NON-FATAL OCCUPATIONAL INJURIES ADMITTED TO HOSPITALS AMONG GENERAL ORGANIZATION FOR SOCIAL INSURANCE WORKERS IN AL-KHOBAR CITY, SAUDI ARABIA: EXPERIENCE OF ONE YEAR

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Aim of the study: 1- To determine the mean rate of non-fatal occupational injuries needing hospitalization in Al-Khobar city for one year, among the employees of the General Organization for Social Insurance. 2- To describe the nature and characteristics of these injuries. 3- To estimate the direct costs of their treatment.

Method: This was a descriptive study involving employees of the General Organization for Social Insurance in their place of work, who were admitted to hospital during a ten-month period of time. The study included 720 employees, who were selected randomly, according to the doctor's judgment or due to a specific injury. The study was conducted at the hospital admission service.

Results: The mean rate of these injuries was 7.1/1000 employees. Among the injured workers, 77% were male and 23% were female. Of them, 51% were Saudis, while 49% were expatriates. The hand and arm injuries were the most frequent type of injury (32.1%), followed by multiple injuries (20.7%) and upper extremity (20.5%) injuries. The main causes of these injuries were accidents (33.4%) and work accidents (23.9%) and system failures (14.5%). The most frequent cause of injury was due to falling (37.9%) followed by accidents (30.3%) and system failures (14.5%). A total of 76% of the injured employees were admitted to the hospital at least once, while 9.2% were admitted for a longer period of time (more than six months).

Conclusions: The rate of these injuries is lower than that of similar studies conducted in other countries. The injuries related to the social insurance system are responsible for 13.8% of the total number of injuries and accounted for 12% of the total treatment cost. The main cause of these injuries is due to falling, which is responsible for 37.9% of the cases. It is recommended that the General Organization for Social Insurance conducts studies on the causes of these injuries and takes the necessary measures to reduce their incidence.

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Objectives: (1) To determine the incidence rate of non-fatal occupational injuries requiring admission into private hospitals in Al-Khobar city during a 12-month period among workers insured by the General Organization for Social Insurance (GOSI). (2) To describe the pattern, characteristics and outcome of these injuries. (3) To estimate their subsequent direct medical costs.

Methods: This is a cohort study design. The cohort consisted of workers at workplaces where insurance cover ensured admission into two private hospitals selected randomly in Al-Khobar city. A data-collecting sheet was used to collect the necessary data from both the patient and his medical file on admission into hospital.

Results: The injury incidence rate was 7.1 per 1,000 full-time workers. All injured workers were males. Grouped by nationality, 1.5% were Saudis, 74.8% from the Indian subcontinent and 13.2% Filipinos. Main injury sites included hands and fingers (32.1%), multiple parts (20.7%), lower limbs (20.5%), eyes, head and neck (11.5%) and back (9.5%). Falls were the main cause of injury (33.4%), followed by tools-related injuries (23.9%), falling objects (14.5%) and car accidents (12.0%). The majority of admissions (77.8%) were for periods less than 1 week with only 7.1% for more than 3 weeks. Absence from work was more than 3 weeks and less than 1 week in 35.5% and 24.9% of the admissions, respectively. The majority of the cases (65.0%) visited clinics 2-7 times. Direct medical cost per admission was less than SR 2,000 in 63.9% of the cases in one hospital (1 USD = SR 3.75).

Conclusions: The incidence rate was lower than, but comparable to those rates estimated in more detailed surveys from other countries. Occupational injuries requiring admission into hospitals contributed to 18.3% of the total cases of injuries among insured people during year 1995 and were responsible for significant medical charges, human suffering and loss of productivity. Based on the results of this study, it is recommended that GOSI should study the reasons behind the current situation and find appropriate solutions.

Key Words: Occupational injuries, hospital admissions, Al-Khobar, Saudi Arabia

INTRODUCTION
The Kingdom of Saudi Arabia (KSA) is considered one of the fastest industrializing countries. The 1995 annual statistics of the Ministry of Industry and Electricity indicated that the number of factories had increased at a rate of 163% over 13 years. As a result of this increase, more workers were needed and occupational accidents resulting from the increasing exposure to various potential occupational hazards have become unavoidable. Workers with occupational injuries are seen by private hospitals, which are able to provide suitable medical care for which they are paid by GOSI. By law, establishments employing 10 or more workers have to have their employees insured with GOSI.

