

Safety among foreign workers and impact on emergency medicine services in Singapore

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ABSTRACT

Introduction: This article aims to study work-related injuries through the eyes of the foreign workers and correlate the findings with their perception of job safety and their level of training received.

Methods: A prospective questionnaire-based survey was conducted between April and October 2002 in the Emergency Department of a secondary level hospital. 285 consecutive foreign workers with work-related injuries were enrolled.

Results: The majority of the foreign workers were of Asian origin, male, and 20-30 years of age. 66 percent had prior working experience. 83 percent of those surveyed rated the safety training received as "just enough" or better. There was a positive correlation between job skills and safety training (r , equals 0.733). 82 percent said that safety equipment were available, though only one-half made use of them. 67 percent of the injured received some form of first aid at scene, mainly bandaging. 17 percent did not receive any first aid because of lack of equipment or first aid training. The two most common injuries were wounds to the limbs (33.2 percent) and foreign body (FB) entry into the eyes (17.7 percent). Correspondingly, toilet and suture and removal of FB in the eye were the two most common procedures done.

Conclusion: In this study, the foreign workers generally felt that the safety and work skills training were adequate. However, there are some problems that still need to be addressed.

Keywords: emergency medicine, first aid, industrial accidents, migrant workers, worker safety

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INTRODUCTION

Singapore is an industrialised city state with limited land and resources. To aid in the rapid development and growth, Singapore employs more than 650,000 foreign workers⁽¹⁾. The workers are involved in a variety of occupations. According to the labour laws in Singapore, both local and foreign workers are required to receive adequate work-related training to ensure competence and skills in their chosen occupation. In the same vein, safety training has been stressed to decrease the likelihood of work-related injuries. Despite this, however, industrial accidents in Singapore appear to be on the rise, based on statistics derived from the Ministry of Manpower, Singapore (3,500 accidents in Y2000 increasing to 3,800 in Y2001)⁽²⁾.

Various studies done previously have looked at these injuries from the viewpoint of the affected industry and the economic impact. As far as we know, there has not been a study examining how the foreign workers themselves view such injuries especially in relation to job safety and training received. We conducted a prospective observational survey to determine the perceived level of safety and work-related training among foreign workers in Singapore. We looked at the common mechanisms of injury and the safety features put in place at the work sites, and attempted to identify possible causes of non compliance, if any, to safety and its training.

We also looked at the type of injuries resulting from such accidents, their frequency of occurrence and the groups of workers most affected. We evaluated the resources needed in the Emergency Department to manage such injuries. As a point of contrast, we also conducted interviews with supervisors of the injured workmen and obtained their views on safety at work and its relation to their workers' injuries.

METHODS

A prospective questionnaire-based survey was conducted from April 2002 to October 2002 in the Emergency Department (ED) of Alexandra Hospital.

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Fig. 1 Perception of safety training standards.

The hospital has an annual ED patient census of over 48,000, of which at least 15% are foreign workers. The survey form was in a multiple choice question-and-answer format. Should the desired answer not be among those suggested, the option was available for a short written answer by the participant.

Based on pre-existing data about the nationalities of the foreign worker attendees, we devised the surveys in their native languages. This was to minimise the likelihood of misunderstanding of the questions and answers as well as to reduce bystander bias that may have resulted because of interpretations. In the unlikely event that the patient may not be fluent in the written language, we sought the help of his colleagues or accompanying employers/supervisors. A foreign worker was defined as a non-Singapore citizen, non-permanent resident working in Singapore. Foreigners studying in Singapore and tourists were excluded. A work-related injury was defined as an injury that occurred while the patient was engaged in a work-related activity on or off the employer's premises.

All consecutive foreign workers who registered for ED consultation during the survey period were enrolled for the study. Green work permit cards issued to each foreign worker by the Ministry of Manpower were used for their ED registration. These permit cards aided in our identification and enrollment of eligible patients. The triage nurse, on identifying a foreign worker with a work-related injury, performed the routine initial history-taking and assessment of vital signs. The patient was invited at this time to participate in the survey with prepared explanatory pamphlets in his native language. Based on the history and a set of guidelines, the nurse decided on the injury mechanism and gave the participant three survey forms, namely: demographics, mechanism of injury

Table 1. List of patients.

