Zung Depression Scores for CVA Patients Enrolled in an Inpatient Rehabilitation Program

Michael F. Martelli, PhD and Pamela MacMillan, EdD

Abstract

Due to the motivation required for post-stroke rehabilitation, detection and treatment of depression is critical. A validated instrument with relevant norms that is easily administered and accepted by patients is needed. Zung Depression Inventory scores were collected, using the interview format which elicits patient's endorsement of presence or absence of symptoms of depression. Data were collected for 89 consecutive patient admissions (avg age=68.5; 41 males, 48 females; 56% white, 44% black. 64 Right and 25 Left CVA's; severely dysphasic patients excluded) to an inpatient rehabilitation program. Comparable to findings from other studies, roughly 55% of patients in this sample reported significant levels of depressive symptomatology according to Zung's norms for the elderly. The greater proportion of Right hemisphere CVA's in the present sample suggested the possibility of a greater percentage of patients underestimating symptomatology compared to other samples. However, no differences in level of depression were found when comparing Right and Left hemisphere CVA patients, though the exclusion of severely dysphasic patients from the present sample and the absence of anterior-posterior localization may limit the meaningfulness of this comparison. Item analysis revealed that feelings of sadness and crying spells correlated least with global depression scores. These traditional hallmarks of depression (i.e. affective disturbance) appear to have little validity for this population, probably due to the occurrence of organically based emotional lability. In contrast, items measuring cognitions related to hopelessness and death wishes were most strongly predictive of global depression levels. Consistent with studies suggesting a strong somatic component in depression among the elderly, the somatic subscale of the Zung was more correlated with global depression than ideational, psychomotor, or affective subscales. Though global depression scores were not significantly different between sexes, female patients reported more cognitive symptoms compared to males.

Zung Depression Scores for CVA Patients
Enrolled in an Inpatient Rehabilitation Program

Michael F. Martelli, PhD and Pamela MacMillan, EdD

Introduction

Due to the high level of motivation required for maximum post-stroke rehabilitation, detection and treatment of depression among stroke patients appears critical. One study has documented the negative impact of depression on post-stroke rehabilitation process and outcome (Sinyor, Amato, Kaloupek, Becker, Goldenberg & Coopersmith, 1986). Specifically, they noted 1) lower functional status ratings (i.e. greater functional impairment) at admission and discharge (although rate of improvement was not significantly different); 2) relatively lower participation levels on measures of coping strategies employed; and 3) greater likelihood of post-discharge functional decline. Note: severity of stroke accounted for 10% of variance in depression scores.

Reports of the incidence of significant depression among patients with recent CVA's have ranged between 25% and 60% (Robinson, Starr, Kubos & Price, 1983).

```
SAMPLE STUDIES REPORTING INCIDENCE OF POST-STROKE DEPRESSION
```

Sample	N	% Depressed	Mean Zung
Robinson, et.al (1983)	103	49 %	
Sinyor, et.al (1986)	64	47 %	
Robinson, et.al (1982)	103	30 %	
Martelli & Rybarczyk (1987)	51	40 %	42. (7.1)
Martelli & Mac Millan (1989)	89	45 %	38.29(8.3)

Factors effecting reported incidence rates:

```
1. Inclusion/exclusion of:
     a) Left handers
     b) Previous Stroke
     c) Previous Other Neurologic Event
     d) Premorbid/Current Psychiatric Disorder
     e) Premorbid ETOH abuse
     f) Clear CT Lateralization
     g) Cortical vs Subcortical
     h) Antidepressant Medications
2. Age of Sample
3. Right/Left CVA ratio and Anterior/Posterior Ratios
4. Time since stroke
5. Social Support
6. Severity of physical and cognitive impairment
```

Identification of significantly depressed stroke patients has been difficult for several reasons. Simple sadness and grief related to losses due to the stroke would be expected with even the most adaptive patients. Organically-based emotional lability, though relatively common, by itself is not a symptom of general emotional dysfunction. Moreover, it is often difficult to distinguish the various physical effects of a stroke from the somatic effects of depression (e.g., appetite, sleep and energy disturbance). Even when screening can be accomplished, since as many as 400,000 strokes occur each year in the U.S. (Robbins & Baum, 1981) systematic evaluation by trained mental health professionals is a seemingly unrealistic ambition. This explains the finding of Robinson and colleagues that less than 10% of patients with post-stroke depression receive treatment.

The purpose of the present paper is to outline the development of a simple, validated screening instrument with relevant norms that is simple to administer and accepted by patients and one which can be used by professionals from any medical discipline to help in identification and treatment of this under-recognized syndrome.

```
 GENERAL CRITERIA FOR A USEFUL DEPRESSION SCREENING INSTRUMENT
================================================================
1.  Reflect full spectrum of depressive symptoms (content valid)
2.  Brevity (short, simple)
3.  Good acceptance by intended population
4.  Reflective of patients' own responses (i.e. self-administered)
5.  Quantitative not qualitative
6.  Standardized
7.  Reliable
8.  Valid


            ZUNG DEPRESSION SCALE: ADVANTAGES
=====================================================================
1.  Lower reading levels (5-6) versus Beck Dep Inv. and MMPI (6-8).
2.  Greater variability in Beck scores (larger S.D.).
3.  Beck lacks fixed extremes for Responses versus Zung
4.  Beck is more cumbersome has more items, is difficult to present
    orally, while Zung is simpler and easier to present and clarify.
5   In one study only Zung (versus Beck, MMPI) differentiated
    depressed versus non-depressed in psychiatric inpatients.
6.  Zung Addresses components/symptom clusters.
7.  Greater acceptance of Zung vs Beck for rehab/medical pt.'s.
8.  Shows increasing scores with age, reflecting predicted
    relationship between age and depression.
9.  Sensitive measure of treatment efficacy.
10. Useful for discriminating between depressed and non-depressed
11. Zung readily lends itself to use as a general depression screening
    instrument for use by multiple disciplines.
12. Normative Data available for wide variety of dx, age groups.
13. Applicable to a wide variety of populations
```

Method

Zung Depression Scale scores were collected, using the interview format which elicits patient's endorsement of presence or absence of symptoms of depression. Data were collected for 89 patient admissions in an inpatient rehabilitation program at Sheltering Arms Rehabilitation Hospital (Richmond, Va.), Moderate to severely dysphasic patients were excluded. Scores were analyzed to determine occurrence of clinically significant depression for the total sample, and by breakdowns by Hemisphere Laterality and Sex. Correlations between items, Zung subscales (Zung, 1965), Blumenthal's subscales (1975), and total scores were conducted. In addition, regression analyses were conducted to determine whether a shorted version of the Zung could be derived.

Results and Discussion

```
ANOVA COMPARING ZUNG SCORES BY SEX, HEMISPHERE


DEPRESSION LEVEL       FREQUENCY               PERCENT
-----------------------------------------------------------
Non (20-39)               49                    55.1
Minimal/Mild (40-47)      27                    30.3
Moderate (48-55)          11                    12.4
Severe (>56)               2                     2.2


SEX                    FREQUENCY               PERCENT
-----------------------------------------------------------
Female                    48                    53.9
Male                      41                    46.1


HEMISPHERE             FREQUENCY               PERCENT
-----------------------------------------------------------
Left                      25                    28.1
Right                     64                    71.9


RANK ORDERING OF ZUNG ITEMS ACCORDING TO MEAN ENDORSEMENT
Item                       MEAN  SD    Zung Scale Rank
-----------------------------------------------------------
Z12 Anergia                2.8  1.0    PsyMo      1
Z8  Constipation           2.2  1.0    Physio     2
Z4  Sleep disturbance      2.2  1.2    Physio     3
Z13 Restlessness           2.1  1.1    PsyMo      4
Z1  Depressed affect       2.1   .9    Aff        5
Z10 Fatigue                2.0  1.0    Physio     6
Z18 Emptiness              2.0  1.0    Psy        7
Z17 Uselessness (Pers deval)  2.0  1.0 Psy        8
Z2  Diurnal Variation      1.9  1.0    Physio     9
Z14 Hopelessness           1.9  1.0    Psy       10
Z5  Decreased appetite     1.9  1.2    Physio    11
Z16 Indecisiveness         1.9  1.0    Psy       12
Z11 Confusion/Concentration 1.8 1.0    Psy       13
Z3  Crying spells          1.8   .9    Aff       14
Z6  Decreased libido       1.7  1.0    Physio    15
Z20 Pleasure Loss          1.7  1.0    Psy       16
```

```
Z15  Irritability              1.7   .9   Psy       17
Z7   Weight loss               1.7   .9   Physio    18
Z9   Tachycardia               1.4   .5   Physio    19
Z19  Death wish/rumination     1.3   .6   Psy       20
-----------------------------------------------------------
```

Comparable to findings from other studies, roughly 45% of patients in this sample reported significant levels of depressive symptomatology according to Zung's norms for the elderly. The 89 patients had an average raw Zung index of 38.9, placing them as a group just below the low "minimal to mild" depression range for Zung's (1965) original norms and slightly above the average for Zung's (1967) sample of normal older persons. Moderate to severe depression was found in 15 % of the sample (Zung's equal to or greater than 60) and as many as 45% showed mild depressive symptoms (Zung's of 50-59). This 15 % occurrence of significant depression is lower than rates reported in most studies (Robinson, et al., 1983). This discrepancy may be related to the stricter selection criteria used for admission into a rigorous rehabilitation program like the one at Sheltering Arms. In addition, the sample is older than the the patients involved in most studies. Older persons who are at greater risk and have "sooner or later" expectations for the occurrence of medical traumas like stroke may be more psychologically prepared to accept and cope with such events.

The greater proportion of Right hemisphere CVA's in the present sample suggested the possibility of a greater percentage of patients underestimating symptomatology compared to other samples. However, when hemisphere of lesion was analyzed as a moderator variable, no differences in global score or factor profile were found. Earlier studies suggested that left CVA's are more prone to depression (Robinson, et al., 1983) but more recent evidence suggests that the relationship is complicated by intrahemispheric location factors (Sinyor,Kaloupek, Becker, Goldenberg & Coopersmith, 1986). Our lack of differences may be related to: 1) failure to account for anterior-posterior localization, thus limiting the meaningfulness of this comparison; 2) the fact that the verbal requirements of the test disqualified patients with severe language and cognitive impairments. Finally, though global depression scores were not significantly different between sexes, female stroke patients tended to score higher on Zung's psychological subscale than males. This matches the general literature indicating that negative cognitions are more frequently reported by distressed females.

Individual item analysis revealed that feelings of sadness and crying spells correlated least with global depression scores. These traditional hallmarks of depression (i.e. affective disturbance) appear to have little validity for this population, due in part to the occurrence of organically based emotional lability. This suggests that affective symptoms of sadness and tearfulness probably have little utility in screening for depression among stroke patients. This may be contrary to the expectations of untrained medical staff persons. In contrast, items measuring cognitions related to hopelessness and death wishes were most strongly predictive of global depression levels (e.g. "I feel hopeful about the future" and "I feel others would be better off if I were dead"). Questions regarding suicidal ideation are frequently avoided by medical staff and even mental health professionals concerned about adverse reactions (see Sinyor et al., 1986). Depression with such prominent ideational features may be most responsive to cognitive psychotherapy.

Consistent with a previous study at Shleltering Arms and other studies suggesting a strong somatic component in depression among the elderly, the somatic subscale of the Zung was more correlated with global depression than psychomotor, or affective subscales; however, in the present sample, the psychologic subscale showed the highest overall correlation with global depression.

```
     INTERCORRELATIONS OF ZUNG SYMPTOMS CLUSTER AND TOTAL SCORES
          AffectDist   PhysioDist   PsyMotDist   PsychoDist   DEPRESSION
_____
AffectDist      -          .22          .24          .32         .50
PhysioDist                  -           .43          .33         .77
PsyMotDist                               -           .40         .65
PsychoDist                                            -          .81
DEPRESSION                                                        -
-----------------------------------------------------------------------


TOTAL DEPRESSION VARIANCE ACCOUNTED FOR BY SYMPTOM FACTORS
             DEPRESS:    R     R2
_____
AffectDist              .50   22 %
PhysioDist              .77   27 %
PsyMotDist              .65   25.4%
PsychoDist              .81   28.4%
```

The relationship between Zung's (1965) face-valid subscales, Blumenthal's (1975) empirical factor and global scores were analyzed.

```
VARIMAX ROTATED FACTOR ANALYSIS - ZUNG (N=89)
Item                          Factor               Zung Scale
-------------------------------------------------------------
Z17 Uselessness (Pers deval)                       Psy
Z20 Pleasure Loss             FACTOR 1             Psy
Z18 Emptiness                 Psychological-Cognitive  Psy
Z19 Death wish/rumination                          Psy
Z14 Hopelessness                                   Psy
Z16 Indecisiveness                                 Psy
-------------------------------------------------------------
Z15 Irritability                                   Psy
Z1  Depressed affect          FACTOR 2             Aff
Z13 Restlessness              Affective-Emotional  PsyMo
Z3  Crying spells                                  Aff
-------------------------------------------------------------
Z2  Diurnal Variation                              Physio
Z6  Decreased libido          FACTOR 3             Physio
Z10 Fatigue                   Neurovegetative 1    Physio
-------------------------------------------------------------
Z5  Decreased appetite                             Physio
Z7  Weight loss               FACTOR 4             Physio
Z12 Anergia                                        PsyMo
Z8  Constipation              Neurovegetative 2    Physio
-------------------------------------------------------------
Z9  Tachycardia               FACTOR 5             Physio
Z4  Sleep disturbance                              Physio
Z11 Confusion                                      Psy
-------------------------------------------------------------
```

```
ZUNG SYMPTOM CLUSTER SCALES
--------------------------------------------------------
Z1  Depressed affect          AFFECTIVE DISTURBANCE
Z3  Crying spells
--------------------------------------------------------
Z2  Diurnal variation
Z4  Sleep disturbance
Z5  Decreased appetite
Z6  Decreased libido
Z7  Weight loss
Z8  Constipation
Z9  Tachycardia
Z10 Fatigue                   PHYSIOLOGICAL DISTURBANCE
--------------------------------------------------------
Z12 Anergia
Z13 Restlessness             PSYCHOMOTOR DISTURBACNE
--------------------------------------------------------
Z11 Confusion
Z14 Hopelessness
Z15 Irritability
Z16 Indecisiveness
Z17 Uselessness
Z18 Emptiness
Z19 Death Wish/Rumination
Z20 Pleasure Loss            PSYCHOLOGICAL DISTURBANCE
--------------------------------------------------------
```

Consistent with earlier findings of the strong somatic expression of depression among the general population of the elderly (Steuer, Back, Olsen & Jarvek, 1980), the Zung somatic subscale was significantly more related to global score than ideation, psychomotor or affective subscales. No other subscale findings were notable.

References

Blumenthal, M. (1975). Measuring Depressive symptomatology in a general population. Archives of General Psychiatry, 32, 971-978.

Griffin, P.T., and Kogut, D. (1988). Validity of orally administered Beck and Zung Depression Scales in a state hospital setting. Journal of Clinical Psychology, 44, 756-759.