Epidemiological studies of occupational accidents are needed to identify high-risk industries and the pattern or nature of these injuries in order to formulate suitable preventive measures. Few studies on this have been carried out in Saudi Arabia. The studies of Al-Ghamdi, Al-Sibai, Al-Khawashki, Taha and Ballal, were limited to
specific objectives different from the ones considered in this study.

In United States (US), severe occupational traumatic injury was included in the 10 leading problems in occupational Safety and Health.\textsuperscript{7,9}

Judging from the number and type of studies done in this country it is clear that there is a paucity of information in Saudi Arabia on occupational injuries, both general and severe. To the best of the investigator’s knowledge, no study has been done in Saudi Arabia on severe occupational injuries requiring admission to hospitals. A study of this kind would show the number, type and the severity of occupational injuries, and give more information on nature of the severe occupational injuries, their causes, the risk factors and their outcome. The objectives of this study were to: (1) Determine the incidence rate of non-fatal occupational injuries requiring admission to hospitals; (2) Describe the pattern, characteristics and outcome of these injuries; (3) Estimate their subsequent direct medical costs.

MATERIAL AND METHODS
This is a cohort study with 1-year follow-up. The cohort consisted of 65,915 workers at work places where the insurance cover ensured admission to 2 hospitals in Al-Khobar city during a 12-month period among GOSI insured workers; (2) Describe the pattern, characteristics and outcome of these injuries; (3) Estimate their subsequent direct medical costs.

RESULTS
Incidence of occupational injuries in the sample
The response rate in the study was 100%. During the study period there was a total of
468 admissions, 213 (45.5%) of which were in Hospital A. During the same period, there were a total of 65,915 exposed workers. The overall annual incidence of occupational injuries requiring admission was 7.1 per 1000 workers (1.7 for Saudis and 7.4 for non-Saudis). The annual incidence rate in hospital A was 5.6 per 1000 compared to 9.0 per 1000 in hospital B (Table 1).

Table 1: Incidence rate of occupational injuries per 1,000 workers by nationality and hospital in the cohort of 65,915 workers

| Variable    | Number     | Incidence rate per 1000 workers |
|-------------|------------|---------------------------------|
| Saudis      | 7/4092     | 1.7                             |
| Foreigners  | 461/61823  | 7.4                             |
| Hospital A  | 213/37655  | 5.65                            |
| Hospital B  | 255/28260  | 9.0                             |

Pattern of occupational injuries

Less than two-thirds of the sample population (64.7%) was aged below 35 years and the vast majority of the sample was from the Indian subcontinent (74.8%), Filipinos (13.2%) and only 1.5% were Saudis. Most of the work injuries occurred inside the workplace (89.7%).

The main causes of the injuries were falls (33.8%); tools-related (23.9%), falling objects (14.5%) and car accidents (12.0%). The main body parts injured were hands and fingers (32.1%), followed by multiple parts (20.7%), lower limbs (20.5%), eyes, head and neck (11.5%) and back (9.5%) (Table 2).

The majority of admissions (77.8%) were for periods of less than one week while only 7.1% of admissions stayed in hospital for periods of more than 3 weeks. However, the majority of admissions (35.3%) resulted in subsequent absence from work for a period of more than 3 weeks, while 24.9% of admissions resulted in absence from work for periods lasting less than one week. Following discharge from hospital, 65.0% of the injured persons had between 2-7 visits to the outpatient clinics, 8.2% had 2 visits or less, 17.6% between 8-14 visits, while 9.2% attended the clinics more than 15 times.

In Hospital A, the cost of medical care for the majority of the admissions (63.9%) was less than SR 2000 per admission, while the cost for 22.1% was between SR 2000 – 4000 per admission, and more than SR 4000 per admission for the remaining 13.9%.

Table 2: Nationality, cause of injury and body parts injured in 468 admitted employees in the cohort of 65,915 workers

| Variable            | No. (%) |
|---------------------|---------|
| **Nationality**     |         |
| Saudis              | 7 (1.5) |
| Indian subcontinent | 344 (74.8) |
| Filipinos           | 61 (13.3) |
| Other Arabs         | 38 (8.5) |
| Others              | 10 (2.1) |
| **Cause of injury** |         |
| Fall                | 158 (33.8) |
| Tools related       | 112 (23.9) |
| Falling objects     | 68 (14.5) |
| Car accidents       | 56 (12.0) |
| Lifting             | 25 (5.3) |
| Fire                | 21 (4.5) |
| Others              | 28 (6.0) |
| **Body parts injured** |       |
| Hands and fingers   | 150 (32.1) |
| Multiple parts      | 97 (20.7) |
| Lower limbs         | 96 (20.5) |
| Eyes, head and neck | 54 (11.5) |
| Back                | 43 (9.2) |
| Others              | 28 (6.0) |

Table 3 shows selected admission features in relation to the two hospitals under study. The number of clinic visits, admission days, and absence from work in days were associated significantly with the hospitals in question. Similarly, there was a significant association between the anatomical part injured and period of absence from work.
Table 3: Frequency of clinic visits, admission days and absenteeism distributed by hospitals

| Variable         | Total No. (%) | Hospital A No. (%) | Hospital B No. (%) | p-value |
|------------------|---------------|--------------------|--------------------|---------|
| **Clinic visits**|               |                    |                    |         |
| <2               | 38 (8.2)      | 26 (12.3)          | 12 (4.7)           | <0.0001 |
| 2-7              | 303 (65.0)    | 153 (72.5)         | 150 (58.8)         | <0.0001 |
| 8-14             | 82 (17.6)     | 20 (9.5)           | 62 (24.3)          |         |
| ≥ 15             | 43 (9.2)      | 12 (5.7)           | 31 (12.2)          |         |
| **Admission in days** |        |                    |                    |         |
| 1-7              | 360 (77.8)    | 178 (84.8)         | 182 (71.9)         | <0.003  |
| 8-14             | 50 (10.8)     | 17 (8.1)           | 33 (13.0)          |         |
| 15-21            | 20 (4.3)      | 3 (1.4)            | 17 (6.7)           | <0.009  |
| > 21             | 33 (7.1)      | 12 (5.7)           | 21 (8.3)           |         |
| **Absence in days** |        |                    |                    |         |
| 1-7              | 113 (24.9)    | 52 (25.0)          | 61 (24.9)          | <0.009  |
| 8-14             | 92 (20.3)     | 49 (23.6)          | 43 (17.6)          |         |
| 15-21            | 88 (19.4)     | 49 (23.6)          | 39 (15.9)          |         |
| > 21             | 160 (35.3)    | 58 (27.9)          | 102 (41.6)         |         |

(p<0.0001), length of hospitalization (p<0.003), number of clinic visits (p<0.001) and the cost of treatment (p<0.017). The cause of occupational injury was significantly associated with period of absence from work (p<0.001) and admission days (p<0.01).

There were insufficient data to suggest significant associations between the different age groups with parts of body injured, length of absence from work, duration of hospitalization, number of clinic visits or cost of medical care. Place of injury was associated significantly with parts of body injured (p<0.001) and duration of hospitalization (p<0.001). Time of injury was not found to be significantly associated with period of hospitalization, absence from work or cost of treatment.

**DISCUSSION**

**Incidence of occupational injuries**

The overall calculated incidence of occupational injuries requiring admission to hospitals was 7.1 per 1000 insured workers in the 1-year period of study. This rate represents 18.3% of the total cases of occupational injuries among GOSI insured employees in the Kingdom of Saudi Arabia calculated earlier in 1995. This rate represents only the severe occupational injuries requiring admission to hospital. The rate in the present study is less than the rates of 1.58%, 1.06% and 7% reported by different investigators. However, it agrees with the range between 0.49% - 1.52% reported from Iowa in 1990.

