duration, efficiency, disturbance, medication, and daytime sleep dysfunction of families. Impaired of QOL can be generally assessed using SF-36, as in a previous study.<sup>10</sup> For health care providers, it is important to understand the needs and expectations of families during their ICU stay. The family's experience in the ICU can be assessed using Family Satisfaction in the ICU (FS-ICU).<sup>79</sup> One of the important aspects of PICS-F is the assessment of the care burden of patients. It is important to note that families have a tremendous burden regarding patient care. This burden can be assessed using Zarit Burden Interview 12 items (Zarit-12).<sup>80</sup>

## TIMING TO ASSESS PICS-F

The timing of evaluations for PICS-F is important in understanding and addressing the challenges faced by families of ICU patients. Evaluating PICS-F at the optimal timing allows for comprehensive assessment and management of the family's needs. The Society of Critical Care Medicine

**TABLE 2** Instruments to assess PICS-F.

	Family after hospital discharge	Items	Score range	Cutoff	Features
Anxiety or depression	HADS (Hospital Anxiety and Depression Scale)	14	0–21	≥8 <sup>66</sup>	
Depression	PHQ-9 (Patient Health Questionnaire-9)	9	0–27	≥10 <sup>67</sup>	Omitting suicide and hurting thought question
	PHQ-8 (Patient Health Questionnaire-8)	8	0–24	≥10 <sup>68</sup>	
	CES-D (Center for Epidemiologic Studies Depression)	20	0–60	≥16 or 20 <sup>69,70</sup>	
PTSD	IES-R (Impact of Event Scale-Revised)	22	0–4 (average)	>1.6 at average <sup>66</sup>	Based on DSM-IV
	IES-6 (Impact of Event Scale-6)	6	0–4 (average)	>1.75 at average <sup>66</sup>	Short version of IES-R
	PCL-5 (PTSD Checklist-5)	20	0–80	≥28 or 37 <sup>71</sup>	Based on DSM-V
	PCL-S or -C (PTSD Checklist for Specific or Civilian version)	17	17–85	≥28 or 30 <sup>72</sup>	PCL-S asks symptoms related to a specified event
Complicated grief	ICG (Inventory of complicated grief)	19	0–76	≥25 or 30 <sup>73</sup>	Internal consistency, convergent and criterion validity
Sleep	PSQI (Pittsburgh Sleep Quality Index)	9	0–21	> (sleep disturbance) <sup>74</sup>	Sleep quality, latency, duration, efficiency, disturbance, medication, daytime sleep dysfunction
Quality of life	SF-36 (Short Form-36)	36	0–100	NA	Usage fee required, physical, pain, general health, vitality, social, emotional, psychological
Quality of care	FS-ICU 24 (Family Satisfaction in the ICU)	24	0–100	NA	Family's assessment of quality of patient's care in the ICU
Caregiver burden	Zarit-12 (Zarit Burden Interview 12 items)	12	0–48	13 <sup>75</sup>	Social, psychological, physical burden of caregivers

Abbreviations: DSM, Diagnostic and Statistical Manual of Mental Disorders; ICU, intensive care unit; NA, not applicable; PTSD, post-traumatic stress disorder.

recommended screening for PICS within 2–4 weeks of hospital discharge in ICU survivors,<sup>66</sup> but the timing of screening and follow-up for PICS-F is unclear. It is essential to align the evaluations with the patient's trajectories. Evaluating PICS-F too early during this period may not capture the full extent of the family's challenges. Furthermore, too-late evaluation may miss the opportunity to manage those with PICS-F. Because there are no organized criteria for evaluation timing, the timing of evaluation and the frequency of PICS-F at the evaluation timing in previous studies are summarized in Table 3. According to this summary, the assessment was frequently conducted at 3-month or 6-month time points, although the beginning of the assessment varied among studies.

## LONGITUDINAL OUTCOMES OF EACH PICS-F COMPONENT

The longitudinal prevalence of PICS-F divided into psychological and non-psychological problems is presented in Figure 2.