		Number (%)
Nationality	Bangladeshi	84 (26.2)
	Indian	131 (40.8)
	Chinese	34 (10.6)
	Thai	12 (3.7)
	Others	24 (7.5)
Sex	Male	278 (86.6)
	Female	7 (2.2)
Age (in years)	16-20	5 (1.6)
	20-30	165 (51.4)
	30-40	94 (29.3)
	40-50	21 (6.5)
Previous work experience	Yes	212 (66.0)
	No	73 (22.7)
Years worked in Singapore	0-2	149 (46.4)
	2-5	91 (28.3)
	>5	45 (14.0)
Reasons to work in Singapore	Better pay	174 (54.2)
	Better job prospect	34 (10.6)
	Safer place to work	21 (6.5)
	Good work experience	15 (4.7)
	No work in homeland	21 (6.5)
	Others	20 (6.3)

survey and safety survey.

Each participant completed the forms while waiting for consultation, and subsequently underwent medical care as needed. The doctor then completed a medical survey form documenting the injury site and type. The diagnostic tests and therapy needed for the management of the patient's injuries were noted and the final disposition of the patient recorded. The supervisors, if present with the patient, were also invited to participate in a survey on their attitude towards safety training. The Ethics Review Committee of the Hospital approved the study.

The collected data was analysed using Statistical Package for Social Sciences (SPSS) version 11.0 (Chicago, IL, USA). Comparison of proportion of data was subjected to chi-square testing. A p-value of less than 0.05 was considered significant.

RESULTS

Over the six-month period, a total of 5,851 foreign workers visited the ED of Alexandra Hospital for medical consultation. Of these, 2,739 had

Fig. 2 Correlation between perception of standards of safety training and work training.

