The risk factors of the functional status, quality of life, and family psychological status in children with postintensive care syndrome: A cohort study

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ABSTRACT

Background: Intensive care treatment has a side effect of several impairments after hospital discharge, known as postintensive care syndrome (PICS). PICS in children must be well evaluated because PICS can affect their global development and quality of life. Our specific aims are to determine the impact of intensive care treatment and the risk factors which contribute to PICS.

Methods: In this observational cohort study, we identified critically ill children treated in intensive care units (ICUs) for more than 24 h and survived. We evaluated the internal and external risk factors of the patients in the intensive care. We interviewed their parents to define the functional status and quality of life of the patients in 7 days before ICU admission and the psychological status of the family at the time of intensive care admission. The interview was repeated in 3 months after the intensive care discharge.

Results: There was a significant decrease in functional status and quality of life after intensive care treatment ($P < 0.001$). However, none of the internal risk factors were significantly associated with PICS. Neurologic involvement in the disease was associated with the significantly reduced functional status of patients, while the severity of the disease was significantly associated with both functional status and quality of life. Our study also showed a significant psychological disorder of the family in the intensive care.

Conclusion: The occurrence of PICS in children was associated with the severity of the disease, decreased the functional status and quality of life, and contributed to psychological disorders for the family.

Key words: Critical illness, functional status, pediatric intensive care, post-intensive care syndrome, quality of life, risk factors

INTRODUCTION

Improvement of pediatric intensive care technology and management recently has brought the increase of children’s survival rate from various critical diseases.[1] However, this improvement is frequently followed by an increase in morbidity after the intensive care has finished.[2] This condition is also known as postintensive care syndrome (PICS) and has a varied spectrum of impairment. PICS is defined as the novel...
impairment of a patient who survived intensive care after suffering a critical condition.\[9\] These impairments are classified into three main groups, which are physical function, mental status, and cognitive function.\[3\] New disabilities in children following intensive care may have significant long-term effects and should be detected and managed comprehensively in a timely fashion. In children, PICS detection is complicated by differences in dependency and baseline functional status, organ maturation, and other factors. In addition, PICS may also negatively impact the patient’s family, known as PICS-Family.\[1,4\]

The main concern of PICS impairment in children is how this condition affects functional status and quality of life afterward. A study by Namachivayam et al. showed that there was a decrease in mobility in children after surviving from pediatric intensive care unit (PICU), and this limitation mostly lasts up to 1 year afterward.\[10\] This condition is also known as intensive care unit-acquired weakness (ICU-AW), which occurs by several mechanisms, including microvascular ischemia, catabolism-induced muscle wasting, and critical neuropathy.\[4\] Even more than mobility impairment, Colville and Pierce (2012) showed an overall decrease of quality of life (QoL) from children for up to 1-year post-ICU treatment.\[7\] The effects of PICS are also altering psychological and cognitive aspects of children, which are harder to deal with.

The treatment process of the ICU involves several invasive interventions which the patient must deal with, and this could be associated with morbidity in PICS. Other factors known to impact the occurrence of PICS include age, gender, type and severity of disease, amount of intervention performed, and length of intensive care.\[9\] These factors could influence the outcome of the patient, but the significance and the synergy of each factor remains unclear. This study aimed to show the effect of intensive care treatment on pediatric patients in terms of functional status and QoL and the impact on the family. Risk factors were analyzed to further clarify their level of contribution.

**METHODS**

This analytical observational prospective cohort study was designed to discover the impairment of functional status and QoL in children with PICS and the psychological impact on their family with identification of significant contributing internal or external factors. The sample of this study was defined as children aged 1 month–18 years who were treated in the PICU for more than 24 h and survived the critical disease. The patient and family then followed up 3 months after the intensive care. This study was conducted by the Pediatric Emergency Department of Saiful Anwar General Hospital from December 1, 2019, to May 31, 2020, at PICU of Saiful Anwar General Hospital. All the protocols in this study were approved by the Ethical Committee of Faculty of Medicine, Brawijaya University, Malang City, Indonesia.

