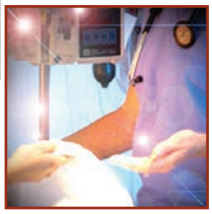

Validation of a New Clinical Tool for Post–Intensive Care Syndrome

By Sophia Wang, MD, Duane Allen, MD, Anthony Perkins, MS, Patrick Monahan, PhD, Sikandar Khan, DO, Sue Lasiter, PhD, RN, Malaz Boustani, MD, MPH, and Babar Khan, MD, MS

Background Post–intensive care syndrome is defined as the long-term cognitive, physical, and psychological impairments due to critical illness.
Objective To validate the self-report version of the Healthy Aging Brain Care Monitor as a clinical tool for detecting post–intensive care syndrome.
Methods A total of 142 patients who survived a stay in an intensive care unit completed the Healthy Aging Brain Care Monitor Self-report and standardized assessments of cognition, psychological symptoms, and physical functioning. Cronbach α was used to measure the internal consistency of the scale items. Validity between the Healthy Aging Brain Care Monitor and comparison tests was measured by using Spearman correlation coefficients. Patients with post–intensive care syndrome were compared with a sample of primary care patients (known groups validity) by using the Mann-Whitney test. General linear models were used to adjust for age, sex, and education level.
Results The total scale and all subscales had good to excellent internal consistency (Cronbach α, 0.83-0.92). Scores on the psychological subscale strongly correlated with standardized measures of psychological symptoms (Spearman correlation coefficient, 0.68-0.74). Results on the cognitive subscale correlated with the delayed memory measure (-0.51). Scores on the physical subscale correlated with the Physical Self-Maintenance Scale (-0.26). Patients with post–intensive care syndrome had significantly worse scores on subscales and total scores on the Healthy Aging Brain Care Monitor than did primary care patients.
Conclusion The self-report version of the Healthy Aging Brain Care Monitor is a valid clinical tool for assessing symptoms of post–intensive care syndrome. (*American Journal of Critical Care.* 2019;28:10-18)

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In 2010, the Society of Critical Care Medicine organized a task force to raise awareness of the long-term cognitive, psychological, and physical impairments of survivors of critical illness. Impairments in these 3 domains are collectively known as post–intensive care syndrome (PICS).[1] PICS affects 50% to 70% of intensive care unit (ICU) survivors, and its effects can persist for 5 to 15 years after ICU hospitalization.[2] A major barrier in the detection of PICS is the lack of a single, validated clinical tool to rapidly assess patients for impairments in all 3 domains of the syndrome.[1]

The self-report version of the Healthy Aging Brain Care Monitor (HABC-M SR) is a 27-item questionnaire used to evaluate cognitive, functional, and psychological domains[3] (see Figure). Patients indicate how often they experienced the target symptoms (cognitive, psychological, and functional) in the preceding 2 weeks. The HABC-M SR can be administered face-to-face, via telephone, or via the internet. The instrument has been validated in older patients with normal cognition, mild cognitive impairment, early-stage dementia, and late-life depression. Our aim in this study was to validate face-to-face administration of the HABC-M SR as a rapid assessment tool for PICS.

Methods

Participants and Setting

A total of 261 patients were recruited from July 2011 to May 2017 at the Critical Care Recovery Center (CCRC) at Eskenazi Hospital, Indianapolis, Indiana, one of the first ICU adult survivor clinics in the United States.[4] Eskenazi Hospital provides health care to a racially diverse, underserved population in the Indianapolis metropolitan area. Patients were included in the study if they were 18 years or older, had been admitted to the Eskenazi ICU, had received mechanical ventilation or had been delirious for more than 48 hours, had been recommended for follow-up by a critical care physician, and had a score greater than 17 on the Mini-Mental State Examination (MMSE).[5] Patients were excluded if they were receiving hospice or palliative care services. Patients who did not complete an HABC-M SR (n = 86) or neuropsychological testing (n = 33) also were excluded from the study.

