Reviewer’s report

Title: Burden of traumatic spinal fracture in 2006 - 2007 in Tehran, Iran

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Reviewer: Farshad Pourmalek

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Review of manuscript titled “Burden of traumatic spinal fracture in 2006 - 2007 in Tehran, Iran”

Farshad Pourmalek 15 March 2011

This is an interesting study about the burden of traumatic spinal fractures at the subnational level. Two major clarifications are needed before the study results can be assessed as acceptable. First is the issue of time discrepancies among calendar years for population, cause incidence, and associated causes’ incidence data and how these disparities can affect the results. The second point is transformation of life-long relative risk of mortality to an annualized value.

(A) Major Compulsory Revisions

(1) Clear delimitation of the reference year of study is needed. Did the study cover 12 months or more or less? From when to when (e.g. March 2006 – March 2007).

(2) Page 9. “The study had several limitations. Data for the population of Tehran was available at 2006, but the data for incidence was from 2006 – 2007 and the data for sex, age, and associated injuries was related to 1999-2004. Different types of vertebral fractures have the same DW; therefore, different types did not separate.” Discuss how the limitations are believed not to hamper validity of the study results. What are the predictable overestimations or underestimations in different components of DALYs?

- Page 2. “The International Classification of Diseases, 10th revision (ICD-10) codes of S12.0, S12.1, S12.2, S12.7, S12.8, and S12.9 for cervical vertebral fractures, S22.0, and S22.1 for thoracic and S32.0 and S32.7, S32.8 for lumbar vertebral fractures were used to identify patients with TSF in the “National Trauma Data Bank (NTDB)”.” Page 2. “In brief, the NTDB is a database on more than 16,000 trauma patients that had been collected from 1999 to 2004 in 8 major cities of Iran including six hospitals in Tehran. Age and sex distribution of TSF patients (Table 1), outcome (death vs. survival), and associated injuries of TSF patients were also extracted from the databank.”

There are considerations regarding the place, time, and person (the injuries codes to be included or excluded).

(3) Place: Patient inflow of third-level hospitals in Tehran includes many patients
from other cities. In the meantime, only six hospitals cannot include all the patient inflow from Tehran itself. So the patient population that is represented by six hospitals in Tehran does not exactly represent the population of Tehran.

(4) Time: Where the study title mentions years 2006-2007 as the reference years, why the National Trauma Data Bank (NTDB) data from 2006-2007 was not used for? Where the data for 1999-2004 were used, how can this affect the study results? There is no mention of using average annual values for 1999-2004 data. Should average annual value be used for representing burden in one year, even though the mean value would refer to average for 1999-2004 time period.

(5) Injury codes: Some of the codes that need to be included are not included and some of the codes that should not be included are included.

S12.8 that is “Fracture of other parts of neck (Hyoid bone, Larynx, Thyroid cartilage, and Trachea)” should not be included but is included. This should not be included since it is not spinal fracture.

S18 that is “Traumatic amputation at neck level (Decapitation)” is not included but should be included since it is traumatic spinal fracture.

S19 that is “Other and unspecified injuries of neck” should be partly included but is not included. Parts of this code are traumatic spinal fracture and need special treatments like redistribution.

S22.9 that is “Fracture of bony thorax, part unspecified” should be partly included but is not included. Parts of this code are traumatic spinal fracture and need special treatments like redistribution.

S29.7 that is “Multiple injuries of thorax” should be partly included but is not included. Parts of this code are traumatic spinal fracture and need special treatments like redistribution.

S29.9 that is “Unspecified injury of thorax” should be partly included but is not included. Parts of this code are traumatic spinal fracture and need special treatments like redistribution.

S32.8 that is “Fracture of other and unspecified parts of lumbar spine and pelvis” is totally included whereas just a part of it is traumatic spinal fracture (that is “Fracture of lumbosacral spine NOS” – noted that lumbar is meant to be included in this study and sacral meant to be excluded) but the other part is not traumatic spinal fracture (that is “Fracture of ischium” and “Fracture of spine NOS”). This code needs special treatments like redistribution.

S39.9 that is “Unspecified injury of abdomen, lower back and pelvis” should be partly included but is not included. Parts of this code are traumatic spinal fracture - lower back - and need special treatments like redistribution.

(6) Why the data on “outcome (death vs. survival)” are not provided. How were they used?

(7) Provide data on all-cause death rates, cause-specific death rates, incidence, YLL, disability weights, YLD, and DALYs by age and sex in an appendix spread sheet.
In the study of Puisto and colleagues, a lifelong RRM of 1.33 for females and 1.43 for males following TSF was reported which was mainly due to cancers or respiratory diseases, even after exclusion of metastatic fractures at the time of TSF occurrence. We considered post-hospital mortality based on these studies. What was done to transform the lifelong relative risk of mortality to that during the reference year of study?