Every parent of the patients who were eligible to be included in this study received and signed informed consent about this study. We classified many predicted risk factors into internal and external factors. The internal factors included gender, age, family composition, and socioeconomic status. The family composition was divided into intact (parents are married and live together in the same house with the children) and nonintact (any close family member who does live not in the same house). Based on monthly income category set by Indonesian Central Bureau of Statistic where socioeconomic status was divided into: low (monthly income < Rp 1,500,000), middle (monthly income between Rp 1,500,000 to Rp 3,500,000), and high (monthly income > Rp 3,500,000).\[8\]

The external factors included surgical intervention, neurological disease involvement, pediatric index mortality (PIM), PICU length of stay, length of mechanical ventilation, and the number of interventions. The number of interventions was evaluated using Therapeutic Intervention Scoring System (TISS) score [Appendix 1].\[9\] The parents were also interviewed about Functional Status Scale (FSS) [Appendix 2],\[10\] Pediatric Quality of Life (PedsQL) [Appendix 3]\[11\] of their children <7 days before admission, and the psychological condition of the family by Depression, Anxiety, and Stress Score (DASS) [Appendix 4]\[12\] on the time of intensive care admission. The interview was then repeated after 3 months after completion of the intensive care.

The baseline characteristic data were descriptively analyzed and then reported in median and interquartile range. Normality test was performed to all of the parameters with Shapiro–Wilk test, followed by homogeneity test (by Levene’s test). The comparison of the results of FSS, PedsQL, and DASS between pre-intensive care and 3 months after intensive care was performed by dependent t-test or Wilcoxon Signed Rank test. The bivariate association between each of the factors with FSS, PedsQL, and DASS after intensive care is also being analyzed by Mann–Whitney Test, Kruskall–Wallis Test, or Spearman’s correlation test, based on the type of the data. Every factor which elicits significant differences in bivariate analysis is then collected, and the multivariate analysis is performed (by multiple logistic regression) to gain the contributing factor. Each statistical analysis is considered to be statistically significant if the \( P < 0.05. \)
RESULTS

Subject characteristics
There are 45 children and their parents included in this study who survived the intensive care and could be followed up 3 months later. The baseline characteristics, as shown in Table 1, are already classified into every factor tested in this study. From the internal factors, most of the family was intact and classified into middle social-economic status. From the external factor, more children had a critical disease that required surgical intervention. The severity of the disease by PIM score means reported 8.86% predicted death rate of the patient in this study. TISS score median was 24, which indicated the various interventions given and potentially induced morbidity of the patient afterward.

Comparison between pre- and post-intensive care

Functional Status Scale
There was a significant difference ($P < 0.001$) in children’s functional status before intensive care and 3 months after intensive care. Twenty-two children with previous normal conditions gained mild-to-severe dysfunction 3 months after intensive care [Table 2].

Pediatric Quality of Life
There was a significant ($P < 0.001$) decrease in patients’ QoL before intensive care and after 3 months after intensive care. As shown in Figure 1, the mean of PedsQL before intensive care was 76.1 ± 2.6 and decreased to 61.1 ± 3.1 in 3 months after intensive care.

Family Depression, Anxiety, and Stress Score
There was a significant improvement of family psychological condition between admission and 3 months after completing the intensive care. As shown in Table 3, most of the family developed depression, anxiety, and stress with various severity; however, they got improvement after 3 months’ postintensive care.

Risk factor to functional status
From the bivariate analysis, there were several risk factors significantly associated with the functional status of the patient. As shown in Table 4, none of the internal factors are associated, and all of the external factors but surgical interventions were associated with the functional status. From the multivariate analysis, PIM score and neurologic disease involvement were significantly associated with less functional status in children after intensive care, as shown in Table 5.

Risk factor to quality of life
From the bivariate analysis, several external factors of the patient had an association with the decrease in QoL. Similar to the pattern shown in functional status, as shown in Table 6, none of the internal factors and external factors elicited a significant decrease; however, surgical intervention was associated with the patients’

Table 1: Baseline subjects characteristics

| Variable                          | Number (n = 45) |
|----------------------------------|----------------|
| Internal factor                  |                |
| Male gender, $n$ (%)             | 28 (62)        |
| Age, $n$ (%)                     |                |
| 1 month-1 year                   | 10 (22)        |
| 1-5 years                        | 19 (42)        |
| 5-10 years                       | 11 (24)        |
| 10-18 years                      | 5 (11)         |
| Family composition, $n$ (%)      |                |
| Nonintact                        | 5 (11)         |
| Intact                            | 40 (89)        |
| Socioeconomic status, $n$ (%)    |                |
| Low                              | 10 (22)        |
| Middle                           | 23 (51)        |
| High                             | 12 (27)        |
| External factor                  |                |
| Surgery intervention, $n$ (%)    |                |
| With surgery                     | 12 (27)        |
| Without surgery                  | 33 (73)        |
| Neurologic disease involvement, $n$ (%) |        |
| Neurologic                       | 23 (51)        |
| Nonneurologic                    | 22 (49)        |
| PIM score, median (IQR)          | 8.9 (3.6-20.7) |
| PICU length of stay (days), median (IQR) | 5 (4-7)     |
| Length of mechanical ventilation, median (IQR) | 5 (2-16) |
| TISS score, median (IQR)         | 24 (17-32)     |

Table 2: Functional Status Scale result

| FSS                        | Normal | Mild dysfunction | Moderate dysfunction | Severe dysfunction |
|---------------------------|--------|------------------|----------------------|-------------------|
| Preintensive care*        | 34     | 9                | 2                    | 0                 |
| Postintensive care        | 12     | 13               | 16                   | 4                 |

*Preintensive care was defined as the patients’ time of intensive admission.

FSS: Functional Status Scale

Table 3: Family Depression, Anxiety, and Stress Score

| Depression                | Normal | Mild | Moderate | Severe | Very severe | $P$   |
|---------------------------|--------|------|----------|--------|-------------|-------|
| Preintensive care*        | 27     | 8    | 7        | 0      | 3           | <0.001|
| Postintensive care        | 41     | 3    | 0        | 1      | 0           |       |
| Anxiety                   |        |      |          |        |             |
| Preintensive care         | 13     | 4    | 15       | 11     | 2           | <0.001|
| Postintensive care        | 35     | 5    | 4        | 0      | 1           |       |
| Stress                    |        |      |          |        |             |
| Preintensive care         | 35     | 3    | 4        | 3      | 0           | 0.007 |
| Postintensive care        | 44     | 0    | 1        | 0      | 0           |       |

*Preintensive care was defined as the patients’ time of intensive admission

Table 4: Bivariate analysis of risk factor to functional status

| Internal risk factor       | $P$   | External risk factor |
|---------------------------|-------|----------------------|
| Age                       | 0.74  | Surgery intervention |
| Gender                    | 0.36  | Neurologic disease involvement |
| Family composition        | 0.68  | PIM score |
| Social economy status     | 0.57  | Length of PICU stay |
|                           |       | Length of ventilator usage |
|                           |       | TISS score |
|                           |       | 0.01 |
|                           |       | 0.001 |
|                           |       | 0.005 |

PIM: Pediatric Index Mortality, PICU: Pediatric intensive care unit, TISS: Therapeutic Intervention Scoring System
QoL. From the multivariate analysis, as shown in Table 7, only the PIM score showed a significant association with the decrease in QoL \((P < 0.001)\).

**Risk factor to family psychological condition**

From the bivariate analysis, several external factors of the patient had a significant association with the deterioration of the family psychological condition, as shown in Table 8. All kinds of psychological disturbances evaluated by DASS elicited by similar external risk factors, such as PIM score, length of ventilator usage, and TISS score. From the multivariate analysis, as shown in Table 9, none of the risk factors showed a significant association with family psychological condition differences.

