

ORIGINAL ARTICLE

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**LABORATORY-ACQUIRED INJURIES IN MEDICAL LABORATORY: A SURVEY OF THREE REFERRAL MEDICAL LABORATORIES FROM YEAR 2001 TO 2005**

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**ABSTRACT**

**Background:** The occupationally acquired accident and injuries in Malaysian medical laboratories are still largely unexplored prior to this survey. Some of these questions are attempted in this survey and act as source of reference for the number and accident injuries in medical laboratories in the area of Klang Valley and also in Malaysia.

**Methods :** This survey was carried out based on recordable cases throughout the calendar year of 2001 to 2005 from 3 main medical laboratories of Hospital Kuala Lumpur (HKL), Hospital Universiti Kebangsaan Malaysia (HUKM) and Pusat Perubatan Universiti Malaya (PPUM).

**Results :** The average annual incident rate for this three medical laboratories is 2.05/100 full time equivalent (FTE) employees. The annual incident rate in individual medical laboratory is 2.04/100 FTE (HKL), 2.07/100 FTE (HUKM) and 2.04/100 FTE (PPUM) employees, respectively. The most common injury that is 25.3% of the total cases reported was due to cuts by sharp objects and the second most common injury was exposure to biohazard and chemical substances which constitutes 19.9% of the total cases. Needle prick injury (16.8%), fire (8.4%), fall/slip (6.3%) and gases leak and locked in cold room were reported as one case each.

**Conclusion :** The average incident rate from this study is remarkably similar compared with the incident injury rate reported by BLS (2006) which is 2.1/100 FTE in the average size of medical laboratory and diagnostic. Besides this incident rate of injury and illness as a comparison, it also can be used as a benchmark to evaluate the safety performance among medical laboratories in Malaysia.

**Keywords :** Incident rate, medical laboratory, full time equivalent (FTE) employees

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## **INTRODUCTION**

There is no question that health care workers and laboratory personal continue to be at risk for occupational exposure to infectious agents. They are at a high risk of occupational exposure to blood and body fluids of patients, resulting in possible transmission of blood-borne pathogens, such as hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV)<sup>1</sup>. In medical laboratory, there are numerous categories of hazard in workplace such as physical, chemical, ergonomic, psychological and bio-hazard<sup>3</sup>. The risk of occupational transmission of infectious diseases could be substantially precaution<sup>2</sup>. Safety in medical laboratory can be achieved by recognizing the environmental risks in workplace in order to control or reduce them to acceptable levels.

Risk is the likelihood of the harm or undesired event occurring, and the consequences of its occurrence. Whereas, hazard is any source or situation with potential for harm in terms of human injury or ill health, damage to property, damage to the environment or a combination of these<sup>4</sup>. However, hazard in workplace can be identified by several methods, such as accident and ill health statistics, investigations of accidents and incidences, near-misses and occupational ill health<sup>5</sup>.

The knowledge and research on occupationally acquired injuries among Malaysian laboratory workers are largely unexplored prior to this survey. Some of these questions are attempted to address and act as source of reference for the number and incident injuries in medical laboratories in the area of Klang Valley and also in Malaysia. This survey was carried out in three medical laboratories which are Hospital Kuala Lumpur (HKL), Hospital Universiti Kebangsaan Malaysia (HUKM) and Pusat Perubatan Universiti Malaya (PPUM). These three medical laboratories act as referral laboratories in Klang Valley area and also in Malaysia.

## **MATERIALS AND METHODS**

The survey was carried out in 1996 in three medical laboratories, namely HKL, HUKM and PPUM. Data were collected from recordable cases based on logs and records kept by each medical laboratory throughout the calendar year of 2001 until 2005. Further more, this survey also included data concerning the circumstances and nature of the injuries or illness, parts of body affected, event or exposure and cases of near-miss. From the data

the number and incidence rates of nonfatal occupational injuries and illnesses are estimated. Nature of accidents were grouped into different categories such as needle prick injuries, cuts by sharp objects, exposure/spill to biohazard, exposure/spill to chemical, fire, fall/slip, exposure to gases leak, hit by objects and locked in cold room.

