Association of Secondary Health Conditions With Future Chronic Health Conditions Among Persons With Traumatic Spinal Cord Injury

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Background: Secondary health conditions (SHC) are physical and mental health conditions that are causally related to disabilities. Studies have found that SHC increase risk of negative health outcomes among people with traumatic spinal cord injury (TSCI). However, little has been done to assess the association of SHC with the risk of chronic health conditions (CHC) after TSCI. **Objectives:** To identify the prevalence of CHC in adults with TSCI, changes in CHC at follow-up, and the associations of baseline SHC with future CHC. **Methods:** Participants included 501 adults with TSCI of at least 1-year duration, identified through a population-based surveillance system. Baseline and follow-up self-report assessments were completed. We measured seven SHC: fatigue, spasticity, pain, pressure ulcers, subsequent injury, fracture, and anxiety disorder, and measured seven CHC: diabetes, heart attack, coronary artery disease, stroke, cancer, hypertension, and high blood cholesterol. Control variables included gender, race/ethnicity, age at injury, years post injury, injury severity, smoking status, binge drinking, and taking prescription medication. We implemented a Poisson regression model for the multivariate analyses. **Results:** The total number of CHC, the percentage of participants having at least one CHC, and prevalence of three individual CHC (diabetes, cancer, and high cholesterol) increased from baseline to follow-up. After controlling for demographic, injury characteristics, and behavioral factors, pain interference and anxiety disorder at baseline were associated with the total number of CHC at follow-up. **Conclusion:** CHC are common among adults with TSCI and increase significantly over time. Pain and anxiety disorders appear to be risk factors for future CHC. **Key words:** chronic health conditions, population-based cohort, secondary health conditions, spinal cord injury

Introduction

Individuals with traumatic spinal cord injury (TSCI) are at an increased risk for experiencing acute and long-term health complications, including secondary and chronic health conditions (CHC).¹⁻⁴ Secondary health conditions (SHC) include physical and mental health conditions that are causally related to a disability; they may arise directly (e.g., spasticity) or indirectly as the result of a TSCI-related disability (e.g., pressure sores), and they may be acute, recurrent, or persistent after injury.^{1,2,4} CHC typically include preexisting conditions generally associated with the aging process, not specific to the disability, such as heart disease, hypertension, diabetes, and cancer. These conditions progress slowly and last for an extended period of time (>12 months), limiting daily activities and requiring continued medical management in the general population.^{5,6} While an abundance of literature focuses on individual SHC or CHC after TSCI, there is less focus on comorbid health conditions, and the natural time course and

relationships between SHC and CHC have yet to be adequately assessed.

Evidence suggests a pattern of premature aging after TSCI, characterized by earlier onset of CHC as well as increased severity and frequency of these health conditions compared to age-matched individuals without disability.^{7,8} Numerous studies have reported on the increased risk and the high incidence and prevalence rates of CHC in adults with chronic TSCI. However, owing to differences in methodology, the prevalence ranges are wide, and true estimates of the impact are difficult to ascertain. For example, previous studies have found prevalence rates of cardiovascular disease ranging between 11% and 35%⁹⁻¹³; rates of myocardial infarction and stroke have been reported to be between 3% and 19%^{3,10,14} and 3% and 10%,^{3,9,10,15,16} respectively. Increased rates of hypertension (6%-43%),^{1,3,14,15,17} diabetes (5%-63%),^{2,3,14,18,19} and dyslipidemia (11%-32%)^{3,14,15} have also been reported. In recent studies of CHC in population-based cohorts, the prevalence rate of cancer was found to be roughly 6% to 9%.^{3,15}

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Although older age and greater time since injury have been associated with a higher prevalence of CHC,^{2,3} longitudinal data regarding the natural course of CHC after TSCI is lacking.

It is important to note that CHC often do not occur in isolation but rather are comorbidities, present in addition to SHC and other CHC. In fact, having one or more CHC is a significant predictor of having a new CHC,²⁰ and studies have found that 23% to 36% of adults with chronic TSCI report having multiple CHC (>2 CHC).^{3,15} A number of studies have found that SHC increase the risk of negative health outcomes, including hospitalization²¹⁻²⁵ and mortality.²⁶⁻³⁰ In the literature, we found pain was associated with hypertension³¹ and with cardiovascular disease.³² Studies also found anxiety disorders were associated with chronic medical illness, such as cardiac disorders, hypertension, and gastrointestinal problems.^{33,34} However, few studies have assessed the longitudinal relationships between SHC and CHC in the literature.