For this purpose, the data on population structure and general mortality rates and at least three of the above mentioned epidemiological indices are necessary. What was the source of data on general mortality rates and how was under-registration of deaths treated. More details needed on general mortality rates for Tehran in 2006-2007. Discuss the effects of cause of death misclassification on study results.

To estimate the incidence of TSF in 2006 and 2007, two population based studies were performed in September 2007 and 2008 in Tehran. The details of these studies have been described previously. Totally, 3 new cases of TSF (C1- L5) were found in 18,346 person-years that provided an incidence of 16.35 (95%CI: 3.4-48.0) per 100,000. TSF incidence was 21.29 and 11.17 per 100,000 for males and females, respectively. Citation to the second study is not mentioned here. Is there an interpretation of how the low number of cases in age and sex specific groups (essentially one case, each in one age-sex group, summing up to 3 cases) renders or not the estimates unreliable and how this affects the results?

The estimated sex-age specific incidence of 354 cases of iTSF has been demonstrated based on disease modeling in Table 2. How does estimation of 354 cases of isolated Traumatic Spinal Fracture in 2006-2007 in Tehran with census-based population of 7,976,000 in 2006 (mentioned in page 2) relate to the estimated all-age incidence rates of 10.89 for males and 5.61 for females (mentioned in table 2), where 354 / 7,976,000 is 4.44 in 100,000? The estimated all-age incidence rates of 10.89 for males and 5.61 for females for isolated Traumatic Spinal Fracture (mentioned in table 2) multiplied by all-age population of 3,986,419 for males and 3,817,464 for females (mentioned in table 3) could produce about 434 and 214 cases respectively. How are these 648 cases related to “the estimated sex-age specific incidence of 354 cases of iTSF”? Why is the total population of Tehran in 2006-2007 mentioned in table 3 (i.e. 7,803,883) even less than the census-based population of Tehran in 2006 mentioned in page 2. i.e. 7,976,000?

Regarding other associated injuries, we did not find a correlation between thoracoabdominal injuries and increased rate of mortality. Although the patients were severely injured, it was mainly due to increased incidence of associated thoracic injuries. No significant difference in mortality was observed. Not ideal to present some results in the discussion section of the manuscript that have not been mentioned in the previous sections. Provide relevant details in methods and results sections and discuss the findings in discussion section. Reference number (20) is for DisMod II software. Is this a relevant reference for this paragraph?
The manuscript does not have an abstract.

**Minor Essential Revisions**

1. Page 1. “To the best of our knowledge, there is no previous study on the assessment of burden of TSF in the Iranian community using the DALY.” The databases that were searched should be mentioned.

2. Page 2. The 2006 census was used to determine Tehran’s population (7,976,000), age, and sex distribution. Provide citation.

3. Page 3. “In the present study, among all associated injuries, we included only SCI, head, and extremity injuries in the calculation.” Why?

4. Page 3. “Short-term mortality of iTSF was considered as zero.” Why is this assumption needed? Does it mean, for instance, that short-term mortality of head injury is zero? How does this assumption, if it holds true (that should not be the case here), affect the estimations?

5. Page 4. “In brief, cluster random sampling was used and structured interviews were performed with participants to detect history of spine fracture. All cases with positive history were evaluated by a specialist to document the spine fracture.” Was this evaluation a review of medical documents held by patient and/or examination? More details needed. What about the fatal cases? What about cases that have migrated out of Tehran? How the validity and reliability of these measurements can be judged about?

6. Page 5. “Post-hospital YLD was estimated to be zero, because there was no definite evidence for continuous pain or disability after 51 days.” Is this an empirical finding or a clinical impression?

7. Table 5. Where the long-term YLD for “Open wounds” is zero (in the second row of data - if dash is meant to represent zero), how can that for “Open wound plus skull Fx” that is 8.409 be greater than that for “Skull Fracture” that is 8.408? How can long-term YLD for “Brain [[injury??]] + Limb Fx” be marked with “ - ” (second last row of data) where “Brain Injury” has the second highest long-term YLD of 10.362? Why it is not correct if one interprets these figures as if a limb fracture on the top of one’s brain injury prevents long-term disability that would otherwise ensue if there were no limb fracture?

8. Page 6. “In 25 died patients with aTSF, 9 patients presented with intracranial hemorrhage, 2 with skull fractures, 6 with spinal cord injuries (SCI), 4 TSF and associated dislocation, 1 tracheolaryngeal crush, 1 open wound, and 2 unknown injuries.” What does “presented” mean here? Is it the main clinical presentation or cause of death? How are these categories mutually exclusive? Was not there any patient with two of these conditions together?

**Discretionary Revisions**

1. Provide ICD-10 codes for associated injuries in an appendix file. This can be useful for other researchers and readers.
Level of interest: An article of importance in its field

Quality of written English: Needs some language corrections before being published

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests.