Part I: Characteristics of Surgical Spine Patients at Bangkok Spine Academy (BSA)

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OBJECTIVE. To use the Oswestry Disability Index (ODI) and Euro Quality of Life (EuroQol) as pre-screening assessment tools to improve surgery outcomes for patients with spinal disorders.

MATERIALS AND METHODS. Prior to surgical intervention, 223 (out of 311 lumbar spine) patients who were eventually treated with surgery at Bangkok Spine Academy between August 2010 and June 2011, filled out the above mentioned questionnaires pre-operatively. ODI and EuroQol were used to assess their mobility, activities, pain, anxiety etc., which could help better determine their spine disability together with their medical history and physical examination.

RESULTS. Mobility: Pre-operative 157 (92.9%) had problems, 12 (7.1%) had no problems. **Self-care**: Pre-operative 97 (57.4%) had problems, 72 (42.6%) had no problems. **Usual activities**: Pre-operative 157 (92.9%) had problems, 12 (7.1%) had no problems. **Pain/discomfort**: Pre-operative 167 (98.82%) had problems, 2 (1.18%) had no problems. **Anxiety/depression**: Pre-operative 137 (81.07%) had problems, 32 (18.93%) had no problems.

CONCLUSION. All patients who underwent surgery for the treatment of low back pain were found to be having significant disability and restrictions in their lives; using the pre-operative ODI and EuroQol measurements they could be categorized as having moderate to severe disability.

Back pain is second only to the common cold as the most frequent reason for seeing a physician. Low back pain is experienced by most individuals, with 70 to 80% of the world's population experiencing low back pain sometime during their lives.[1]

An international comparative study by Cherklin DC, et al showed the rate of back surgery in the United States was at least 40% higher than in any other country and was more than five times that of England and Scotland. Back surgery rates increased almost linearly with the per capita supply of orthopedic and neurosurgeons in the country. These findings illustrate the potentially large impact of health system differences on rates of back surgery.[2]

Surgical goals are improvements in pain, functional status and quality of life. It is well known that some patients operated on for spinal disorders will have a poor result, regardless of the apparent technical success of the operative procedure itself.[3] This has prompted the search for risk factors and the development of pre-screening tools to assist with both the patient selection procedure and the promotion of realistic expectations on behalf of the patient.[4-6] In order

to make the correct diagnosis, Bangkok Spine Academy (BSA) always focuses on the history of medical illness and a thorough physical examination of all patients. We follow the Joint Clinical Practice Guidelines from the American College of Physicians and the American Pain Society for diagnosing and treating Low Back Pain.[7]

The BSA had 2,994 low back pain patients in 2010 and 223 (7.44%) underwent surgery. BSA has begun to develop a spine registration for patients who underwent lumbar spine surgery in order to study patient's history, population, epidemic, quality of life and ability to perform daily activities. The analysis of this information will help us to improve our care and treatment of our patients.

Currently, there are several assessment tools used to measure the treatment results of patients who undergo lumbar spine surgery. Oswestry Disability Index (ODI) is an internationally accepted measure for spine disability and is used in most if not all spinal treatment result assessments. Additional measures are also used to supplement the ODI in order to fully define the patient's spine condition; commonly used questionnaires include the SF-36, SF-12 and the Euro Quality of Life (EuroQol). Therefore we decided to utilize the ODI and EuroQol[8] with our prospective surgery candidates as a pre-screening procedure and so we could also have effective tracking of the patient's improvement on follow up. The following data then shows the pre-operative state of our patients, using the abovementioned measures.

Materials and methods

Sample Size

The focus of this study is the 223 (out of 311 lumbar spine) patients treated with surgery at BSA between August 2010 and June 2011.

EuroQol

Pre-operative measurements of mobility, self-care, activities of daily life, pain, and anxiety and/or depression were determined by EuroQol using visual analogue scale (VAS) and 5 Dimensions (5D).[9]

The EuroQol Visual Analogue Scale (EQ-VAS)

The EQ-VAS is a part of the EuroQol Questionnaire. The patients rate their current health state on the line, which ranges from 0 - 100 (The worst to the best imaginable health).[10]

Oswestry Disability Index (ODI)

ODI versions with a scale ranging from 0-5 were used. Questionnaires addressing 10 common activities were administered, using both English and validated translations into other languages. Points were added up each section and plugged in to the following formula in order to calculate the patient's level of disability:

Point total / 50 x 100 = % disability (aka: 'point total' divided by '50' multiply by ' 100 = percent disability).[11,12]

In Thai patients the authenticated Thai ODI was used; in non-Thai speaking patients, the English ODI (version 0.1) was used.[13]

Thai score

In a study of the quality of life of Thai people across the country, using the EuroQol questionnaire, the formula to calculate the quality of life of Thai people was called Thai score.

Thai score = $1-0.202-(0.121*mo)-(0.121*sc)-(0.059-ua)-(0.072*pd)-(0.032*ad)-(0.190*m2)-(0.065*p2)-(0.046*a)-(0.139*N3)$.[14]

Table1: Interpretation of scores

Score	Description
0% to 20%	**Minimal disability:** The patient can cope with most living activities. Usually no treatment is indicated apart from advice on lifting, sitting and exercise.
21%-40%	**Moderate disability:** The patient experiences more pain and difficulty with sitting, lifting and standing. Travel and social life are more difficult and they may be disabled from work. Personal care, sexual activity and sleeping are not grossly affected and the patient can usually be managed by conservative means.
41%-60%	**Severe disability:** Pain remains the main problem in this group but activities of daily living are affected. These patients require a detailed investigation.
61%-80%	**Crippled:** Back pain impinges on all aspects of the patient's life. Positive intervention is required.
81%-100%	These patients are either bed-bound or exaggerating their symptoms.

SPSS Data Analysis

This descriptive statistic is used to analyze demographic data. EuroQol-5D is composed of five dimensions (mobility, self-care, usual activities, pain/discomfort and anxiety/depression). Each dimension has 3 levels: no problem, some problem, extreme problems.[15] The ratings in the different possible health states will be transformed into an index value. We decided to adapt this and say that each dimension has two levels of severity: No problem and problem. No problem states were those rated the health as full health (all dimensions rated as 1). The problems which were proportionally ranked from 1-3 were analyzed.

Results

Patients who filled out a questionnaire asking them to respond to questions in their native language before undergoing a surgical procedure at BSA between August 2010 and June 2011.

Patient population

Baseline parameters and patient data are presented in Table 2. The majority of patients, 169, or 75.78% were Thai. The proportion of males to female was male 129 (57.8%) female 94 (42.2%). Fifty-seven patients (25.6%) were in the age range of 51-60. Mean ± SD age of patients was 53.69 ± 15.62, minimum 20, and maximum 88. Eighty six patients (38.6%) had a body mass index range 25.1-30; Mean ± SD Body mass index was 26.28 ± 6.11, minimum 18.03, maximum 45.70. Two hundred and one (201) patients (94.6%) were non-smokers. Duration of pain for acute pain 127 (56.95%) Mean ± SD 44.60 ± 29.66, minimum 5 days, maximum 90 days and for chronic pain 96 (43.05%) Mean ± SD 733.70 ± 841.46 minimum 120 days, maximum 3,650 days. Fifteen (6.72%) of patients had previously undergone back surgery in the past. 96 patients (38.56%) had underlying diseases. Surgical procedures were categorized into five groups: Lumbar decompression with Fusion 64 (28.7%), Lumbar decompression without Fusion 76 (34.1%), Lumbar Microdiscectomy 68 (30.5%), Total Disc Replacement 1 (0.4%) and Mixed procedures 14 (6.3%) of the cases.

Mobility: Pre-operative 157 (92.9%) had problems, 12 (7.1%) had no problems. **Self-care:** Pre-operative 97 (57.4%) had problems, 72 (42.6%) had no problems. **Usual activities:** Pre-operative 157 (92.9%) had problems, 12 (7.1%) had no problems. **Pain/discomfort:** Pre-operative 167 (98.8%) had problems, 2 (1.12%) had no problems. **Anxiety/depression:** Pre-operative 137 (81.1%) had problems, 32 (18.9%) had no problems. (See Table 3 for more details)

The EQ Visual analog scale is presented in Table 4. Total patients pre-operative 223 cases, report EQ Visual analog scale Mean ± SD 50.25 ± 16.65, Median 50, 25th percentile 40, 75th percentile 60.

EQ-5D dimensions (Thai score). Thai patients pre-operative 169 cases, report EQ-5D dimensions Mean ± SD 0.488 ± 0.151, Median 0.452, 25th percentile 0.45, 75th percentile 0.57. Lumbar decompression without Fusion 0.468, Lumbar Microdiscectomy 0.483, Lumbar decompression with Fusion 0.503 and Mixed procedures 0.536 respectively presented in Figure 1.

EQ-VAS (Thai score index). Thai patients pre-operative 169 cases, report EQ-VAS Mean ± SD 50.592 ± 16.501, Median 50, 25th percentile 40, 75th percentile 60. Lumbar Microdiscectomy 46.9, Lumbar decompression without Fusion 50.741, Lumbar decompression with Fusion 50.304 and Mixed procedures 50.333 respectively presented in Figure 2.

Oswestry Disability Index Score Of the 223 pre-operative patients. Reported scores were: Mean ± SD 32.58 ± 21.60, Median 32, 25th percentile 12, 75th percentile 48. Mixed procedures 46.51, Total disc replacement 34, Lumbar Microdiscectomy 34.37, Lumbar decompression with Fusion 33.82 and Lumbar decompression without Fusion 27.34 respectively presented in Figure 3.

Discussion

Our patients' ages ranged from 20-88. Seventy-five percent (75%) were Thai and 25% were non-Thai. Both groups received pre-operation ODI and EuroQol assessment and were reevaluated at 6 months after surgery. At entry surgical patients showed a wide range of ODI values but most were in the moderately disabled range of 40-60 indicating to us a justification to consider surgical treatment.

Additional data from the EuroQol confirmed the surgical patients' disability and gave expanded detail about which aspects of the patients lives were most affected. The majority of patients experienced significant pain, with chronic pain (pain ≥ 3 months) being felt more severely than acute pain (pain ≤ 3 months). Pain/discomfort was also reported very frequently, by 98.21% of patients. Difficulty with Usual activities 92.83%, Mobility 91.93%, Anxiety/Depression 80. Seventy-two percent (72%), and Self-care 57.85% were reported respectively: see Table 3. We found the sexual dysfunction assessment not to be well defined in our patient population, which is very likely due to unspoken cultural restriction amongst Thais to fully discuss this aspect of their clinical symptoms.
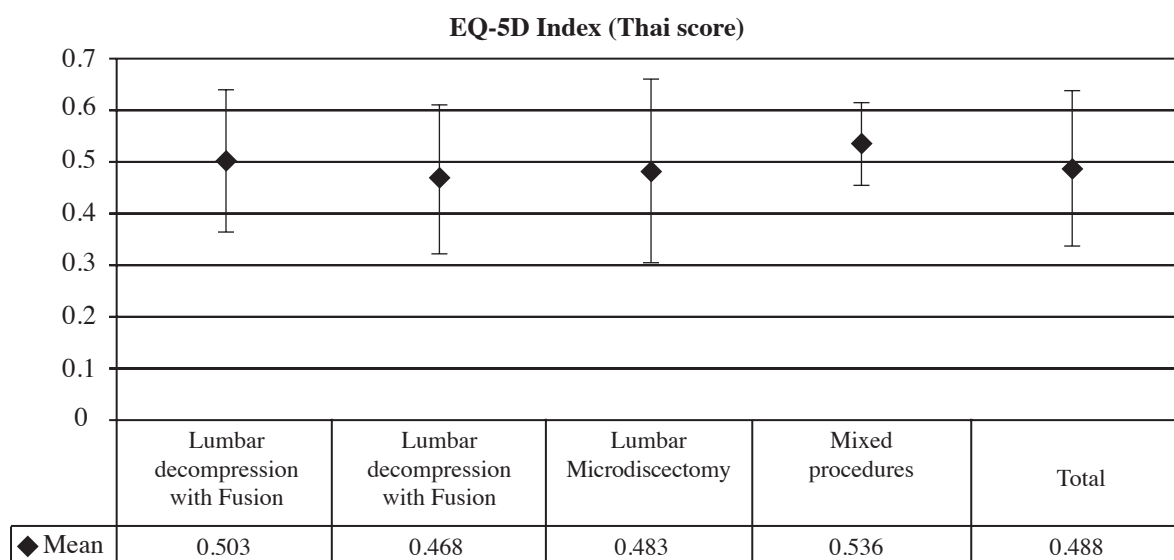
Table2: Patient characterritics.