The final sample included a subgroup of 142 patients who completed both the HABC-M SR and the standardized assessments. Standardized assessments were done at the initial visit, and the HABC-M SR was completed in a week or less during the same visit or a subsequent follow-up visit (mean gap, 7.2 days; SD, 10.0 days). Standardized assessments included ones to examine cognition (either the Consortium to Establish a Registry for Alzheimer's Disease Neuropsychological Battery [CERAD-NB] or the Repeatable Battery for the Assessment of Neuropsychological Status [RBANS]), psychological symptoms (Public Health Questionaire 9 [PHQ-9] or the Geriatric Depression Scale 30 [GDS-30], Posttraumatic Symptom Scale [PTSS-10], and Generalized Anxiety Disorder 7 [GAD-7]), and functional levels (Physical Self-Maintenance Scale [PSMS] and instrumental activities of daily living [IADL] self-report). We chose to use the CERAD and GDS-30 during the initial assessments because these tests had been validated with the HABC-M SR. However, because the CCRC referral base began to include

> A major barrier to detection of PICS is the lack of a single, validated clinical tool to rapidly assess patients for cognitive, functional, and psychological impairments.

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Over the past **2 weeks**, how often did **you** have problems with: (Use ✔ to indicate your answer.)	Not at all **(0-1 day)** 0 points	Several days **(2-6 days)** 1 point	More than half the days **(7-11 days)** 2 points	Almost daily **(12-14 days)** 3 points
Judgment or decision-making				
Repeating the same things over and over such as questions or stories				
Forgetting the correct month or year				
Handling complicated financial affairs such as balancing checkbook, income taxes, and paying bills				
Remembering appointments				
Thinking or memory				
Learning how to use a tool, appliance, or gadget				
Planning, preparing, or serving meals				
Taking medications in the right dose at the right time				
Walking or physical ambulation				
Bathing				
Shopping for personal items like groceries				
Housework or household chores				
Being left alone				
Your safety				
Your quality of life				
Falling or tripping				
Less interest or pleasure in doing things, hobbies or activities				
Feeling down, depressed, or hopeless				
Resisting help from others or getting agitated				
Feeling anxious, nervous, tense, fearful, or panic[ky]				
Believing others are stealing from you or planning to harm you				
Hearing voices, seeing things, or talking to people who are not there				
Poor appetite or overeating				
Falling asleep, staying asleep, or sleeping too much				
Acting impulsively, without thinking through the consequences of your actions				
Wandering, pacing, or doing things repeatedly				
Place Sticker Here	**Cognitive subscale**			
	Functional subscale			
	Behavioral and mood subscale			
	Total score			

Figure Healthy Aging Brain Center Monitor Self-report version.

younger ICU survivors, we decided to switch the cognitive and depression assessments to the RBANS and PHQ-9, respectively. The PSMS and IADL self-ratings can be used for all age ranges. Retrospective analysis of deidentified clinical data was approved by the appropriate institutional review board.

HABC-M SR

The HABC-M SR was developed by an interdisciplinary panel of dementia experts and was validated in patients who had a score greater than 17 on the MMSE.[3] The HABC-M SR (Table 1) is a 27-item self-administered tool used to evaluate cognitive, functional, and psychological symptoms. The cognitive subscale consists of 6 questions about memory, orientation, and judgment. The functional subscale consists of 11 questions about IADLs and activities of daily living (ADLs). The psychological subscale consists of 10 questions about symptoms of depression, psychosis, and anxiety. Each question is rated on the basis of the patient's perceived frequency of the symptom during the 2 preceding weeks: 0 = not at all (0-1 day), 1 = several days (2-6 days), 2 = more than half the days (7-11 days), 3 = almost daily (12-14 days). The maximum scores for cognitive, functional, and psychological subscales are 18, 33, and 30, respectively. The maximum total score is 81. Higher numbers for the 3 subscales and the total score correlate with higher severity of symptoms.[3]

Table 1
Correlations of scores on subscales of the Healthy Aging Brain Care Monitor Self-report questionnaire[a]

	Subscale	
Subscale	**Cognitive**	**Psychological**
Psychological	0.698	—
Functional	0.703	0.610

[a] Numbers in table are Spearman correlation coefficients.

Standardized Assessments of Cognition

All patients completed the MMSE, a 30-point questionnaire used to assess for cognitive impairment.[5]

They also completed the Trail Making Test (TMT), which consists of 2 parts to measure processing speed (TMT-A) and executive functioning (TMT-B).[6] The amount of time needed to complete each part is the score. In TMT-A, the participant sequentially connects 25 encircled numbers distributed on a sheet of paper. In TMT-B, the participant connects circles alternating between numbers and letters in ascending order (eg, 1, A, 2, B, 3, C). Patients then completed either the RBANS or the CERAD-NB. The RBANS is a neuropsychological screening tool validated in patients with a wide range of neuropsychiatric disorders.[7,8] It yields 5 index scores (attention, language, visuospatial/constructional abilities, immediate memory, delayed memory) and a total scale score (40-160 points). The CERAD-NB is a standardized test battery designed to detect cognitive deficits in patients with Alzheimer dementia.[9] It consists of 8 subtests (verbal fluency, Boston naming, MMSE, word list learning, constructional praxis, word list recall, word list recognition, and constructional praxis recall) used to measure general cognition, semantic fluency, graphomotor construction ability, confrontation naming, and verbal learning and memory.

Standardized Assessments of Psychological Symptoms

All patients completed either the GDS-30 or the PHQ-9 to assess depressive symptoms. The GDS-30 is a 30-item, self-report, yes-no instrument used to measure depression in elderly persons.[10] The PHQ-9 is a self-administered 9-question scale used to rate the frequency of depressive symptoms on a scale of 0 to 3 (0 = not at all, 1 = several days, 2 = more than half the days, 3 = nearly every day) during the preceding 2 weeks.[11] A subset of patients also completed the PTSS-10, a 10 item self-report used to screen for posttraumatic stress disorder, with a total severity score of 10 to 70. The items are based on the *Diagnosis and Statistical Manual of Mental Disorders* (Third Edition) criteria for posttraumatic stress disorder. The PTSS-10 has since been validated in patients with acute respiratory distress syndrome after ICU treatment by using a structured clinical interview based on criteria of the *Diagnosis and Statistical Manual of Mental Disorders* (Fourth Edition).[12]

Standardized Assessments of Physical Functioning

Patients or their informal caregivers completed the PSMS, a 6-item questionnaire used to assess a patient's ability to complete ADLs.[13] Each patient's level of functioning for IADLs was also assessed by using a modified version of the Lawton IADL scale[13]; participants were asked to rate, on a 3-point Likert scale (1 = completely independent to 3 = completely dependent), their ability to perform 7 IADLs (using the telephone, traveling, shopping, preparing meals, doing housework, medication management, and finances).

Data Collection

At the initial visit, the critical care physician completed a history and interview with both the patient and the patient's informal caregiver (if one was available) and performed a full physical examination, including vital signs and a neurological examination. A health care professional or psychometrist administered the HABC-M SR and the standardized assessments of cognition, psychological symptoms, and functional symptoms as described earlier. Medical history and medication lists were collected from patients, informal caregivers, and electronic medical records.

Statistical Analysis

Internal consistency of the scale items was assessed by using Cronbach α. Convergent-divergent validity was assessed by performing 2 separate analyses. First, we examined the relationship between the HABC-M SR scales and standardized cognitive, psychological, and functional scales. We expected that the individual scales from the HABC-M SR would correlate highest with the external scales that belonged to the same domain (eg, the HABC-M SR psychological scale would correlate with the GDS-30, PHQ-9, and PTSS-10). Then we used generalized linear models to test whether this association remained significant after we made adjustments for age, sex, and education. We then compared the results for the HABC-M SR from the CCRC cohort with the results of the group used in the original validation study for the HABC-M SR. Patients in the original validation study for the HABC-M SR were recruited if they had had at least 1 visit to primary care during the period from January 1, 2008, to April 1, 2011; were 65 years or older; and had either a diagnosis of cognitive impairment or had received at least 1 prescription of a cholinesterase inhibitor or memantine or had any *International Classification of Diseases, Ninth Revision,* code indicating depression or had received at least 1 prescription of a selective serotonin reuptake drug. We used the Fisher exact test to test for differences in percentage of patients with the lowest

> Patients seen in the CCRC were more likely than primary care patients were to report cognitive, functional, or psychological symptoms.