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**DISCUSSION**

There was a significant decrease in functional status and QoL in children after they had undergone intensive care and survived. Functional status evaluated by FSS showed the condition of 6 domains, which are mental status, sensory function, communication, motoric function, feeding ability, and respiration. Each FSS domain can deteriorate after intensive care and indicate several pathologic events described in PICS, such as muscle mass decrease, neuromuscular weakness, blunt sensory, nociceptive function, fatigue, and weight loss. This functional disruption furthermore causes a reduction of patients’ QoL. These conditions may improve after a long time with follow-up therapy, as reported by Theofilou et al. that there was a significant improvement in the patient 12 months later. This study evaluated until 3 months after intensive care was fulfilled, thus evaluated patients over a longer time horizon, may identify continued recovery and restore children’s QoL.\(^{[13]}\)

None of the internal risk factors were significantly associated with the decrease in functional status and QoL of the patient. This result is different from a previous study by Als et al. that reported younger children and nonintact family composition had an association with fatigue postintensive care, one of the spectra of PICS.\(^{[14]}\) The nonintact family was much less than the intact family in our study, which can explain the nonsignificant results. In addition, the composition of the family not always correlated with less care of the children, which also can reduce the disability of the children. The external factor more significantly induces morbidity in children postintensive care.

Neurologic disease involvement had a significant association with the decrease of functional status postintensive care but was nonsignificant to reduce the QoL. This result parallels with the previous study which reported neurologic critical disease that causes the patient to be hospitalized in intensive care produce neurologic morbidity in children postintensive care.

DISCUSSION continues...
Table 8: Bivariate analysis of risk factors to the family psychological condition

| Internal factors          | External factors          | P   |
|---------------------------|---------------------------|-----|
| Depression                |                           |     |
| Age                       | 0.56                      | 0.39|
| Gender                    | 0.11                      | 0.17|
| Family composition        | 0.46                      | 0.03|
| Social economy status     | 0.99                      | 0.01|
| Length of PICU stay       |                           | 0.005|
| Length of ventilator usage|                           | 0.09|
| Anxiety                   |                           |     |
| Age                       | 0.76                      | 0.51|
| Gender                    | 0.62                      | 0.57|
| Family composition        | 0.98                      | 0.02|
| Social economy status     | 0.75                      | 0.16|
| Length of PICU stay       |                           | 0.01|
| Length of ventilator usage|                           | 0.14|
| Stress                    |                           |     |
| Age                       | 0.38                      | 0.46|
| Gender                    | 0.19                      | 0.16|
| Family composition        | 1.00                      | 0.02|
| Social economy status     | 0.25                      | 0.02|
| Length of PICU stay       |                           | 0.006|
| Length of ventilator usage|                           | 0.42|

PIM: Pediatric Index Mortality, PICU: Pediatric intensive care unit, TISS: Therapeutic Intervention Scoring System.

Table 9: Multivariate analysis of risk factors to the family psychological condition

| Risk factors                      | OR (95% CI) | P   |
|-----------------------------------|-------------|-----|
| Depression                        |             |     |
| Gender                            | 1.12        | 0.20|
| Neurologic disease involvement    | 3.92        | 0.26|
| PIM score                         | 1.34        | 0.29|
| Length of PICU stay               | 1.84        | 0.50|
| Length of ventilator usage        | 6.35        | 0.28|
| TISS score                        | 0.60        | 0.33|
| Anxiety                           |             |     |
| PIM score                         | 1.06        | 0.11|
| Length of PICU stay               | 1.08        | 0.57|
| Length of ventilator usage        | 1.12        | 0.57|
| TISS score                        | 0.95        | 0.43|
| Stress                            |             |     |
| Gender                            | 0.81        | 0.86|
| Neurologic disease involvement    | 1.16        | 0.86|
| PIM score                         | 1.77        | 0.48|
| Length of PICU stay               | 1.65        | 0.71|
| Length of ventilator usage        | 5.36        | 0.56|
| TISS score                        | 0.67        | 0.76|

PIM: Pediatric Index Mortality, PICU: Pediatric intensive care unit, TISS: Therapeutic Intervention Scoring System.

postintensive care. Patients with higher PIM scores on PICU admission developed more functional status impairment and lower QoL afterward. These results are following the previous study from Pereira et al. which reported that functional impairment even lasted up to 2 years’ postintensive care and was mainly affected by the severity of the disease and any organ dysfunction. Lower functional status in children postintensive care can lead to disturbance of normal development which causes higher and longer dependence on parents’ care. This event reduces the ability of the children to learn and develop by themselves, thus lowering their QoL.[16]

From the impact of intensive care to family psychological conditions, admission of their children definitely caused a burden in psychological terms. Of the 45 parents included in this study, 18 developed depression syndromes, 32 with anxiety, and even 10 parents developed stress conditions in the time of their children admission to PICU. These results are similar to a study from Davidson and Harvey who reported anxiety found in 10%–75% family and 8%–42% develop symptoms of Post-Traumatic Stress Disorder.[17] This condition can be hard enough to disturb the daily activity of the family and require taking some medication to relieve them. A study from Lemiale et al. reported 36% of the family took antidepressant medication, and 8% took psychotropic drugs.[18] The psychological condition of the family was much better after 3 months in this study. The ability to adapt to the patient’s problem or disability would reduce the incidence of depression, anxiety, or stress to the family. The complete comprehension of the family about the patient’s condition was also crucial to prevent the psychological problem, which could be achieved by involvement of the close family in their children nursing and good communication between health professionals and the family throughout and after the intensive care.[19]

There are some limitations to this study, considering this study was single-centered research. The social and cultural background was similar between the patient and family included in this study, so the demography characteristics were homogeneous, and this can impact the outcome of the study. Another factor that could influence the patients’ outcomes, such as intervention postintensive care also not evaluated in this study. Longer study and the impact of the intervention postintensive care required to comprehend the occurrence of PICS and how can we deal with it.

CONCLUSION

From this study, we found that the occurrence of PICS in children could decrease the functional status and QoL. The severity of the illness was the important factor affecting the deterioration of functional status and QoL. Neurologic disease involvement at the time of admission also had an impact on the patient’s outcomes postintensive care. Intensive care to the children also had an impact on their family, especially their parents, and could induce psychological disturbances, such as depression, anxiety, and stress. These conditions were relieved as time goes on and better comprehension to adapt to the patient’s condition.
Research quality and ethics statement
This study was approved by the Institutional Review Board/Ethics Committee of the Faculty of Medicine, Universitas Brawijaya, Malang City, Indonesia (Approval No.400/291/K.3/302/2019; Approval date December 13th, 2019). The authors followed the applicable EQUATOR Network guidelines, specifically the STROBE Guidelines, during the conduct of this research project.

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Conflicts of interest
There are no conflicts of interest.

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Appendix 1: Therapeutic Intervention Scoring System (TISS-28) (Rosa et al., 2015)

| Category                                                                 | TISS-28 points |
|--------------------------------------------------------------------------|----------------|
| Basic activities                                                          |                |
| Standard monitoring (hourly vital signs, fluid balance)                   | 5              |
| Biochemical and microbiological investigation                             | 1              |
| Single medication (any route)                                             | 2              |
| Multiple intravenous medications                                         | 3              |
| Care and prevention of decubitus and daily dressing changes              | 1              |
| Frequent dressing changes (at least one time per each nursing shift)     | 1              |
| Care of drains                                                           | 3              |
| Cardiovascular support                                                   |                |
| Single vasoactive medication                                             | 3              |
| Multiple vasoactive medications                                          | 4              |
| Intravenous replacement of large fluid losses (>3 L/m²/day)              | 4              |
| Peripheral artery catheter                                               | 5              |
| Pulmonary artery flotation catheter                                      | 8              |
| Central venous line                                                      | 2              |
| Cardiopulmonary resuscitation after arrest in the past 24 h              | 3              |
| Specific intervention                                                    |                |
| Single specific interventions in the ICU (naso or orotracheal intubation, cardioversion, introduction of pacemaker, endoscopies, emergency surgery in the past 24 h) | 3              |
| Multiple specific interventions in the ICU (more than one described above) | 5              |
| Specific interventions outside ICU (surgery or diagnostic procedures)     | 5              |
| Ventilatory support                                                      |                |
| Mechanical ventilation                                                   | 5              |
| Supplementary ventilation support (supplementary oxygen by any method except if mechanical ventilation parameters apply) | 2              |
| Care of artificial airways (endotracheal tube or tracheostoma)           | 1              |
| Treatment for improving lung function (e.g., thorax physiotherapy, incentive spirometry, inhalation therapy, intratracheal suuctioning) | 1              |
| Renal support                                                            |                |
| Hemofiltration/dialytic techniques                                       | 3              |
| Quantitative urine output measurement                                    | 2              |
| Active diuresis (e.g., furosemide >0.5 mg/kg/day)                        |                |
| Neurologic support                                                       |                |
| Measurement of intracranial pressure                                     | 4              |
| Metabolic support                                                        |                |
| Treatment of complicated metabolic acidosis/alkalosis                    | 4              |
| Intravenous alimentation                                                 | 3              |
| Enteral feeding through gastric tube or other route (e.g., jejunostomy)   |                |

TISS: Therapeutic Intervention Scoring System

Appendix 2: Functional Status Scale (FSS) (Pollack et al., 2009)

| Normal (score = 1) | Mild dysfunction (score = 2) | Moderate dysfunction (score = 3) | Severe dysfunction (score = 4) | Very severe dysfunction (score = 5) |
|--------------------|-----------------------------|-------------------------------|--------------------------|-------------------------------|
| Mental Status      |                             |                               |                           |                               |
| Sensory functioning|                             |                               |                           |                               |
| Communication      |                             |                               |                           |                               |
| Motor functioning  |                             |                               |                           |                               |
| Feeding            |                             |                               |                           |                               |
| Respiratory status |                             |                               |                           |                               |

- Normal sleep/wake periods; appropriate responsiveness
- Sleepy but arouseable to noise/touch/movement and/or periods of social nonresponsiveness
- Diminished vocalization, facial expression, and/or social responsiveness
- Coordinated body movements, normal muscle control, and awareness of action and reason
- All food taken by mouth with age-appropriate help
- Room air and no artificial support or aids
- Normal sleep/wake periods; appropriate responsiveness
- Lethargic and/or irritable
- Absence of attention-getting behavior
- 1 limb functionally impaired
- Oxygen treatment and/or succioning
- Unresponsive, coma, and/or vegetative state
- Minimal arousal to stimuli (stupor)
- No demonstration of discomfort
- ≥2 limbs functionally impaired
- Continuous positive airway pressure treatment for all or part of the day and/or mechanical ventilatory support for part of the day
- Abnormal responses to pain and touch
- Diffuse spasticity, paralysis, or decerebrate/decorticate posturing
- Parenteral nutrition with oral or tube feedings
- Parenteral nutrition with oral or tube feedings
- All parenteral nutrition
- All parenteral nutrition
## Appendix 3: Pediatric Quality of Life (PedsQL) (Varni et al., 2003)

| Criteria description | Physical functioning                                                                 | Social functioning                                   | Emotional functioning                                        | School functioning                                                                 |
|----------------------|--------------------------------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                      | It is hard for me to walk more than one block                                          | I have trouble getting along with others             | I feel afraid or scared                                      | It is hard to pay attention at work/school                                         |
|                      | It is hard for me to run                                                             | Others do not want to be my friend                   | I feel sad or blue                                           | I forget things                                                                   |
|                      | It is hard for me to do sports activity or exercises                                 | Others tease me                                      | I feel angry                                                 | I have troubles keeping up with my work or studies                                 |
|                      | It is hard for me to lift something heavy                                            | I cannot do things others my age can do              | I have trouble sleeping                                     | I miss work or school because of not feeling well                                  |
|                      | It is hard for me to take a bath or shower by myself                                 | It is hard to keep up with my peers                  | I worry about what will happen to me                         | I miss work or school to go to the doctor or hospital                             |
|                      | It is hard for me to do chores around the house                                       |                                                      |                                                             |                                                                                  |
|                      | I hurt or ache                                                                       |                                                      |                                                             |                                                                                  |
|                      | I have low energy                                                                    |                                                      |                                                             |                                                                                  |
|                      |                                                                                      |                                                      |                                                             |                                                                                  |
|                      | Emotional functioning                                                                |                                                      |                                                             |                                                                                  |
|                      | I feel afraid or scared                                                               |                                                      |                                                             |                                                                                  |
|                      | I feel sad or blue                                                                   |                                                      |                                                             |                                                                                  |
|                      | I feel angry                                                                         |                                                      |                                                             |                                                                                  |
|                      | I have trouble sleeping                                                              |                                                      |                                                             |                                                                                  |
|                      | I worry about what will happen to me                                                 |                                                      |                                                             |                                                                                  |

Each criteria scored as a number from 0 (Never = No disability) to 4 (Almost always = Maximal disability). The raw scores then transformed into 0-100 scale (0 = 100, 1 = 75, 2 = 50, 3 = 25, 4 = 0) with 100 indicate best function.
### Appendix 4: Depression, Anxiety, and Stress Score (DASS) (Antony et al., 1998)

| Criteria | Score |
|----------|-------|
| I found myself getting upset by quite trivial things (1) |  |
| I was aware of dryness of mouth |  |
| I couldn’t seem to experience any positive feeling at all |  |
| I experienced breathing difficulty |  |
| I just couldn’t seem to get going |  |
| I tended to over-react to situations |  |
| I had a feeling of shakiness |  |
| I found it difficult to relax |  |
| I found myself in situations which made me so anxious I was most relieved when they ended |  |
| I felt that I had nothing to look forward to |  |
| I found myself getting upset rather easily |  |
| I felt that I was using a lot of nervous energy |  |
| I felt sad and depressed |  |
| I found myself getting impatient when delayed in any way |  |
| I had a feeling of faintness |  |
| I felt I had lost interest in just about everything |  |
| I felt I wasn’t worth much as a person |  |
| I felt I was rather touchy |  |
| I perspired noticeably in the absence of high temperatures or physical exertion |  |
| I felt scared without any good reason |  |
| I felt that life wasn’t worthwhile |  |
| I found it hard to wind down |  |
| I had difficulty in swallowing |  |
| I couldn’t seem to get any enjoyment out of the things I did |  |
| I was aware of the action of my heart in the absence of physical exertion |  |
| I felt down-hearted and blue |  |
| I found that I was very irritable |  |
| I felt I was close to panic |  |
| I found it hard to calm down after something upset me |  |
| I feared that I would be “thrown” by some trivial but unfamiliar task |  |
| I was unable to become enthusiastic about anything |  |
| I found it difficult to tolerate interruptions to what I was doing |  |
| I was in a state of nervous tension |  |
| I felt I was pretty worthless |  |
| I was intolerant of anything that kept me from getting on with what I was doing |  |
| I felt terrified |  |
| I could see nothing to be hopeful about |  |
| I felt that life was meaningless |  |
| I found myself getting agitated |  |
| I was worried about situations in which I might panic and make a fool of myself |  |
| I experienced trembling |  |
| I found it difficult to work up the initiative to do things |  |

Each criteria scored from 0 (never, not suitable) to 3 (almost always, very suitable). Then the score classified into depression criteria (number 3, 5, 10, 13, 16, 17, 21, 24, 26, 31, 34, 37, 38, 42); anxiety criteria (number 2, 4, 7, 9, 15, 19, 20, 23, 25, 28, 30, 36, 40, 41); and stress criteria (number 1, 6, 8, 11, 12, 14, 18, 22, 27, 29, 32, 33, 35, 39). Total score of each group then classified into severity degree below:

| Depression | Anxiety | Stress |
|------------|---------|--------|
| Normal     | 0-9     | 0-7    | 0-14 |
| Mild       | 10-13   | 8-9    | 15-18|
| Moderate   | 14-20   | 10-14  | 19-25|
| Severe     | 21-27   | 15-19  | 26-33|
| Very Severe| >27     | >19    | >33  |