Robinns, M. & Baum, H.M. (1981). Incidence. In F.D Weinfeld (Ed.) Stroke, (suppl.), 45-57.

Robinson, R.G., Starr, L.B., Kubos, K.L. & Price, T.R. (1983). A two-year longitudinal study of post-stroke mood disorders: findings during the initial investigations. Stroke, 14, 736-741.

Shafer, A., Brown, J., Watson, C.G., Plemel, D., DeMotts, J., Howard, M.T., Petrik, N., and Balleweg, J. (1985). Journal of Consulting and Clinical Psychology, 53, 415-418.

Sinyor, D., Amato, P. Kaloupek, D.G., Becker, R., Goldenberg, M. & Coopersmith, H. (1986). Post-Stroke depression: Relationship to ' functional impairment, coping strategies, and rehabilitation outcome. Stroke. 17, 1102-1107.

Sinyor, D. Jaques, P. Kaloupek, D.G, Becker, R., Goldenberg, M., & Coopersmith, H. (1986). Post-Stroke depression and lesion location: An attempted replication. Brain, 109, 537-546.

Zung, W.W.K., Richards, C.B. & Short, M.F. (1965). Self-rating depression in an outpatient clinic: Further validation of the SDS. Archives of General Psychiatry, 13, 508-515.

Zung, W.W.K. (1967). Depression in the normal aged. Psychosomatics, 8, 287-292.

Zung, W.W.K., and Zung, E.M. (1986). Use of the Zung Self-Rating Depression Scale in the Elderly. Clinical Gerontologist, 5, 137-148.

APPENDIX

```
SAH MEDICAL PSYCHOLOGY MODIFICATIONS OF THE ZUNG

1.  Interview format allows clarification, greater validity
      (How often do you ... ?)
2.  Z4 - clarification (Onset, Maintenance, AM, nightmares)
3.  Z9 - clarification (e.g., when you're nervous)
4.  Z11 - clarification (Thinking, Concentration)
5.  Z12 - clarification (Energy, Motivation)
6.  Z19 - rewording ("How often have you wished you hadn't woken
                     up after your stroke?")
7.  Kogut & Griffin (1988) additions: (Little/None & Most/All)
8.  Use SAH norms for classification decisions
```

PLEASE ANSWER THE FOLLOWING QUESTIONS By Rating (with a Check mark) HOW YOU HAVE FELT DURING THE PAST 4 WEEKS. PLEASE Answer HONESTLY & ACCURATELY (FOLLOWING SCALE):

1 - Little or None of the Time   2 - Some of the Time
3 - Frequently/ Good Part of the Time   4 - Most or All of the Time

	Questions	Little/ None	Some Time	Good Part	Most or All
1	I FEEL DOWNHEARTED, BLUE AND SAD?				
2	MorninG IS WHEN I FEEL BEST?				
3	I HAVE CRYING SPELLS OR FEEL Like It?				
4	I have troUBLE SLEEPING THROUGH THE NIGHT? (x4)				
5	I Eat As Much As I Used To?				
6	I ENJOY LOOKING AT, TALKING TO & BEING WITH ATTRACTIVE MEMBERS OF The Opposite sex?				
7	I NOTICE THAT I AM LOSING WEIGHT?				
8	I HAVE TROUBLE WITH CONSTIPATION?				
9	MY HEART BEATS FASTER THAN USUAL?				
10	I GET TIRED FOR NO REASON? (or for what seems like no reason)				
11	MY MIND IS AS CLEAR AS IT USED TO BE? (Thinking,Conentration, etc.)				
12	I FIND IT EASY TO DO THE THINGS I USED TO? (Energy, Motivation, etc.)				
13	I AM RESTLESS AND CAN'T KEEP STILL?				
14	I FEEL HOPEFUL ABOUT THE FUTURE?				
15	I AM MORE IRRITABLE THAN USUAL?				
16	I FIND IT EASY TO MAKE DECISIONS?				
17	I FEEL THAT I AM USEFUL AND NEEDED?				
18	MY LIFE IS PRETTY FULL?				
19	I FEEL THAT OTHERS Might BE BETTER OFF IF I WERE DEAD?				
20	I STILL ENJOY THE THINGS I USED TO DO?				
	Total Raw Score: _____	+	+	+	+

Normative Data for Inpatient CVA Rehabilitation Patients on the Zung SDS *(N=104; Raw Scores)*					SAH Proposed CVA Classificiations	
Sc#	Scale Name	Mean	S.D.	Item #'s		
1	Dysphoria	4.1	1.5	1, 3	<38	Nonsignificant
2	PhysioDisturb	16.6	4.0	2, 4-10	40-45	Mild Mood Disturbance
3	PsychoMotor	5.2	1.5	12, 13	46-48	Mild/Moderate
4	Psychologic	15.1	4.4	11, 14-20	49-55	Moderate
5	SumDepression	41.4	8.1	1-20	>=56	Severe

SAH Medical Psychology Scale Modifications

1. Interview format allows clarification, greater validity (How often do you ... ?)

1. Z4 - clarification (Onset, Maintenance, AM, nightmares)

1. Z9 - clarification (e.g., when you're nervous)

1. Z11 - clarification (Thinking, Concentration)

1. Z12 - clarification (Energy, Motivation)

1. Z19 - rewording ("How often have you wished you hadn't woken up after your stroke?")

1. Kogut & Griffin (1988) additions: (Little/None & Most/All)

Martelli & MacMillan (1990)

Initial Signs of Depression Frequently Include:

❑ Poor or erratic recovery from neurological insult
❑ Noncompliance with treatment regimen or recommendations
❑ Agitation & behavior management problems
❑ Deterioration in a previously stable neurological deficit
❑ Decline from previously stable functional status: self-care, activities, social interest, etc.

Vegetative and Psychological Signs are Most Often Primary:

❑ <u>Neurovegetative</u>: sleep, appetite, energy, libido.
❑ <u>Psychologic/Cognitive</u>: hopelessness, helplessness, worthlessness, irritability, death wishes & decreased pleasure, concentration. Both patient & family (& staff, significant others) should be interviewed as patient report may be unreliable due to lack of awareness, denial, verbal-linguistic processing or reasoning problems, etc.

Affect is Often the Least Reliable Diagnostic Indicator in the Neurologically Impaired & Special Rules Apply to the Evaluation of Affective Expression:

❑ Pseudobulbar emotional incontinence, or organic emotional lability (i.e. crying with easy redirection & report of not being especially sad or cognizant of why one is crying) is not diagnostic of depression, as it represents a release of reflexive mechanisms controlling affective expression from inner emotional experience
❑ Pathologic laughing or crying in absence of pseudobulbar palsy does suggest depression
❑ Some organic sequela (i.e. aprosodic voice patterns and euphoric behavior) may be incongruent with patient's self-report and lead to an underestimate of depression. These behaviors can occur independent of depression; hence, self-report shouldn't be disregarded
❑ Conversely, other organic sequela (e.g. reduced emotional expression reflected in flattened affect, facial hemiplegia) may contraindicate modulated emotional experience self-report & should not be misinterpreted as depressed affect

Abnormal Dexamethasone Suppression Level can Help Establish the Existence of Endogenous Depression.

Trial Intervention is Indicated in All Suspected Cases: Antidepressant Medications Often Represent the Simplest Course.

Agitation & Behavioral Problems are Frequent Signs of Depression. Evaluation of Depression is Always Indicated. Neuroleptics Which are Frequently Used to Reduce Agitation & Behavioral Problems Often Mask Untreated Depression.

Adapted From Ross & Rush (1985) and Martelli & MacMillan (1990)