The incidence rate of occupational injuries in Hospital B (9 per 1000) was higher than in Hospital A (5.65 per 1000). This may be explained by the fact that the former is busier than the latter. The incidence of occupational injuries among non-Saudis was approximately four times that of Saudis. This result supports earlier similar finding.

**Pattern of occupational injuries**

**Age and nationality**

The majority of the injured were under 35 years. This supports other studies, which showed that the highest rates of accidents were among workers under the age of 35 years. The general trend in these studies is a decline in incidence with advancing age. However, this depends on the age structure of the whole population. An alternative explanation could be related to the fact that experience increases with advancement in age.

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Saudis had much lower rates than non-Saudis (nationals of the Indian subcontinent and the Philippines). These findings are in conformity with an earlier study carried in the same region where workers from the Indian subcontinent had the highest incidence rate (139 per 1000), followed by Filipinos (106 per 1000) and then Saudis (87 per 1000). This may be explained in part by the social stresses experienced by these expatriates, such as differences in the social environment and probably the psychological trauma of being absent from their families. Moreover, hired foreign employees may be engaged in more risky jobs. Johnston's review of 20 selected studies, all of which assessed the relationship between stress, and occupational injury shows significant relationship between injury and stress. Inability to understand the language was found to be an important reason for the high rate of accidents among migrant laborers in Australia during their first five years after taking residence in the country.

Cause of injury and body parts involved
The most common cause of injury found in the study was falls (33.8%). Reports from within Saudi Arabia found it the second leading cause of injury, while it was the prime cause of occupational spinal cord injury (SCIs) elsewhere. Tools-related injuries ranked second in this study but were the commonest source of injury in a large study conducted in this country. Manual work puts the upper limbs more at risk of injury. This type of work could explain the high rate of hand and finger injuries in the present study. This agrees with other studies.

Duration of admission to hospital and absence from work
Fortunately, most of the injuries sustained by the studied population were mild judging by the length of stay in hospital. However, the length of stay in this study was longer than the average length of stay of 4.4 days reported by Williams. Man-days lost due to occupational injury can be used as an index of case severity and economic impact for both the employee and employer. Frumkin reported that approximately half the respondents in his study had missed more than 3 days of work, and 15% had missed more than one month. It was therefore, not surprising to find a significant association in this study between parts of body injured and the period of absence from work (p<0.0001), period of admission in days (p<0.003), number of clinic visits (p<0.001) and cost of treatment (p<0.017). Hand and finger injuries in particular, can cause long spells of absence. Reports from Taiwan showed that the severity of injury determined the duration of morbidity and the magnitude of future productivity. Indirect cost due to sickness and absence increases when the absence is paid, as is the case in this study.

Direct medical cost
The average cost of inpatient management for the majority of the injured was less than SR 2000. A figure close to this was reported from injuries managed in 1995 but was much higher than the cost for year 1983. The increase in cost over the period indicated in the Average Cost of Treatment (ACT) may be explained by the rise in medical costs. However, in other countries the total cost was much more than the figure reported earlier from Saudi Arabia (SR 14,173,031). For example, in one study, the average medical charges incurred by patients injured at work and requiring hospitalization was US Dollars 10,910 per patient. The treatment cost of work-related injuries in 1986 in USA amounted to 34.8 billion US Dollars and almost doubled in 1991.
Comparing the two hospitals

Hospital B is a busy hospital with a higher turnover rate of patients than to hospital A. The latter is known to admit patients requiring longer periods of admission and rehabilitation. This may explain the variation in incidence of occupational injuries requiring admission between the 2 hospitals. Similarly, this may have played a part in the differences between the 2 hospitals on the variables shown in Table 3.

In conclusion, the present study showed considerable incidence rate of occupational injuries requiring admission into 2 hospitals, which was lower than, but reasonably comparable to those rates estimated in more detailed surveys for comparable periods. These injuries represented 18% of the total cases of injuries among insured people during year 1995. The injuries were responsible for significant medical charges, human suffering and loss of productivity. The young were more at risk.

Although the finding of this study may not be generalized beyond the study population, it is recommended that: (1) GOSI should study the reasons behind the current situation in order to find solutions for it. (2) Further applied research be done on general and severe injuries.

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