Group Categories	Thai (n=169)	Foreign (n=54)	Total (n=223)
Sex			
Male	94 (55.6)	35 (64.8)	129 (57.8)
Female	75 (44.4)	19 (35.2)	94 (42.2)
Age			
20-30	17 (10.1)	1 (1.9)	18 (8.1)
31-40	23 (13.6)	10 (18.5)	33 (14.8)
41-50	26 (15.4)	11 (20.4)	37 (16.6)
51-60	39 (23.1)	18 (33.3)	57 (25.6)
61-70	32 (18.9)	11 (20.4)	43 (19.3)
71-80	27 (16.0)	2 (3.7)	29 (13.0)
>80	5 (3.0)	1 (1.9)	6 (2.7)
Mean ± SD, (Min, Max)	**54.10 ± 16.40 (20, 88)**	**52.42 ± 12.92 (30, 87)**	**53.69 ± 15.62 (20, 88)**
BMI			
< 18.5	3 (1.8)	1 (1.9)	4 (1.8)
18.5 – 23.0	33 (19.5)	12 (22.2)	45 (20.2)
23.1 – 25.0	48 (28.4)	5 (9.3)	53 (23.8)
25.1 – 30.0	63 (37.3)	23 (42.6)	86 (38.6)
30.1 – 40.0	22 (13.0)	12 (22.2)	34 (15.2)
> 40.0	0 (0.0)	1 (1.9)	1 (0.4)
Mean ± SD, (Min, Max)	**25.79 ± 6.25 (18.03, 36.00)**	**27.92 ± 5.39 (19.03, 45.70)**	**26.28 ± 6.11 (18.03, 36.00)**
Smoking Habits			
Non smokers	158 (93.5)	43 (79.6)	201 (90.1)
Smokers	7 (4.1)	5 (9.3)	12 (5.4)
Ex smokers > 1 year	1 (0.6)	1 (1.9)	2 (0.9)
Ex smokers < 1 year	3 (1.8)	5 (9.3)	8 (3.6)
Duration of pain			
Acute pain ≤ 3 months	83 (49.11)	44 (81.48)	127 (56.95)
Mean ± SD, (Min, Max)	**43.22 ± 29.01 (7, 90)**	**51.93 ± 33.05 (5, 90)**	**44.60 ± 29.66 (5, 90)**
Chronic pain ≥ 3 months	86 (50.89)	10 (18.52)	96 (43.05)
Mean ± SD, (Min, Max)	**736.31 ± 933.32 (120, 3653)**	**727.62 ± 584.43 (120, 2190)**	**733.70 ± 841.46 (120, 3650)**
Previous back surgery			
Yes	12 (7.1)	3 (5.55)	15 (6.72)
No	157 (92.89)	51 (94.44)	208 (93.27)
Underlying diseases			
Yes	76 (44.97)	20 (37.03)	96 (38.56)
No	93 (53.02)	34 (92.96)	137 (61.43)
Group Categories	**Thai (n=169)**	**Foreign (n=54)**	**Total (n=223)**
Procedure			
Lumbar decompression with Fusion	56 (33.1)	8 (14.8)	64 (28.7)
Lumbar decompression	54 (32.0)	22 (40.7)	76 (34.1)
Lumbar Microdiscectomy	50 (29.6)	18 (33.3)	68 (30.5)
Total Disc Replacement	0 (0.0)	1 (1.9)	1 (0.4)
Mixed procedures	9 (5.3)	5 (9.3)	14 (6.3)