Our purpose was to (1) utilize longitudinal data to identify the prevalence of seven CHC, including diabetes, heart attack, angina or coronary artery disease, stroke, hypertension, high blood cholesterol, and cancer in a population-based cohort of adults with chronic TSCI; (2) assess changes in the prevalence of CHC over a 4-year interval; and (3) examine the associations between SHC (fatigue, spasticity, pain, pressure ulcers, subsequent injury, fracture, and anxiety disorder) and future CHC after TSCI.

Materials and Methods

Participants

We used a cohort study design. All participants were recruited through the Spinal Cord Injury Surveillance System Registry (SCISSR) in South Carolina. The SCISSR is a population-based registry of TSCI in the state. All 62 acute care nonfederal hospitals in South Carolina have a statutory requirement to report uniform billing discharge data to the State Budget and Control Board. More details of SCISSR can be found elsewhere.³⁵ Our participant pool included 812 participants with TSCI who were enrolled in a more detailed outcomes database of SCISSR between 2010 and

2013. All participants in our study met the following criteria at baseline: (a) resident of South Carolina, (b) minimum 18 years of age, (c) TSCI onset before 2013, (d) residual impairment of the injury, and (e) minimum of 1 year post injury. We followed up this cohort from 2015 to 2017. Our final sample included the 501 participants who completed both the baseline and follow-up self-reported assessment (SRA). The attrition rate at follow-up was 38%.

Procedures

Institutional review board approval was obtained prior to initiating any data collection. We sent the study introductory letter to all potential participants 4 to 6 weeks prior to the mailing of SRA materials. A second SRA mailing and a follow-up phone call targeted nonresponders. A third mailing was implemented for those who lost or misplaced materials but stated an intention to participate. We offered \$50 remuneration to all respondents. The data collection procedures were the same for both baseline and follow-up SRA.

Measures

We collected data on CHC with standard Behavioral Risk Factor Surveillance System (BRFSS) questions developed by the Centers for Disease Control and Prevention (CDC).³⁶ BRFSS questions asked participants if a doctor, nurse, or other health professional ever told them they had diabetes (not including gestational), a heart attack (also called a myocardial infarction), angina or coronary artery disease, stroke, hypertension, high blood cholesterol, and cancer (including skin cancer and other cancers).

We had focused on seven SHC that were available in our baseline SRA, and they were previously studied in the SCI literature: fatigue, spasticity, pain, pressure ulcers, subsequent injury, fracture, and anxiety disorder. Fatigue was assessed by the Modified Fatigue Impact Scale (5-item).³⁷ Pain interference was measured by the Brief Pain Inventory.³⁸ The original pain interference score has seven questions regarding whether pain has interfered with general activity, mood, walking ability, normal work, relations with others, sleep, and life enjoyment. Because many participants were not actively employed and/or could not walk,

they skipped the walking ability and normal work questions of pain interference. Our pain interference score calculation excluded these two indicators. We asked participants whether a doctor or other healthcare provider ever told them that they had an anxiety disorder (yes vs. no), whether they had pressure sore surgeries in the last year (yes vs. no), and whether they had any fracture post TSCI (yes vs. no). The participants also reported the number of injuries in the past year and provided their average spasticity rating (0-10, with 0 being no spasticity and 10 being spasticity as much as you can imagine). Demographic and injury characteristics included gender, race/ethnicity (non-Hispanic White vs. others), age at injury onset, years post injury, three injury levels (C1-C4, C5-C8, and noncervical levels), and ambulatory ability (Are you able to walk at all?). In addition, we had three behavioral factors: current smoker (yes vs. no), binge drinking during the past month (yes vs. no), and currently taking any prescription medication (yes vs. no). The binge drinking was defined as “having five or more drinks on one occasion.”

Analyses

We first presented demographic and injury characteristics among participants lost to follow-up and the final study sample. Then we assessed the prevalence of each of the seven CHC and the prevalence of at least one CHC at baseline for the lost participants as well as the study participants. Next we compared CHC prevalence and the total number of CHC between participants' baseline measures and follow-up measures by using the McNemar test and the paired *t* test.