Table 2
Characteristics of patients with post–intensive care syndrome (N = 142)

Characteristic	Value[a]
Demographics	
Age, mean (SD), y	52.3 (13.0)
Education, mean (SD), y	11.8 (2.3)
Female sex	68 (47.9)
Race (n = 140)	
African American	64 (45.7)
Other	9 (6.4)
White	67 (47.9)
Comorbid conditions	
Alcohol use disorder (current or previous) (n = 125)	41 (32.8)
Tobacco use disorder (current or previous) (n = 137)	107 (78.1)
History of depression[b] (n = 139)	64 (46.0)
Central nervous system disorder (n = 138)	36 (26.1)
Cardiac disease (n = 138)	48 (34.8)
Hypertension (n = 138)	97 (70.3)
Diabetes mellitus (n = 138)	38 (27.5)
COPD and other lung disease (n = 138)	64 (46.4)
Cancer (n = 138)	20 (14.5)
Hospital characteristics[c]	
Days in hospital, mean (SD)	17.1 (15.5)
Days in intensive care unit, mean (SD)	12.1 (13.1)
Delirium during entire hospitalization	63 (45.7)
Respiratory failure	129 (93.5)
Initial CCRC visit information	
Time between initial visit in CCRC and discharge from the hospital (days)	89.3 (54.2)

Abbreviations: CCRC, Critical Care Recovery Center; COPD, chronic obstructive pulmonary disease.
[a] Values are number (percentage) of patients unless otherwise indicated in first column. If percentage is based on fewer than 142 patients, that too is noted in first column.
[b] Based on diagnosis of depression reported by informant or documented on patient's chart.
[c] For the hospital stay with the sentinel stay in the intensive care unit that resulted in CCRC referral.

Table 3
Internal consistency, reliability, and score distributions for Healthy Aging Brain Center Monitor Self-report[a]

	Subscale			
Variable	Cognitive	Functional	Psychological	Total
No. of items	6	11	10	27
Cronbach α	0.83	0.83	0.84	0.92
No. of possible levels	18	33	30	81
Range	0-15	0-24.75	0-22	0-57.75
Mean	3.7	6.3	6.4	16.3
Median	2.0	3.3	5.0	12.5
SD	4.1	6.8	6.0	14.5
Lowest possible value, %	33.3	25.0	20.1	12.3
Highest possible value, %	0.0	0.0	0.0	0.0

[a] Internal consistency of the scale items was assessed by using Cronbach α.

possible score on each scale and the Mann-Whitney test to detect differences in scale scores across the CCRC and primary care populations. All statistical analyses were performed by using SAS 9.4 software (SAS Institute Inc).

Results

Patient Characteristics

Table 2 gives characteristics of the 142 patients with PICS. The mean age was 52.3 (SD, 13.0) years, and less than half (47.9%) were female. The cohort reflected the diversity of the Indianapolis metropolitan area. Nearly half were African American (46%), and the mean years of education was 11.8 (SD, 2.3). The most common comorbid conditions were tobacco use disorder (78%), hypertension (70%), chronic obstructive pulmonary disease or other lung disease (46%), and depression (46%). The mean length of ICU stay was 12.1 days, and the mean length of hospital stay was 17.1 days. A total of 45.7% of the patients had an episode of ICU delirium. Most patients (94%) required ventilator support during their ICU stay.

Reliability and Scale Score Features of HABC-M SR

Table 3 gives the internal-consistency, reliability, and score distributions of the HABC-M SR. The internal consistency of the HABC-M SR scales was good to excellent (Cronbach α, 0.83-0.92). All the subscale and total scores were positively distributed but still covered a wide range of possible answers. The inter-scale correlation between all of the subscales was moderate (0.610-0.703; see Table 1), but indicated that the subscales were distinct.

Construct Validity of HABC-M SR

Table 4 provides information on the construct validity of the subscale and total scores of the HABC-M SR. The psychological subscale had the strongest correlations with the standardized measures of psychological symptoms, PHQ-9 (Spearman correlation coefficient, 0.73; n = 67), GDS-30 (0.74; n = 56), and PTSS-10 (0.68; n = 59). The cognitive subscale strongly correlated with only the delayed memory measure of the CERAD-NB (-0.51; n = 56), but did not correlate with any of the measures on the RBANS (n = 76). The functional subscale correlated with the PSMS (-0.26). All these relationships remained significant after adjustments were made for age, sex, and education.

Comparison of HABC-M SR Scores Between CCRC and Primary Care Populations

Table 5 compares the subscale and total HABC-M SR scores of CCRC patients with those of primary

Table 4
Construct validity of the Healthy Aging Brain Center Monitor Self-report in CCRC patients

External scales	Correlation with scores[a] Cognitive subscale	Functional subscale	Behavioral/psychological subscale	Total
Cognitive measures				
MMSE	-0.08	-0.11	-0.06	-0.09
RBANS (n = 76)				
Total	-0.20	-0.24[b]	-0.12	-0.22
Immediate recall	-0.20	-0.20	-0.11	-0.19
Visuospatial	-0.21	-0.20	-0.18	-0.25[b]
Language	0.06	0.04	0.09	0.07
Attention	-0.16	-0.21	-0.08	-0.16
Delayed memory	-0.20	-0.22	-0.06	-0.19
Trail A	-0.14	-0.15	-0.08	-0.14
Trail B	-0.10	-0.17	0.14	-0.07
CERAD-NB (n = 56)				
Fluency	-0.38[b]	-0.19	-0.05	-0.19
Naming	-0.22	-0.16	-0.04	-0.18
Praxis	-0.06	-0.18	-0.002	-0.12
Delayed memory	-0.51[c]	-0.42[b]	-0.18	-0.40[b]
AMNART	-0.18	-0.11	-0.23	-0.18
Delayed praxis	-0.25	-0.27[b]	-0.11	-0.25
Tokens	-0.35[b]	-0.26	-0.18	-0.33[b]
Trails A	-0.02	-0.19	0.02	-0.09
Trails B	-0.07	-0.05	0.01	-0.04
Psychological measures				
PHQ-9 (n = 67)	0.59[c]	0.38[b]	0.73[c]	0.58[c]
GDS-30 (n = 56)	0.65[c]	0.51[c]	0.74[c]	0.70[c]
PTSS-10 (n = 59)	0.45[c]	0.34[b]	0.68[c]	0.54[c]
Functional measures				
PSMS (n = 116)	-0.19[b]	-0.26[b]	-0.16	-0.22[b]
Number of independent IADLs (n = 109)	-0.17	-0.26[b]	-0.20[b]	-0.23[b]

Abbreviations: AMNART, American Version of the Nelson Adult Reading Test; CCRC, Critical Care Recovery Center; CERAD-NB, Consortium to Establish a Registry for Alzheimer's Disease Neuropsychological Battery; GDS-30, Geriatric Depression Scale (long version); IADLs, instrumental activities of daily living; MMSE, Mini-Mental State Examination; PHQ-9, Patient Health Questionnaire 9; PSMS, Physical Self-Maintenance Scale; PTSS-10, Posttraumatic Symptom Scale; RBANS, Repeatable Battery for the Assessment of Neuropsychological Status.
[a] Values are Spearman correlation coefficients.
[b] $P < .05$.
[c] $P < .001$.

care patients (n = 291; mean age, 72.7 years; SD, 6.7 years). The CCRC patients had significantly worse scores for all subscales and the total scale on HABC-M SR. The mean total HABC-M SR score for CCRC patients was nearly double the total score for the primary care patients. These relationships remained significant after adjustments for age and sex. Patients seen in primary care were more likely to report no cognitive, psychological, or functional symptoms than were the CCRC patients (Table 6).