Table 3: EuroQol-5 Dimensions (EQ-5D)

EQ-5D dimensions		Lumbar decompression with Fusion	Lumbar decompression without Fusion	Lumbar Microdiscectomy	Total Disc Replacement	Mixed procedures	Total
		(n=64)	(n=76)	(n=68)	(n=1)	(n=14)	(n=223)
Mobility	No problems	8 (12.50)	5 (6.58)	4 (5.88)	0 (0.0)	1 (7.14)	18 (8.07)
	Problems	56 (87.50)	71 (93.42)	64 (94.12)	1 (100.0)	13 (92.86)	205 (91.93)
Self-care	No problems	36 (56.25)	20 (26.32)	29 (42.65)	1 (100.0)	8 (57.14)	94 (42.15)
	Problems	28 (43.75)	56 (73.68)	39 (57.35)	0 (0.0)	6 (42.86)	129 (57.85)
Usual activities	No problems	5 (7.81)	4 (5.26)	6 (8.82)	0 (0.0)	1 (7.14)	16 (7.17)
	Problems	59 (92.19)	72 (94.74)	62 (91.18)	1 (100.0)	13 (92.86)	207 (92.83)
Pain/ Discomfort	No problems	1 (1.56)	2 (2.63)	1 (1.47)	0 (0.0)	0 (0.0)	4 (1.79)
	Problems	63 (98.44)	74 (97.37)	67 (98.53)	1 (100.0)	14 (100.0)	219 (98.21)
Anxiety/ Depression	No problems	17 (26.56)	8 (10.53)	17 (25.00)	0 (0.0)	1 (7.14)	43 (19.28)
	Problems	47 (73.44)	68 (89.47)	51 (75.00)	1 (100.0)	13 (92.86)	180 (80.72)

Table 4: EuroQol Visual analog scale (EQ-VAS)

Visual analog scale (VAS)	Lumbar decompression with Fusion	Lumbar decompression without Fusion	Lumbar Microdiscectomy	Total Disc Replacement	Mixed procedures	Total
Mean (+/- Std. error)	54.22 ± 14.20	50.07 ± 15.57	46.18 ± 19.30	40.00 ± 0.00	53.57 ± 15.98	50.25 ± 16.65
Median	60	50	50	40	55	50
25th percentile	50	40	40	40	40	40
75th percentile	65	60	60	40	70	60
N	64	76	68	1	14	223

EQ-5D Index (Thai score)

◆ Mean	Lumbar decompression with Fusion	Lumbar decompression with Fusion	Lumbar Microdiscectomy	Mixed procedures	Total
	0.503	0.468	0.483	0.536	0.488

Figure 1: Average mean EQ-5D index (Thai Score) Pre-operation in each procedure

Visual analog scale (Thai score)

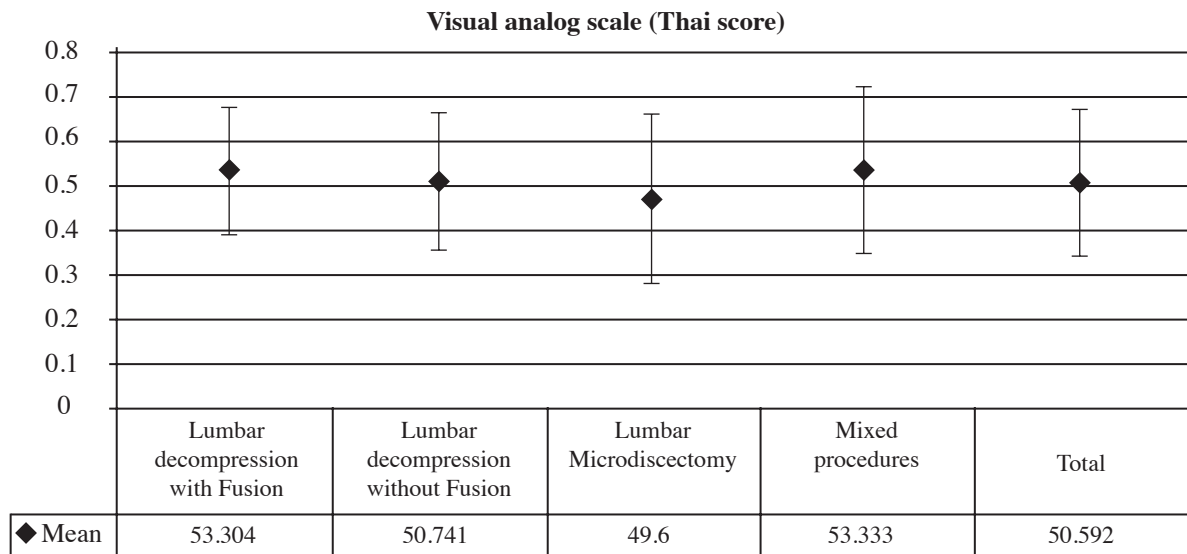| ◆ Mean	Lumbar decompression with Fusion	Lumbar decompression without Fusion	Lumbar Microdiscectomy	Mixed procedures	Total
	53.304	50.741	49.6	53.333	50.592

Figure 2: Average EuroQol Visual analog scale (EQ-VAS) 0-100 Pre-operation in each procedure

Oswestry Disability Index Score

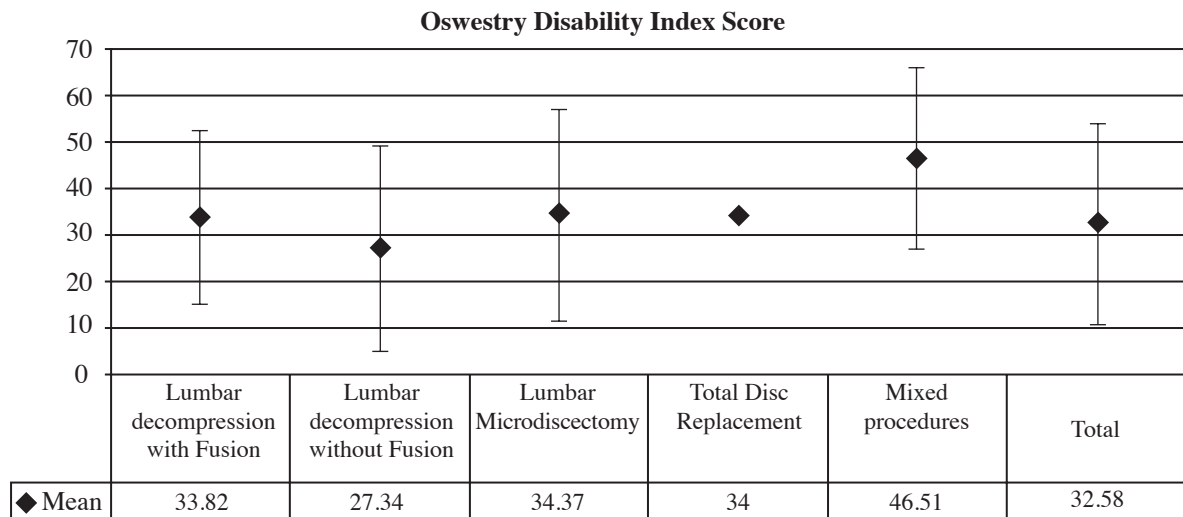| ◆ Mean	Lumbar decompression with Fusion	Lumbar decompression without Fusion	Lumbar Microdiscectomy	Total Disc Replacement	Mixed procedures	Total
	33.82	27.34	34.37	34	46.51	32.58