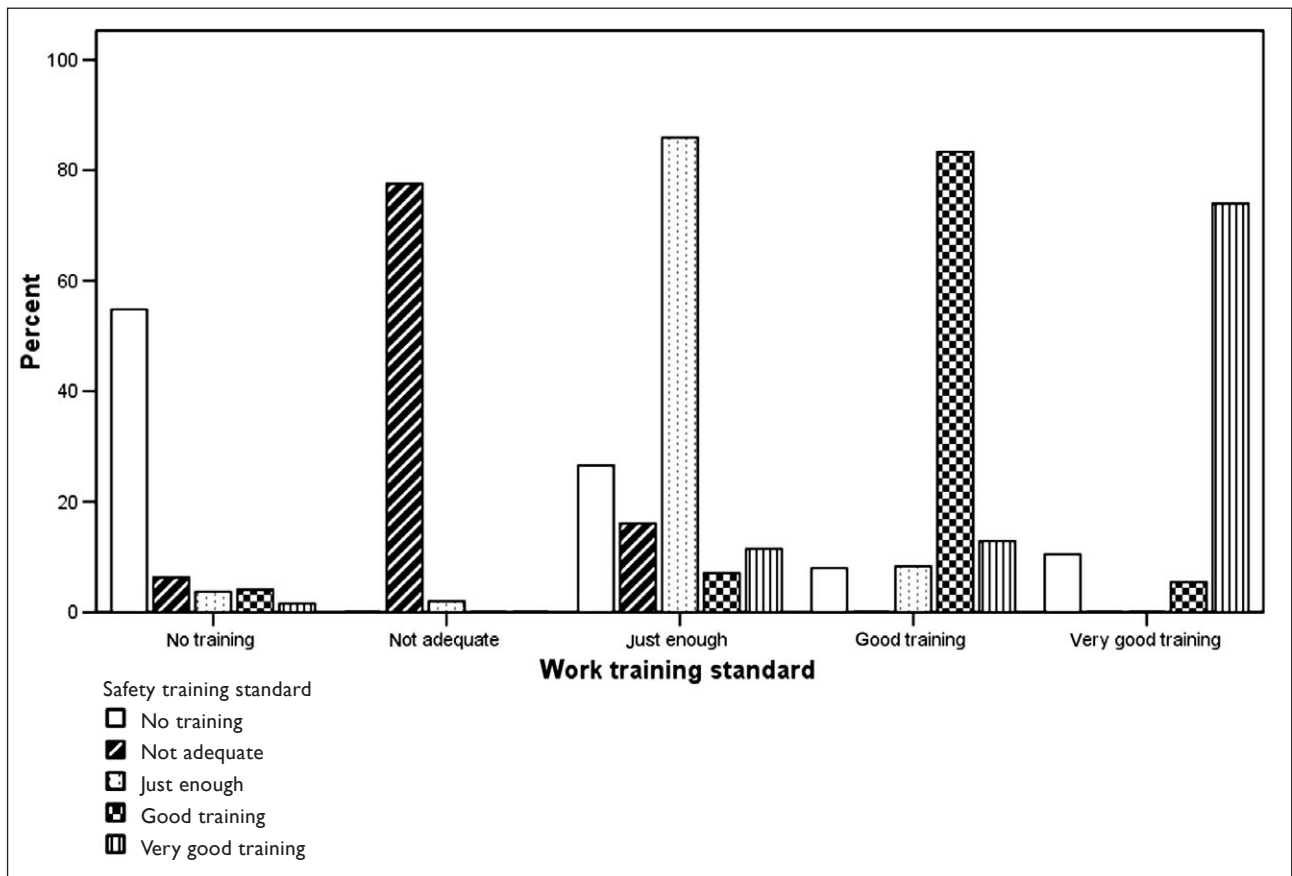
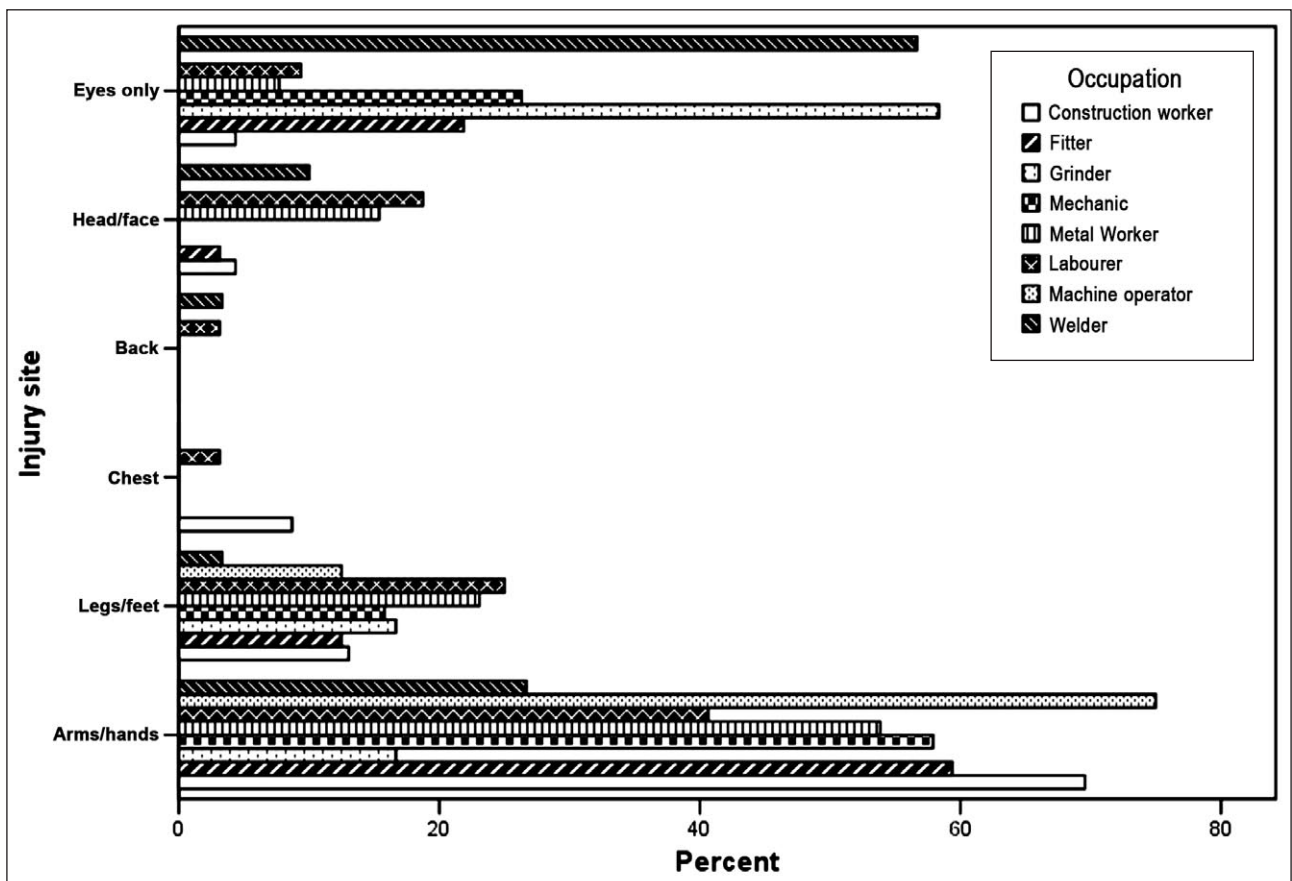