Discussion

Although epidemiological studies suggest a fairly high prevalence of PICS in patients treated in an ICU, this syndrome remains underrecognized.[1,2] A major barrier to the recognition of PICS is that it

Table 5
Comparison of HABC-M SR scores in CCRC and primary care populations[a]

Subscale	CCRC population (n = 142) Mean (SD)	Median (IQR)	Primary care population (n = 291) Mean (SD)	Median (IQR)
Cognitive	3.7 (4.1)	2 (0-6)	1.9 (2.9)	0 (0-3)
Psychological	6.4 (6.0)	5 (1-11)	3.2 (4.2)	2 (0-5)
Functional	6.3 (6.8)	3.3 (0.6-11)	3.2 (4.5)	2 (0-5)
Total	16.3 (14.5)	12.5 (3.2-27.6)	8.3 (10.3)	4 (1-12)

Abbreviations: CCRC, Critical Care Recovery Center; HABC-M, Healthy Aging Brain Center Monitor Self-report; IQR, interquartile range.
[a] Mann-Whitney test showed significant differences ($P < .001$) in scale scores between the 2 populations.

Table 6
Comparison of HABC-M SR lowest possible scores in CCRC and primary care populations

Subscale	Lowest possible value,[a] % (No.) CCRC population (n = 142)	Primary care population (n = 291)	*P*
Cognitive	33.3 (47)	53.6 (156)	<.001
Psychological	20.1 (28)	36.1 (105)	.001
Functional	25.0 (35)	38.5 (112)	.007
Total	12.3 (17)	21.6 (63)	.02

Abbreviations: CCRC, Critical Care Recovery Center; HABC-M, Healthy Aging Brain Center Monitor Self-report.
[a] Fisher exact test was used to test for differences in percentage of patients at the lowest possible scale score (0 for all scales).

affects multiple domains (physical, psychological, cognition). In an era of subspecialized care, the full spectrum of PICS symptoms may not be detected after the hospital stay. Therefore, a clinical tool that can be used to rapidly assess all these domains is much needed. Our findings suggest that the HABC-M SR may be such a clinical tool. The HABC-M SR psychological and functional subscales were reliable tools for measuring the severity of PICS symptoms. Although the HABC-M cognitive scale had low correlations with the cognitive performance measures, the highest correlation was with the CERAD Delayed Memory Scale, which is the area most related conceptually to the HABC-M SR cognitive scale. This finding suggests that the cognitive subscale in PICS may have limited validity.

Despite this limitation of the HABC-M SR, patients seen in the CCRC still reported higher severity of cognitive, psychological, and functional symptoms than did primary care patients. Although the PICS patients in our sample were much younger than the original targeted population for the HABC-M SR, studies have suggested that despite their chronological age, younger ICU survivors may be experiencing the effects of aging similar to the effects apparent in older patients, including marked cognitive deficits. Therefore, clinicians may consider more detailed neuropsychological testing for ICU survivors who report cognitive symptoms. However, normal scores on cognitive subscales should not deter further evaluation if clinicians have concerns about a patient's cognition based on the patient's history and examination.

> The HABC-M SR has potential as a screening tool for rapidly assessing the wide range of symptoms experienced by patients with PICS.

Most important, our findings lay the groundwork for future development of self-report cognitive scales for PICS, similar to the scales being developed and studied for Alzheimer disease. Although neuropsychological assessment (an interview with a reliable informant and use of a full testing battery) remains the gold standard for a workup for a patient who may have cognitive disorders, marked logistical and resource barriers exist for administering neuropsychological assessments on a wide scale. The HABC-M SR cognitive subscale was modeled after the brief self-report and informant report tools used for patients with mild cognitive impairment and early Alzheimer disease, such as the Cognitive Change Index[14] and the Measurement of Everyday Cognition,[15] and additional work will be needed to refine and validate a self-report or informant-based screening tool for cognitive symptoms in patients with PICS. Reliable cognitive screening tools can help clinicians decide appropriately which patients should be referred for further assessment.

In future studies, investigators will need to examine whether the cognitive subscale of the HABC-M caregiver version is a reliable tool that can provide accurate information on the severity of cognitive symptoms in patients with PICS. Despite the lack of correlation between the results of detailed cognitive testing and scores on a cognitive subscale, the subscale still has some relative value, because CCRC patients did report more cognitive symptoms than did primary care patients.

Strengths and Limitations

The major strength of our study is that we have shown that the HABC-M-SR is an easy-to-use, standardized clinical tool and has potential as a screening tool for rapidly assessing the wide range of symptoms experienced by patients with PICS. Many other investigators[16-20] have used a wide range of tools to measure psychological symptoms, cognitive performance, and physical functioning. These tools can be time intensive, may require additional training for health care professionals to administer, and are often used in research involving subspecialty care. The HABC-M SR requires little to no training for health care professionals to administer, can be completed within 5 minutes, and can be administered in a wide range of health care settings (eg, primary care and subspecialty outpatient care). The HABC-M SR can also be repeated for longitudinal follow-up of PICS symptoms. Although the number of ICU survivor clinics is rapidly growing, access to this subspecialty care remains quite limited. Developing a tool to rapidly screen ICU survivors for PICS symptoms in other settings (most notably, primary care) can increase the likelihood that ICU survivors are referred

to the appropriate subspecialty care that they need.

Our study has some limitations. First, the HABC-M SR can be administered only to patients with normal cognition, mild cognitive impairment, or early-stage dementia. Additional studies will be needed to determine whether the caregiver version of the HABC-M is a valid measure of PICS symptoms in patients with moderate to severe dementia. Patients with HABC-M SR scores that indicate no evidence of PICS are less likely to have symptoms suggestive of PICS, but clinicians should always interpret the results of the HABC-M SR in the context of a patient's history and the results of a physical examination. Second, the HABC-M SR was administered in a subspecialty ICU survivor clinic. ICU survivor clinics are more common in Europe, but still fairly rare in the United States, a situation that means many ICU survivors rely on primary care physicians for follow-up after discharge from the hospital. Although additional studies are needed to validate use of the HABC-M SR for screening in larger populations and for longitudinal follow-up, clinicians may find the HABC-M SR helpful in screening for symptoms in ICU survivors and in follow-up.

Although the HABC-M SR has been used in primary care in older patients with possible mild cognitive impairment, early-stage dementia, or late-life depression, the instrument has not been used in primary care to screen younger ICU survivors who may have undetected cognitive, mental health, or functional symptoms that could suggest a diagnosis of PICS. Future studies are needed to determine whether primary care practitioners can accurately administer the HABC-M SR for ICU survivors and then make the appropriate diagnosis and referral for management of PICS on the basis of the results of the HABC-M SR.

The HABC-M SR is a clinical tool that can be administered via multiple means (face-to-face, over the telephone, and via the internet). Future studies are needed to validate whether alternative methods of administration of the HABC-M SR will yield results similar to those of face-to-face administration. Other limitations include the lack of a direct correlation between the HABC-M SR functional subscale and the physical impairments in PICS and selection bias in terms of patients who participated in our study.

Conclusion

As the number of ICU survivors increases, PICS is becoming a major public health issue. Care after discharge from the ICU for these survivors is fragmented.[21] Despite the increase in ICU survivor clinics, most ICU survivors will continue to receive their care from primary care providers.[21,22] Therefore, health care professionals in all disciplines and specialties need clinical assessment tools for PICS that can be used in a wide range of outpatient settings. The use of such tools allows health care professionals to recognize which patients are experiencing the symptoms of PICS and then refer the patients to critical care or another relevant subspecialty for the management of PICS. These assessment tools need to be short and easy to use for health care professionals with little to no expertise in PICS. The HABC-M SR is such a tool, and future studies are needed to examine potential barriers to the adoption of HABC-M SR in outpatient settings for the diagnosis of PICS.

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CE 1.0 Hour Category A

Notice to CE enrollees:

This article has been designated for CE contact hour(s). The evaluation demonstrates your knowledge of the following objectives:

1. Identify the 3 domains of post–intensive care syndrome that need to be assessed.
2. Explain why there is a clinical need for a screening tool for post–intensive care syndrome.
3. Describe the advantages of the Healthy Aging Brain Care Monitor Self-report for the assessment of post–intensive care syndrome.

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