## **RESULTS**

There were total of 595 full time equivalent employees (FTE) in three medical laboratories, which consists of 303 FTE in HKL, 155 FTE in HUKM and 137 FTE in PPUM and they had probable risks being exposed to injuries and illnesses from the activities in medical laboratory.

There are a total of 95 recordable cases (Figure 1) from 2001 to 2005 reported in medical laboratory of HKL, PPUM and HUKM. Overall, the cases show an increase pattern, starting from year 2001 with 6 cases, 2002 (18 cases), 2003 (28 cases) and 2004 with 30 cases of occupational accidents reported. However, the reported cases decreased to 17 in 2005. Overall, HKL medical laboratory contributed 48 cases of occupational accidents, HUKM (20 cases) and PPUM (27 cases) (Figure 2).

From the total recordable cases from 2001 until 2005, the major type of injury involved are due to cuts by sharp objects 25.3% (24 cases), followed by exposure to biohazards and chemicals, 19.9% (18 cases), respectively. Whereas, needle prick injury recorded 16.8% (16 cases), fire 8.4% (8 cases), fall/slip 6.3% (6 cases) and gases leak and locked in cold room 1.1% of each cases.

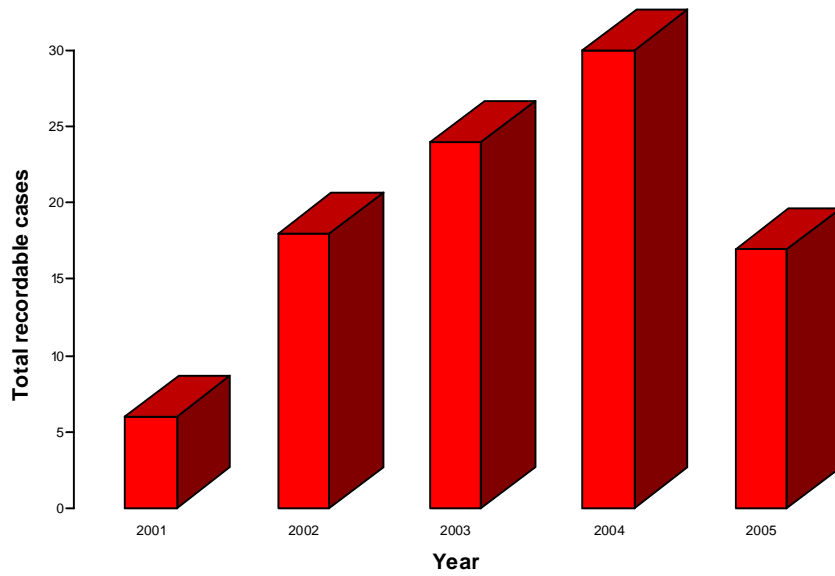


Figure 1 The total recordable accident cases in medical laboratories (HKL, HUKM and PPUM)