Fig. 3 Injury site vs occupation.



traumatic injuries and 1,910 were work-related. 321 of the patients with work-related injuries agreed to participate in the survey. There were 285 completed survey forms, forming the basis of our analysis. The patient characteristics are summarised in Table I.

Workers from India formed the majority of those surveyed (40.6%). The "others" group included workers from Malaysia, Myanmar, Vietnam and "westernised" countries like the United Kingdom and Australia. 87% of those in the survey were males and they were mainly between the ages of 20 and 30 years of age (51.4%). 66% (212) of participants had previous work experience either from their home country or elsewhere. At least 45.5% of those surveyed had up to two years' experience of working in Singapore. Those who came to Singapore to work gave "better pay" as the main reason for doing so (54.2%). Only 6.5% chose "a safer place to work" as the reason for choosing to work in Singapore.

Nearly 74% of the foreign workers agreed that they had received some form of training for the job they perform. The training was rated "just enough" or better by three quarters of the workers. 250 patients or 78% answered "yes" to receiving safety training for their work. 83% rated the training "just enough" or better. There appeared to be a positive correlation between standard of training for both job skills and safety ($r_s=0.733$) (Figs. 1 & 2). For those that did not receive safety training, the most common reason was "no training available" (10.5%), followed by "not given time off for training" (2.1%) and "not informed of training" (3.2%).

Looking at individual nationalities and comparing their perception of safety training ratings, the Chinese nationals as a whole felt most that the training was inadequate (26.5%, $p=0.268$). The 20-30 year age group of foreign workers felt most that training was inadequate or worse (15%, $p=0.635$). Those with no previous work experience felt that their safety training was inadequate or worse (16.9%, $p=0.263$). Comparing current job vocation with patient expectation for safety training, 87% in total felt that the safety training was "adequate or better" ($p=0.034$).

With regard to the presence of safety features such as hard hats, overhead shelters, gloves and boots and personal protective equipments in the work site, 18% (48) of the respondents claimed that none were available. Of those who agreed that safety features were present, only 58.6% or 154 actually made use of them for their protection.

The most common reasons for not making use of the safety features included "troublesome or uncomfortable" (43.5%), "not required" (22.6%), and "I know that nothing will happen to me" (27.4%) ($p=0.503$).

67.7% received some form of first aid at the scene of accident provided by their colleagues or supervisors. Majority of the first aid rendered consisted of bandaging of the injured site (33.3%). 10.5% of patients received some simple medications, usually analgesia like paracetamol. For those who did not receive first aid (16.9%), it was because there was either no first aid box available, or no one trained in providing first aid at scene. 9.5% (27) of patients were transported to seek a doctor's immediate medical attention.

274 of the patients (85.1%) had single injuries. The injuries were predominantly in the upper limbs (46.6%) and the eyes (18.3%). The mechanism of injury included machinery-related (29%), being hit by falling objects (24%) and foreign body entry into eye (22%). Penetration by objects into the limbs constituted 15% of the causative mechanisms. 7% sustained injuries as a result from fall from heights, most of them from between one and three metres high.

Injuries to the arms/hands accounted for the majority of injuries among the construction workers (69.9%), fitters (59.4%) and labourers (40.6%). Eye injuries were seen in 56.7% of the welders and grinders (54.5%) (Fig. 3). Lacerations and abrasions accounted for most of the injury type (33.2%). Foreign body entry, mainly to the eyes, formed about 17.7% of the injuries. Fractures, either closed or open, comprised only 19% of the total injuries surveyed. The fractures were mainly involving the phalanges of the hands.

The most frequently utilised diagnostic modality in our ED for these patients was radiological studies, accounting for 206 of those patients surveyed (64%). Nearly 50% of the patients had either toilet and suture or dressing of the wounds done. This was compatible with the findings that the majority of the injury type were those of lacerations and abrasions. Foreign body removal was done in 16.5% of the cases, mainly from the eyes. Eventually, 81 patients (25.2%) were admitted to the general ward of Alexandra Hospital for further treatment. One (0.3%) was admitted to the high dependency unit. The Orthopaedics Department received the most number of admissions (24.2%), followed by general surgery (1.6%). The medical unit received one inpatient for management after electrocution.

Of those that were discharged, 40.1% (129) of patients received 0-3 days of outpatient medical leave, with a mean and mode of five and two days, respectively. The average lost time from work was 17.8 per 1,000 man-hours for those that were discharged from ED. It rose to an average of 91.2 per 1,000 man-hours lost for those who were admitted and had undergone surgery in hospital. Most of the patients (188 or 58.4%) were discharged from the ED with analgesia or other medications only.

Among the supervisors surveyed, about 50% were aged 30-40 years, and were mainly Singaporeans (65%). At least 50% of them had up to six years experience as supervisors. 22 (95.7%) claimed to have received safety training, mainly from the Ministry of Manpower (60.7%) or from their own company (21.7%). The training comprised both classroom and on-the-job training (43.5%). 13 (56.5%) of them had first aid as part of their safety training. The rest were not provided first-aid training (17.4%) nor given time off for training (4.3%). Only two stated that they were not interested in learning first aid, and another two said that they did not learn first aid as it was not part of their job description. However, 69% (16) of them have been called upon to provide first aid. 60% of them felt that without such training they would not have been able to render assistance to their injured colleagues. Interestingly, an equal number of them felt that issues with safety; particularly the lack of them, contributed significantly to their workers sustaining their present injury.

DISCUSSION

Foreign workers are part of the social and economic change that is seen in a nation undergoing positive development. They tend to be employed in jobs that are usually vacant or generally unacceptable to the native workforce. They have to adapt to different cultures, languages, work methods and psychological strains. Various studies have shown that workplace accidents were up to three times more common among foreign workers than native workers^(3,4). The risk was found to be higher in foreign workers who have been in the country for a relatively short time. However, 45.5% of our foreign workers have at least two years of experience in Singapore before the onset of their accident.

Shannon et al⁽⁵⁾ found, in a 1996 study, that lower lost-time accident rates were associated with greater experience of the workforce. Interestingly, this does not seem to be reflective of the situation here in Singapore with our increasing rate of

industrial-related accidents despite almost half of the workers having some previous work experience in Singapore or other countries. This could mean that the workers were getting more complacent about their work routine and taking safety for granted, or that emphasis on safety has been slowly eroded away with time as most of the workers were employed to function in only one role and are not supposed to cross cover other duties or work that they are not trained for. Conversely, those with little or no previous work experience were concerned about their inadequate safety training.

In a survey conducted in 1997 among 444 of a local Spanish-speaking immigrant community, only 15% spoke English. Majority of them belonged to the construction industry. Of these, only two-thirds who received safety training conducted in English understood it⁽⁶⁾. A 1994 episode of carbon monoxide poisoning of five Hispanic workers investigated by George Washington University researchers also identified the need for appropriate training in occupational health hazards⁽⁷⁾.

It is conceivable that language differences may cause misunderstanding of safety procedures and training. Yet safety training in Singapore is supposed to be carried out in an easy to understand manner and in languages understood by the trainees. This may entail the use of interpreters, who are either foreign workers that have been in Singapore for long enough to be able to converse in a mix of their native language and English, or properly trained interpreters. However, this does not completely eliminate the problem, as there often are many nationalities working in the same worksite, each with their own languages and nuances, and their own learning speeds and capabilities.

A younger workforce may be a factor in the rising trend of industrial accidents with the young traditionally being willing to take on larger risks and hence be more reckless at work. Knight et al⁽⁸⁾ noted in a survey among youths with work-related injuries that nearly 45% of them were not aware that they could be injured at work. In our survey, a large group of our injured lie within the 20-30 year old age group. Interestingly, the same age group also voiced the largest dissatisfaction with safety training that was provided. Though statistically not significant, this finding may suggest that despite being young, these workers are not naïve nor ignorant about the inherent dangers and want changes to improve safety at work.

As better pay has been cited as an important factor in bringing these migrant workers to

Singapore, they may be motivated to put themselves at risk of injury to get the job done faster with incentives like bonuses. Though it is comforting that three-quarters of the surveyed workers themselves profess to have undergone training for the job and on safety issues, and that majority of these workers were quite pleased with the training provided, our concern was that about 25% of the workers felt that safety training had not been carried out due to various factors, like training not being provided, not given time off for such training, or inadequate information about such training availability. Kinn et al⁽⁹⁾ attributed this to the nomadic working environment where workers are moved from one worksite to another without receiving updated safety education and training. However, this cannot be used as an explanation in our context as the foreign workers are generally supposed to function in the same roles they were trained in and they are employed very often for weeks to months on a single project.

A key component of a safety program at work must be the ready availability of safety features and equipment. Vaaranen et al⁽¹⁰⁾ and Bull et al⁽¹¹⁾ separately concluded that lack of proper protective equipment was associated with increased work-related injuries. Our finding was a general consensus among majority of the workers about availability of such features. However, close to one-fifth of them reported that no such safety features were present at their workplace. This could represent a serious breach of management's role in ensuring the safety of their workplace. Unfortunately, this study is limited in that the views are one-sided and based on the opinions of the workers; the findings require further investigating.

The attitudes of the workers were also worrying. Despite the availability of safety equipments and features, up to 40% do not make use of them, citing such reasons as "troublesome", "uncomfortable" and what was even more cavalier and filled with bravado, "I know nothing will happen to me". Perhaps, the need for use of safety equipments should be further stressed during safety training sessions. First-aid availability in terms of equipment and trained personnel formed another keystone of a safety workplace programme. Two-thirds of our injured workers received some form of first aid at scene, mainly in the form of bandaging of the injured area. As most of the accidents involve wounds to limbs, this plays an important part in stopping haemorrhage and relieving pain and swelling of the injured part. Yet 17% of the respondents reported

a lack of first-aid equipment or trained first-aiders to provide immediate injury management.

In Singapore, it is mandated in the Factories Act that the employer shall be responsible for provision of the first-aid box and first-aid training. The contents of the first-aid box are clearly spelled out and include crepe bandages, gauzes and sterile water for irrigation of wounds. For worksites with a large number of workers (>500), a first aid room would have to be set up, which would include a bed or couch, clean running water facilities, splints and clean clothing. The ratio of first-aiders in each workplace is determined by the number of workers and also the type of industries. Generally, there will be one first-aider for every 150 workers, though in special industries like shipyard or construction sites, the ratio increases to 1 for every 100 workers. The first-aiders are required to undergo accredited industrial first-aid training courses for which they will be certified. These will have to be revalidated every three years.

The supervisors, majority of whom tend to be native, will often be in a lead position when an accident occurs, as they will be the first person in authority to be informed. Therefore, they would need to know about safety requirements and what to do in the event of a mishap. Though our sample size for supervisors is small, we gathered that they do receive safety training, very often in form of accredited courses direct from the Ministry of Manpower. But only half of them have actually learned about first aid, though up to 70% had needed to provide initial immediate care of the injured at scene. This may be a group of rescue workers that we need to tap for adverse events at work. Hence, training for them in the field of first aid should be actively encouraged.

In studies conducted elsewhere about injuries related to various industries, the most common were wounds like lacerations and cuts to limbs, and eye injuries, particularly foreign body entry⁽¹²⁻¹⁴⁾. Similar findings were noted in our survey. The workers in industries requiring manual manipulation of work materials, like the construction industry, were more likely to have flesh wounds and fractures, whereas those working with blowtorches and hammers were at higher risk of foreign body entry into the eyes as small bits and pieces of the work material come off during their work process.

It is therefore not surprising that radiological studies form the bulk of the ED resource utilisation. Whether the use of such resources is warranted has been a source of debate. Chen et al⁽¹⁵⁾ had pointed out that communication difficulties formed a barrier

to optimal medical care as there may be inadequate history or omission of key facts, leading to a risk of misdiagnosis and mismanagement. Hence, this will often lead to performance of more diagnostic tests than necessary to avoid this medicolegal pitfall. Failure of correct language interpretation can also affect understanding and active participation of the foreigners in the care process, causing poor compliance and inappropriate follow-up^(16,17).

There has been a call for interpretative services to be readily available at key healthcare facilities like the ED and selected primary healthcare clinics to deal with the above problem, but this has met with varying success. The US government has enacted into law financial provisions for health-related interpretative services⁽¹⁸⁾. The state of Washington has an explicit billing code for interpretative services⁽¹⁹⁾. In Singapore, interpretative services are on a voluntary basis. The Thai Embassy provides a Thai interpreter on call for its nationals working here. Within the hospital, there may be fellow nationals working in various capacities who come forward to provide this service free of charge.

The economic cost to the industry and healthcare lies not only with immediate ED resource utilisation, such as in minor surgery for wound repairs, but also with hospital resource utilisation for procedures like open reduction internal fixation of fractures. Foreign workers in Singapore are entitled to subsidised healthcare. But after the occurrence of a work-related accident, the employers will have to bear the cost of healthcare expenditure at non-subsidised rates for both the inpatient hospital stay and subsequent follow-up treatment. Postoperatively, there is often a prolonged convalescent period, during which the workers are, by law, to be fully compensated with their usual wages. As such, there is an added incentive for employers, government agencies in charge of the labour, manpower and healthcare sectors to ensure that safety at work is stressed at training sessions, actively encouraged and properly supervised at work.

A limitation of this study was that it was an observational study designed to capture data regarding the workers' perception about safety at work. The sample taken was a convenient group of patients with injuries presenting to the ED. Potential bias could result as the injured workers may, out of frustration due to their injury, report negatively about their worksite safety. There was no comparison sample of native workers. There were a total of 5,412 traumatic injuries among Singaporeans during the same period. However,

only 583 (10%) were work-related injuries. Hence, the predominant victims of work-related injuries were among the foreign workers. Their views on this matter would be of utmost importance. Based on these studies, there existed a sizeable proportion of foreign workers in the younger age group and those with previous work experience who felt that safety training was unsatisfactory. Though the numbers appeared to be small and not statistically significant, it would be important to verify this perception and correct any shortcomings.

To confirm the workers' perception, it would have been appropriate to check with the employers directly regarding safety training and presence of safety features and equipment. However, this would have been quite a significant undertaking as the workers come from diverse working backgrounds and often, their employers did not accompany them to the ED. To be genuinely certain, one would have to make an unannounced field trip to the worksite to investigate. This may be a possible theme for future research collaboration with the Ministry of Manpower.

In conclusion, the foreign workers in Singapore generally have a positive view about safety at work. However, we must pay attention to the sizable portion of workers who reported problems related to training, safety features and equipment. Much more can be done to improve safety at work so as to reduce the socioeconomic impact of work-related injuries on the healthcare sector, industries and society at large. This may require a multi-agency approach with the ED acting as an injury surveillance centre⁽²⁰⁾.

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