Figure 3: Average mean Oswestry Disability Index score Pre-operation in each procedure

Conclusion

All patients who underwent surgery for the treatment of low back pain were found to be having significant disability and restrictions in their lives; using the pre-operative ODI and EuroQol measurements, they could be categorized as having moderate to severe disability. The major problems reported were pain and mobility, there were also some problems with self-care and performance of usual activities.

Some differences were found between patients who underwent fusion and who only received laminectomies for decompression, or a herniated disc. Most patients who underwent fusion were elderly and had more co-mobility. Visual analog scale for patients with fusion was 60 and without fusion it was 50. We believe the preoperative ODI and EuroQol are both very useful in confirming the patients' disability and impaired quality of life and these same indices will be useful in reliably documenting the improvement after surgical treatment.

References

1. Podesta L. Rhythmic Physician: Low Back Pain Disc Bulges, Herniations. DRUM! Magazine 2011;on March 17.
2. Cherkin DC, Deyo RA, Loeser JD, et al. International comparison of back surgery rates. *Spine* 1994;19:1201-16.
3. Strömqvist B. Evidence-based lumbar spine surgery (The role of national registration). *Acta Orthop Scand* 2002;73(Suppl 305):34-9.
4. Block AR, Ohnmeiss DD, Guyer RD, et al. The use of presurgical psychological screening to predict the out come of spine surgery. *Spine J* 2001;1:274-82.
5. Carragee EJ. Psychological screening in the surgical treatment of lumbar disc herniation. *Clin J Pain* 2001;17:215-9.
6. Junge A, Dvorak J and Ahrens S. Predictors of bad and good outcomes of lumbar disc surgery. A prospective clinical study with recommendations for screening to avoid bad outcomes. *Spine* 1995;20:460-8.
7. Chou R, Qaseem A, Snow V, et al. Clinical guidelines Diagnosis and Treatment of Low Back Pain: A Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society 2007.
8. Solberg TK, Olsen JA, Ingebrigtsen T, et al. Health-re lated quality of life assessment by the EuroQol-5D can provide cost-utility data in the field of low-back surgery. *Euro Spine J* 2005;14:1000-7.
9. Rabin R, Oemar M and Oppe M. EQ-5D-3L User Guide: Basic information on how to use the EQ-5D-3L instrument. 1-24. 2011.
10. Fairbank JC, Couper J, Davies JB, et al. The Oswestry low back pain disability questionnaire. *Physiotherapy* 1980;66:271-3.
11. Fairbank JC, Pynsent PB, "The Oswestry Disability Index. *Spine* 2000;25:2940-52.
12. Sanjaroensuttikul N. The Oswestry low back pain disability questionnaire (Version 1.0) Thai version. *J Med Assoc Thai* 2007;90:1417-22.
13. Sirinart Tongsiri. The Thai population based preference scores for EQ5D health states 2009. Ministry of Public Health, Thailand.
14. Glassman S, Gornet MF, Branch C, et al. MOS Short Form 36 and Oswestry Disability Index outcomes in lumbar fusion: a multi centerexperience. *The Spine Journal* 2006;6:21-6.
15. The EuroQol Group. EuroQol-a new facility for the measurement of health-related quality of life. Health Policy: The EuroQol Group 2009.