With regard to psychological symptoms, Cameron et al.<sup>11</sup> reported a short-term improvement within several months and a stable prevalence after that period in which depressive symptoms developed. Some studies examining trajectories of depressive symptoms found that a significant number of

families experienced a persistently high degree of depressive symptoms over months to a year (16.4%–57.4%).<sup>11,35</sup> Similarly, Anderson et al.<sup>34</sup> reported a large reduction of the prevalence of anxiety symptoms for a relatively short period. Regarding post-traumatic stress (PTS) symptoms, similar results were reported. In summary, the prevalence of psychological symptoms improves in a short period (e.g., during ICU stay to several months), and it remains almost unchanged (or sometimes even gets worse) after that period (e.g., several months to one year). This underscores the importance of early prevention and screening for high-risk families, as well as long-term psychological support for families with persistent symptoms. However, it might be difficult to prove the association between the event of a patient's ICU admission and the development of long-term psychological symptoms. If the mental state of the family at the time of the patient's ICU admission can be assessed, PICS-F could be diagnosed during long-term follow-up because changes in mental status of the family could be observed. Therefore, it is important to assess the family's mental status at the time of the patient's ICU admission in the diagnosis of long-term PICS-F. Studies examining whether the trajectories of psychological symptoms differ between symptoms (e.g., depression, anxiety, and PTS symptoms) are also required.

There are fewer studies regarding non-psychological problems including socioeconomic problems and physical



TABLE 3 Timing to assess PICS-F.

	<1 month	1–2 months	3 months	3–6 months	6 months	12 months
Anxiety	62% <sup>51</sup>	35% <sup>51</sup>	49% <sup>17</sup>		24% <sup>51</sup>	32% <sup>81</sup>
	42% <sup>34</sup>	21% <sup>34</sup>	67% <sup>82</sup>		15% <sup>34</sup>	
		22% <sup>47</sup>	10% <sup>83,b</sup>		3% <sup>47</sup>	
			9% <sup>47</sup>		40% <sup>81</sup>	
Depression	31% <sup>51</sup>	8% <sup>34</sup>	20% <sup>17</sup>		6% <sup>34</sup>	27% <sup>11</sup>
	16% <sup>34</sup>	42% <sup>47</sup>	56% <sup>82</sup>		24% <sup>11</sup>	
	53% <sup>11</sup>	61% <sup>35</sup>	29% <sup>11</sup>		18% <sup>84,a</sup>	
			27% <sup>83,b</sup>		11.4% <sup>47</sup>	
			21% <sup>47</sup>			
PTSD		36% <sup>85</sup>	33% <sup>17</sup>		49% <sup>51</sup>	24% <sup>85</sup>
			69% <sup>82</sup>		35% <sup>34</sup>	
			10% <sup>83,b</sup>		14% <sup>84,a</sup>	
			64% <sup>46</sup>		48% <sup>46</sup>	
			25% <sup>85</sup>		22% <sup>85</sup>	
Complicated Grief			5% <sup>83,b</sup>		46% <sup>34</sup>	
Fatigue	53% <sup>87</sup>	45% <sup>87</sup>		50% <sup>87</sup>		
Sleep disorder	63% <sup>88</sup>	55% <sup>88</sup>		54% <sup>88</sup>		
	54% <sup>89</sup>	54% <sup>89</sup>				

Note: The beginning of follow-up varies from ICU discharge, hospital discharge, and some research time point. However, within one month, the period during which the patient was admitted to the ICU is included.

Abbreviations: ICU = intensive care unit; PTSD, post-traumatic stress disorder.

<sup>a</sup>This study followed-up for at least 6 months after a patient's death.

<sup>b</sup>This study followed-up at 3–12 months after a patient's death.

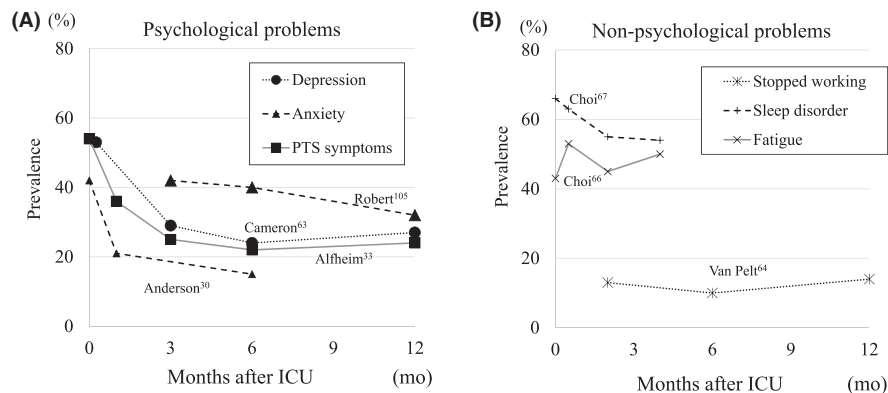


FIGURE 2 Longitudinal prevalence of PICS-F problems. In the long term, the prevalence of PICS-F has not changed. Non-psychological problems refer to symptoms other than anxiety, depression, PTSD, and complicated grief, which were defined as symptoms of PICS-F in the previous report in Critical Care Medicine in 2012.

symptoms than for psychological problems. A study that examined the substantial burden of families as caregivers at 2, 6, and 12 months after ICU admission showed significant lifestyle disruption and employment reduction of families, which persisted for a year.<sup>44</sup> Another study showed that 44.9% of families had to quit work at 1 month, and 36.7% of families had lost savings at 1 year.<sup>90</sup> Families of critically ill patients may need not only psychological support, but also socioeconomic intervention.

Physical symptoms such as fatigue are important, but underreported components of PICS-F. Choi et al.<sup>87</sup> reported that fatigue affected almost half of the families of critically ill patients during the ICU stay, and it persisted at 4 months after ICU discharge. Sleep quality also seems to be impaired in many families of critically ill patients. At 4 months after ICU admission, more than half of families still suffered from poor quality of sleep, as well as during the ICU stay.<sup>88</sup> Of note, these physical symptoms were

reported to be correlated with their psychological symptoms.<sup>87,89</sup> These physical symptoms could be therapeutic targets in families with PICS-F.

## PREVENTION OF PICS-F

Families of ICU patients need to be given and understand accurate information such as the patient's diagnosis, planned care, and prognosis. In addition, they need to inform others about their concerns, needs, and distress to relieve themselves. To address these issues, various communication tools, personnel, and support systems (teams) have been evaluated, and these studies have mainly been conducted in France.<sup>52,86,91-103</sup> More details on each are provided below.

### Provide family information leaflet

One randomized, controlled trial (RCT) investigated whether providing a Family Information Leaflet improved anxiety and depression of families during ICU stays.<sup>91</sup> The leaflet provided general information on the ICU and hospital, the name of the ICU physician caring for the patient, a diagram of a typical ICU room with the names of all the devices, and a glossary of 12 terms commonly used in the ICU. Although the Family Information Leaflet did not significantly decrease symptoms of anxiety and depression of families during ICU stays, it significantly improved families' comprehension of the diagnosis and treatment. On the other hand, family satisfaction was not significantly associated with delivery of the leaflet, but among families with good comprehension those who received the leaflet had significantly better satisfaction scores than those who did not. These data suggest that comprehension is a foundation from which other benefits, such as better satisfaction, can arise. Azoulay et al.<sup>92</sup> conducted a prospective observational study to identify factors associated with poor comprehension by families of ICU patients. They found that failure to give the representative family member an information brochure was one of the factors associated with poor comprehension by families. More importantly, this leaflet both provided information and extended an invitation to talk with ICU caregivers. Therefore, the leaflet not only provides information from the ICU caregivers to the families, but it is also a tool to facilitate interactive communication between families and healthcare providers.

### Intensive care unit diaries

The idea of keeping diaries for unconscious patients came initially from Denmark in 1984, where notes were made concerning events that had happened to the patients or in their personal environment, sometimes also noting what was happening in the world outside.<sup>93</sup> Since then, ICU diaries have long been used in Denmark, Norway, Sweden, Switzerland,

and the United Kingdom for rebuilding the narrative of a life disrupted by illness with loss of patients' memory.<sup>52</sup> In recent years, the effectiveness of ICU diaries not only for patients, but also for their families has been examined. Three RCTs<sup>86,94,95</sup> and one before-after study<sup>52</sup> examined the effects of ICU diaries written by nurses and families of patients on the psychological condition of relatives. One study reported no difference in families' PTSD, depression, and anxiety between the group that received or did not receive the ICU diary.<sup>86</sup> The remaining three studies showed a decrease in families' PTSD,<sup>52,94,95</sup> but depression and anxiety showed no improvement, except in the study of Garrouste et al.<sup>52</sup> A systematic review and meta-analysis of the effect of ICU diaries on patients and families including the abovementioned four studies showed that there was no difference in the incidence of families' PTSD between those who received the ICU diary and those who did not.<sup>96</sup> Therefore, ICU diaries do not seem to have any beneficial effect on the families of ICU patients. However, ICU diaries provide families with information written in easily understandable terms and are available for review at any time during the ICU stay, and they are among the tools that can help improve communication between healthcare providers and families.<sup>52</sup>

### Communication facilitators

Facilitators, such as nurses and social workers trained to improve communication between the ICU team and family participate in family conferences and serve as a bridge between family members and physician communication by confirming the family's understanding and needs after the physician has explained the patient's medical condition. In addition, 24-h follow-up with the families may be provided after the patient's discharge from the ICU.<sup>97</sup> Curtis et al.<sup>98</sup> conducted an RCT in the USA that examined the usefulness of ICU communication facilitators. The facilitators received 2 days of special training from investigators who were experts in each component based on the evidence on clinician-family communication.<sup>98</sup> They found that communication facilitators might be associated with decreased family depressive symptoms at 6 months after ICU discharge. In another study, Garrouste et al.<sup>99</sup> conducted an RCT to investigate family perceptions of having a nurse participating in family conferences and to assess the psychological symptoms of the families after ICU discharge. Although the participation of a nurse in the conferences did not significantly decrease symptoms of anxiety, depression, and PTSD 3 months after patient death or ICU discharge, it was considered positive by the families. Shelton et al. also conducted a nonrandomized, controlled trial, which included a prospective, observational study of ICU decision-making and satisfaction (Phase I) and a controlled, clinical trial to test the intervention's effect (Phase II), to examine the effect of adding a full-time family support coordinator to the surgical intensive care unit team on family satisfaction.<sup>100</sup> They found that the family support coordinator was associated with increases in family

satisfaction with communication. Therefore, the intervention of facilitators trained in communication may be useful in increasing families' understanding and satisfaction with information in the ICU.

### Support grief care with a condolence letter on grief/ bereavement brochure

In cases of dying or deceased ICU patients, caring for families by a condolence letter or the use of a bereavement brochure in the end-of-life conferences has been examined.<sup>101,102</sup> Kentish et al.<sup>101</sup> showed that handwritten condolence letters sent by physician and nurses 15 days after the patient's death might lead to increased symptoms of depression and PTSD in families. However, this study had an important limitation. Because the psychological status of the relatives at the time they received the condolence letter was not evaluated, it cannot be said that sending a condolence letter had a direct effect on the family's psychological state. This factor may have an influence on the effect of a condolence letter, and the kinetics of grieving remain unclear. Nancy et al. showed that the three-step support strategy for families, including a family conference to prepare the relatives for the imminent death, an ICU room visit to provide active support, and a meeting after the patient's death to offer condolences and closure might be helpful to reduce prolonged grief symptoms of families.<sup>103</sup> The use of a condolence letter as part of a step-by-step communication process might have a positive effect. Lautrette et al.<sup>102</sup> showed that the use of a bereavement brochure in the end-of-life conference in the ICU might be helpful to reduce symptoms of anxiety, depression, and PTSD of families. However, the only criterion for inclusion in this study was the belief on the part of the physician in charge that death was inevitable and that a decision to forgo life-sustaining treatment was in order; so in some cases, patients in such circumstances might survive, and it is possible that the evaluation lacks accuracy as grief care. Stephana et al.<sup>104</sup> also found that the evidence is modest in scope in a systematic review and narrative synthesis of RCTs evaluating bereavement interventions in adult ICUs targeting informal caregivers, and deeper understanding of which interventions are most effective, for whom, at what time, and in which contexts, is required. Therefore, several further studies of grief care are needed because of the strong limitations of previous reports.

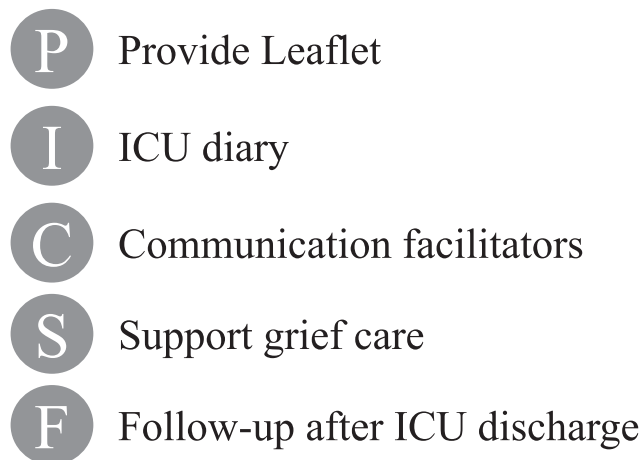
### Bundle for PICS-F prevention

Many of these interventions that are considered useful in the prevention of PICS-F improve comprehension and satisfaction of families, and build good communication between ICU caregivers and families. However, these interventions may not work for all families. A condolence letter, for example, may be too strong a factor triggering painful memories for some families. Therefore, it may be important to make the tool one of proactive availability for families, rather than

one-way information from the ICU caregivers for the prevention of PICS-F. The interventions described above can be divided mainly into those performed during the ICU stay and those performed after ICU discharge. Some of the interventions are initiated during the ICU stay and are continued after discharge from the ICU. Importantly, the effectiveness of a single intervention alone is limited. In addition, the patient's recovery process is also important for the family's psychological status.<sup>105</sup> Thus, prevention of PICS-F requires a continuous bundle of multifaceted and/or multidisciplinary interventions for the patient and families from during the ICU stay to after discharge from the ICU<sup>106</sup> (Figure 3). The Guidelines published by the Society of Critical Care Medicine in 2007 and 2017 provided recommendations to improve the psychological status of families of patients admitted to the ICU, and they recommended relaxing restrictions on family visitation.<sup>107,108</sup> However, the studies that provided evidence for the recommendations were mainly derived from nonrandomized trials, so future large-scale research is needed to establish recommendations for prevention and treatment of PICS-F.

### LIMITATIONS

There were several limitations regarding the present review. First, symptoms of anxiety, depression, and PTSD were not evaluated at baseline in families, and it is difficult to compare them due to different assessment periods. Second, risk factors were only related to psychological symptoms of families.



**FIGURE 3** The bundle for PICS-F prevention. The prevention of PICS-F requires a continuous bundle of multifaceted and/or multidisciplinary interventions for the patient and families from during the ICU stay to after discharge from the ICU. The elements of the bundle are arranged in chronological order from top to bottom. "Provide Leaflet" means that an informational booklet for families is given at the time of ICU admission. "ICU diary" is a daily record of events during the patient's stay in the ICU that the patients and families can look back on after leaving the ICU. "Communication facilitators" means persons to facilitate communication between the healthcare provider and the patient's family during ICU admission. "Support grief care" means support for grief care through a condolence letter on grief and bereavement brochure. "Follow-up after ICU discharge" means that family follow-up should be continued after discharge from the ICU to detect PICS-F earlier.



Third, there might be selection bias because this was not a systematic review. Fourth, the sample size of studies of references were small, and many of the studies were conducted in France. There have also been no studies discussing differences in PICS-F depending on the type of ICU; therefore, these results could not be generalized, and more studies comparing international differences or ICUs are desired in the future.

## CONCLUSIONS

PICS-F has been described as a devastated life, encompassing psychological, physical, and socioeconomic burdens that begin with the emotional impact experienced by the family when the patient is admitted to the ICU. It is important to emphasize that PICS-F needs to be extended beyond the psychological impairments of the families to the physical and socioeconomic impairments in the future, and the family health condition may adversely affect the patient's recovery.

PICS-F can be prevented using a continuous bundle of multifaceted and/or multidisciplinary interventions for the patient and families from during the ICU stay to after discharge from the ICU. Further research will be needed to examine the efficacy of such interventions.

## CONFLICT OF INTEREST STATEMENT

Nobuyuki Nosaka is working on the research about PICS-F under funding from SHARP CORPORATION, but he has not received any direct support for the manuscript. Nobuyuki Nosaka is also working on the research about PICS and PICS-F under funding from LIXIL Corporation, but he has not received any direct support for the manuscript. The remaining authors have disclosed that they do not have any potential conflicts of interest.

## DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

## APPROVAL OF THE RESEARCH PROTOCOL

N/A.

## INFORMED CONSENT

N/A.

## REGISTRY AND THE REGISTRATION NO. OF THE STUDY/TRIAL


N/A.

## ANIMAL STUDIES

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## ORCID

Toru Hifumi  <https://orcid.org/0000-0003-3581-0890>

Nobuto Nakanishi  <https://orcid.org/0000-0002-2394-2688>

[org/0000-0002-2394-2688](https://orcid.org/0000-0002-2394-2688)

Kyohei Miyamoto  <https://orcid.org/0000-0001-5473-2731>

Junpei Haruna  <https://orcid.org/0000-0002-8413-502X>

Shigeaki Inoue  <https://orcid.org/0000-0003-3907-8537>

Norio Otani  <https://orcid.org/0000-0001-7122-5555>

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