Our multivariate analysis used the total number of CHC at follow-up as the outcome. Since the total number of CHC was a non-negative integer with highly-skewed distribution, we used the Poisson regression model for the analysis. The independent variables of interest in this model were seven SHC indicators measured at baseline. We also added six baseline demographic, injury characteristics, and three baseline behavioral factors as the covariables in the Poisson model (gender, race/ethnicity, age at injury onset, years post injury, injury levels, ambulatory ability, smoking, binge drinking, and taking prescription medication).

Results

Among the 501 study participants, there were 70% male, 57% non-Hispanic White, 26% C1-C4 injury level, 27% C5-C8 injury level, and 35% nonambulatory (Table 1). Their mean (*SD*) age at injury was 41.8 (17.4), and they averaged 7.2 (8.3) years post injury at baseline. The average years between baseline and follow-up measures was 4.3 (1.0). Table 1 also indicated that the lost participants (*n* = 311) had higher percentage of male (76%), non-Hispanic White (63%), C1-C4 injury level (29%), and nonambulatory (39%) than the study participants.

Among the study participants, the prevalence of diabetes increased from 14% at the baseline to 17% at the follow-up; the prevalence of high blood cholesterol increased from 32% to 44%; the

Table 1. Demographic and injury characteristics among study sample participants and those lost to follow-up

Variables	Study sample (<i>n</i> = 501)	Lost to follow-up (<i>n</i> = 311)
Years post injury at time 1 (mean ± <i>SD</i>)	7.17±8.31	7.40±8.14
Age at injury, years (mean ± <i>SD</i>)	41.84±17.41	41.71±18.18
Sex (%)		
Male	70	76
Female	30	24
Race-ethnicity (%)		
Non-Hispanic White	57	63
Others	43	37
Injury level (%)		
C 1-4	26	29
C 5-8	27	26
Other injury levels	48	45
Ambulatory status (%)		
Able to walk	65	61
Not able to walk	35	39

prevalence of cancer increased from 7% to 12%. Having at least one CHC increased from 56% at baseline to 65% at follow-up. The McNemar test indicated these changes were statistically significant (**Table 2**). The changes of the other four individual CHC were not significant. The average number of CHC increased from 1.1 (1.3) to 1.3 (1.3), and the paired *t* test indicated statistical significance ($p < .01$). At baseline, 59% of lost participants had at least one CHC, and their average number of CHC was 1.2. Both figures were slightly higher than what was observed at baseline for the 501 study participants. Their prevalence of diabetes (16%), heart attack (9%), angina or coronary artery disease (10%), stroke (11%), and cancer (12%) at baseline were also higher than the 501 participants. However, the prevalence of hypertension (38%) and high cholesterol (29%) were lower compared to the study participants.

After controlling for demographic, injury characteristics, and behavioral factors, we found the number of CHC at the follow-up was significantly related to two SHC measured at baseline: anxiety disorder and pain (**Table 3**). The anxiety disorder at baseline was associated with 25% greater number of CHC at follow-up (rate ratio = 1.25), while a pain interference score of 1 point higher was related to 6% greater number of CHC at follow-up (rate ratio = 1.06). As expected, the number of CHC at follow-up was also positively associated with longer years post injury, older age at injury, and taking medication at the baseline.

Discussion

This study showed evidence consistent with the literature that CHC are prevalent after TSCI, but our estimates based on the population-based sample were higher than those based on clinical samples. For example, we found 56% of participants at baseline and 65% at follow-up reported at least one CHC. Both figures are higher than the 50% reported in a specialty rehabilitation hospital sample study.³ It may indicate that the clinical sample from large specialty hospitals could underestimate the CHC magnitude by not capturing the full group of people with TSCI. It is possible that the cohort in the specialty hospital has better health care access and

Table 2. Prevalence (%) of chronic health conditions (CHC) at baseline and follow-up

CHC	Time 1	Time 2	<i>p</i> *
Diabetes	14	17	<.05
Heart attack	6	7	>.05
Coronary artery disease	6	7	>.05
Stroke	7	7	>.05
Hypertension	43	46	>.05
High cholesterol	32	44	<.01
Cancer	7	12	<.01
Having at least one CHC	56	65	<.01

*McNemar test

receive CHC treatment and prevention expertise in the professional rehabilitation setting.

Although our follow-up time is about 4 years after the baseline measure, relatively a short period to observe new CHC development, we still found the total number of CHC and the percentage of participants having at least one CHC increased from baseline to follow-up. Among the seven CHC, the prevalence of diabetes, cancer, and high cholesterol increased over time significantly, which raises the alarm that health care professionals need to pay more attention to CHC for persons with TSCI.

Our results also suggest an association between SHC and CHC. Although this is not surprising in and of itself, the finding that SHC at baseline is related to future CHC is interesting. It suggests there may be some pattern in which SHC develop and potentially lead to a greater risk of CHC. At a minimum, the presence of pain and anxiety disorders should be considered potential concerns for an unfolding pattern of CHC. Health practitioners may assess anxiety disorders and pain interference as precursors to multiple CHC. The presence of each suggests a greater likelihood of CHC moving forward. Pain interfering with activities may particularly limit activities that may result in the development of CHC at a later time. Preventing SHC is always a priority with people with TSCI, and successful prevention may carry over to a reduced risk of CHC.

Study limitations

Our study provided valuable information on the relationship between CHC and SHC among people with TSCI with some methodologic strengths. We utilized a population-based cohort, which avoided the selection bias found in studies using participants selected from rehabilitation hospitals. Clinical samples may systematically include persons with more severe TSCI (fewer ambulatory cases), while having a smaller portion of those who have few financial resources and are less able to pay for care. Meanwhile our longitudinal study design provided the opportunity to control the outcome measured at baseline to get better estimation of the explanatory power of predictors.

Our limitations include the 38% attrition rate, which may lead to potential biases resulting from unobserved nonrandom loss of participants. Our results show that except for hypertension and high cholesterol, all the other prevalence estimates

were higher among those who only participated at baseline than the 501 participants who completed the study at both time points. Therefore, it is possible that we underestimated the CHC because of the attrition. Second, we did not know the timing of CHC in relation to TSCI, and the 4-year study period is relatively short to develop CHC. Some of the CHC could have developed before TSCI onset, which would give us less power to detect changes over the 4-year timeframe after TSCI onset. Third, our measurement was based on self-report. This may lead to an underestimation of CHC prevalence. It is likely that a portion of participants have never been screened for a particular CHC. Fourth, we did not collect information on the specific types of fracture (osteoporotic vs. traumatic), and traumatic fractures may not be associated with the development of CHC. Fifth, the total pain interference score had lower variance given that the two physical activity items (walking and work) were omitted because of

Table 3. Poisson model for number of chronic health conditions at time 2

Variables	Coefficient	Rate ratio	<i>p</i>
Intercept	-2.82	0.06	<.01
Years post injury at time 1	0.04	1.04	<.01
Age at injury	0.04	1.04	<.01
Male (ref=female)	0.13	1.14	.19
Non-Hispanic White (ref=others)	0.06	1.06	.57
C1-C4 injury level (ref=others)	0.10	1.11	.34
C5-C8 injury level (ref=others)	-0.15	0.86	.20
Able to walk (ref=others)	-0.05	0.95	.62
Current smoker (ref=nonsmoker)	-0.03	0.97	.76
Binge drinking (ref=no binge drinking)	0.11	1.12	.33
Taking prescription medication (ref=no)	0.69	2.00	<.01
Having surgery for pressure sore (ref=others)	0.13	1.13	.55
Getting fracture post SCI (ref=others)	0.09	1.10	.48
Diagnosed anxiety disorder (ref=others)	0.22	1.25	.04
Pain interference score	0.06	1.06	<.01
Number of injuries in the past year	0.01	1.01	.86
Average spasticity	0.00	1.00	.88
Fatigue score	0.00	1.00	.72

their high percentage of missing value.

Our article provides a general picture of the association between SHC and CHC, but their relationship is more complicated than what we have analyzed with the study limitations. We should have particular caution about the distinction between SHC and CHC, which may be blurred in the real-world setting. We also need continued efforts to understand the causal paths, rather than only identifying temporal relationships between variables.

Conclusion

Our study is the first to focus on the relationship between CHC and SHC by using a population-based cohort and a longitudinal design. We found CHC were common among adults with TSCI and increased significantly over time, and some SHC (pain and anxiety disorder) appeared to be risk factors for CHC. Health care professionals should

be aware of the potential impact of SHC on the development of CHC for people with TSCI.

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Conflicts of Interest

The authors report no conflicts of interest.

REFERENCES

1. Jensen MP, Molton IR, Groah SL, et al. Secondary health conditions in individuals aging with SCI: Terminology, concepts and analytic approaches. *Spinal Cord*. 2012;50(5):373-378.
2. Jensen MP, Truitt AR, Schomer KG, Yorkston KM, Baylor C, Molton IR. Frequency and age effects of secondary health conditions in individuals with spinal cord injury: A scoping review. *Spinal Cord*. 2013;51(12):882-892.
3. Saunders LL, Clarke A, Tate DG, Forchheimer M, Krause JS. Lifetime prevalence of chronic health conditions among persons with spinal cord injury. *Arch Phys Med Rehabil*. 2015;96(4):673-679.
4. Rimmer JH, Chen MD, Hsieh K. A conceptual model for identifying, preventing, and managing secondary conditions in people with disabilities. *Phys Ther*. 2011;91(12):1728-1739.
5. Goodman RA, Posner SF, Huang ES, Parekh AK, Koh HK. Defining and measuring chronic conditions: Imperatives for research, policy, program, and practice. *Prevent Chronic Dis*. 2013;10:120239.
6. US Department of Health and Human Services. *Multiple Chronic Conditions - A Strategic Framework: Optimum Health and Quality of Life for Individuals With Multiple Chronic Conditions*. Washington, DC: Author; 2010.
7. Hitzig SL, Eng JJ, Miller WC, Sakakibara BM. An evidence-based review of aging of the body systems following spinal cord injury. *Spinal Cord*. 2011;49(6):684-701.
8. Kemp B, Thompson L. Aging and spinal cord injury: medical, functional, and psychosocial changes. *SCI Nurs*. 2002;19(2):51-60.
9. Cragg JJ, Noonan VK, Krassioukov A, Borisoff J. Cardiovascular disease and spinal cord injury: Results from a national population health survey. *Neurology*. 2013;81(8):723-728.
10. LaVela SL, Evans CT, Prohaska TR, Miskevics S, Ganesh SP, Weaver FM. Males aging with a spinal cord injury: Prevalence of cardiovascular and metabolic conditions. *Arch Phys Med Rehabil*. 2012;93(1):90-95.
11. Myers J, Lee M, Kiralti J. Cardiovascular disease in spinal cord injury: An overview of prevalence, risk, evaluation, and management. *Am J Phys Med Rehabil*. 2007;86:142-152.
12. Groah SL, Weitzenkamp D, Sett P, Soni B, Savic G. The relationship between neurological level of injury and symptomatic cardiovascular disease risk in the aging spinal injured. *Spinal Cord*. 2001;39:310-317.
13. Yang TY, Chen HJ, Sung FC, Kao CH. The association between spinal cord injury and acute myocardial infarction in a nationwide population-based cohort study. *Spine (Phila Pa 1976)*. 2015;40(3):147-152.
14. Wahman K, Nash MS, Lewis JE, Seiger A, Levi R. Increased cardiovascular disease risk in Swedish persons with paraplegia: The Stockholm spinal cord injury study. *J Rehabil Med*. 2010;42(5):489-492.
15. DiPiro ND, Murday D, Corley EH, Krause JS. Prevalence of chronic health conditions and hospital utilization in adults with spinal cord injury: an analysis of self-report and South Carolina administrative billing data. *Spinal Cord*. 2019;57(1):33-40.

16. Wu JC, Chen YC, Liu L, et al. Increased risk of stroke after spinal cord injury: A nationwide 4-year follow-up cohort study. *Neurology*. 2012;78(14):1051-1057.
17. Adriaansen JJ, Douma-Haan Y, van Asbeck FW, et al. Prevalence of hypertension and associated risk factors in people with long-term spinal cord injury living in the Netherlands. *Disabil Rehabil*. 2017;39(9):919-927.
18. Cragg JJ, Noonan VK, Dvorak M, Krassioukov A, Mancini GB, Borisoff JF. Spinal cord injury and type 2 diabetes: Results from a population health survey. *Neurology*. 2013;81(21):1864-1868.
19. Lavela SL, Weaver FM, Goldstein B, et al. Diabetes mellitus in individuals with spinal cord injury or disorder. *J Spinal Cord Med*. 2006;29(4):387-395.
20. Smith AE, Molton IR, Jensen MP. Self-reported incidence and age of onset of chronic comorbid medical conditions in adults aging with long-term physical disability. *Disabil Health J*. 2016;9(3):533-538.
21. Cardenas D, Hoffman J, Kirshblum S, McKinley W. Etiology and incidence of rehospitalization after traumatic spinal cord injury: A multicenter analysis. *Arch Phys Med Rehabil*. 2004;85:1757-1763.
22. Middleton JW, Lim K, Taylor L, Soddan R, Rutkowski S. Patterns of morbidity and rehospitalisation following spinal cord injury. *Spinal Cord*. 2004;42(6):359-367.
23. DeVivo M, Farris V. Causes and costs of unplanned hospitalizations among persons with spinal cord injury. *Top Spinal Cord Inj Rehabil*. 2011;16(4):53-61.
24. Gabbe BJ, Nunn A. Profile and costs of secondary conditions resulting in emergency department presentations and readmission to hospital following traumatic spinal cord injury. *Injury*. 2016;47(8):1847-1855.
25. Krause JS, Murday D, Corley EH, DiPiro ND. Concentration of costs among high utilizers of health care services over the first 10 years after spinal cord injury rehabilitation: A population-based study [online publication December 6, 2018]. *Arch Phys Med Rehabil*.
26. Chamberlain JD, Buzzell A, Gmunder HP, et al. Comparison of all-cause and cause-specific mortality of persons with traumatic spinal cord injuries to the general Swiss population: Results from a national cohort study. *Neuroepidemiology*. 2019;52(3-4):205-213.
27. Krause JS, Cao Y, DeVivo MJ, DiPiro ND. Risk and protective factors for cause-specific mortality after spinal cord injury. *Arch Phys Med Rehabil*. 2016;97(10):1669-1678.
28. Cao Y, DiPiro N, Krause JS. Health factors and spinal cord injury: A prospective study of risk of cause-specific mortality. *Spinal Cord*. 2019.
29. Cao Y, Krause JS, DiPiro N. Risk factors for mortality after spinal cord injury in the USA. *Spinal Cord*. 2013;51(5):413-418.
30. Krause JS, Saunders LL. Health, secondary conditions, and life expectancy after spinal cord injury. *Arch Phys Med Rehabil*. 2011;92(11):1770-1775.
31. Bruehl S, Chung O.Y., Jirjis J.N., Biridapalli S. Prevalence of clinical hypertension in patients with chronic pain compared to nonpain general medical patients. *Clin J Pain*. 2005;21(2):147-153.
32. Cragg JJ, Noonan VK, Noreau L, Borisoff JF, Kramer JK. Neuropathic pain, depression, and cardiovascular disease: A national multicenter study. *Neuroepidemiology*. 2015;44(3):130-137.
33. Harter, MC, Conway, KP, Merikangas, KR. Associations between anxiety disorders and physical illness. *Eur Arch Psychiatry Clin Neurosci*. 2003;253(6):313-320.
34. Roy-Byrne, PP, Davidson, KW, Kessler, RC, et al. Anxiety disorders and comorbid medical illness. *Gen Hosp Psychiatry*. 2008;30(3):208-225.
35. Cao Y, Selassie AW, Krause JS. Risk of death after hospital discharge with traumatic spinal cord injury: A population-based analysis, 1998-2009. *Arch Phys Med Rehabil*. 2013;94(6):1054-1061.
36. Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System. 2010. <http://www.cdc.gov/brfss/questionnaires/pdf-ques/2010brfss.pdf>. Accessed August 22, 2012.
37. Multiple Sclerosis Council for Clinical Practice Guidelines. *Fatigue and Multiple Sclerosis: Evidence-Based Management of Strategies for Fatigue in Multiple Sclerosis*. Washington, DC: Paralyzed Veterans of America; 1998.
38. Cleeland CS, Ryan KM. Pain assessment: Global use of the Brief Pain Inventory. *Ann Acad Med, Singapore*. 1994;23:129-138.