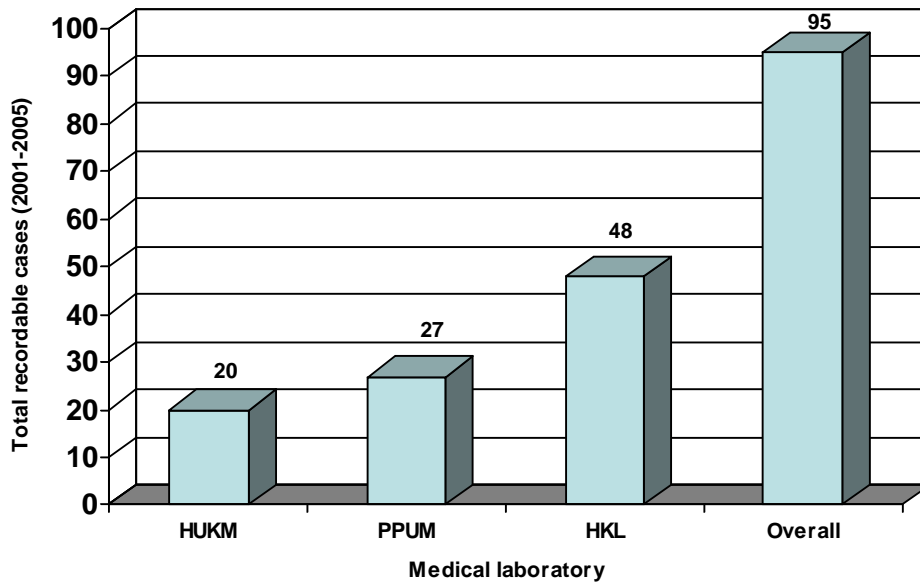


Figure 2 Percentage of occupational accidents by medical laboratories

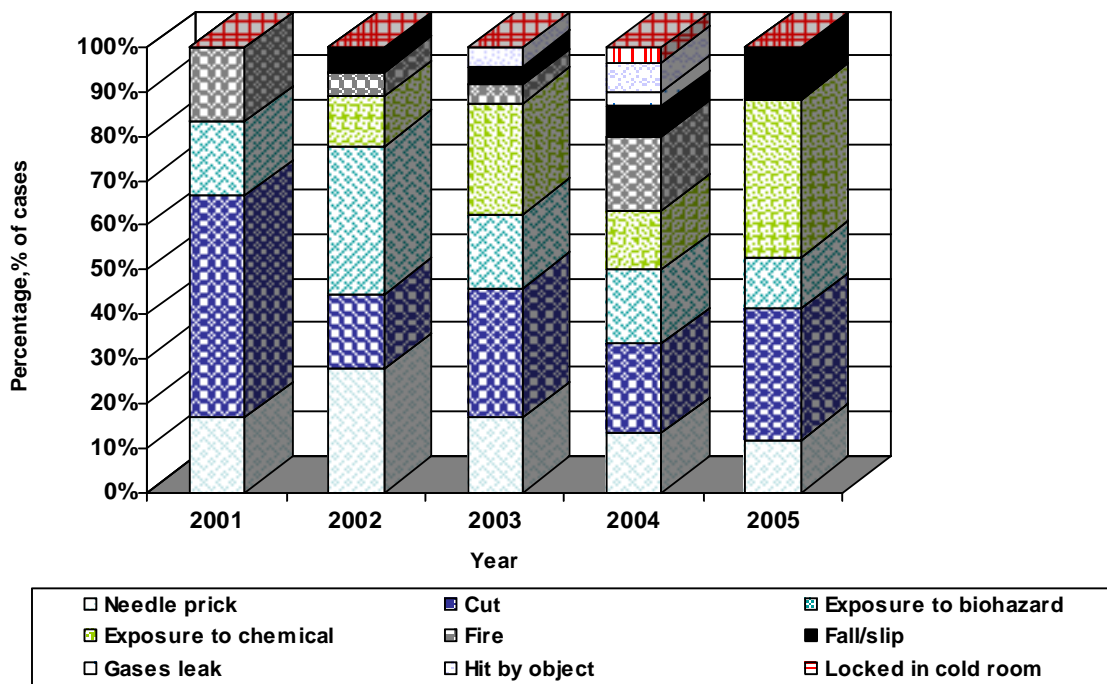
**DISCUSSION**

**Laboratory-Acquired Injuries**

In 2001, there were 6 cases of which the major injuries were due to cut by sharp objects 50% (3 cases) and 1 case each due to needle prick injury, exposure to biohazard and fire. While in 2002, there were 18 reported cases of which 33.3% (6 cases) were involved in exposure to biohazard,

followed by cut by sharp object 16.7% (3 cases), exposure to chemical 11.1% (2 cases), fire and fall/slip 1 case each (1.1%).

In the year 2003, 24 cases were reported with cuts by sharp objects 29.2% (7 cases), followed by exposure to chemicals 25% (6 cases), needle prick injury 16.7% (4 cases) and exposure to biohazard 16.7% (4 cases). Whereas 1 case (1.1%) of each accident of fire, fall/slip and hit by an object was reported.



**Figure 3** Types of occupational accidents in medical laboratory by years

From the overall 30 cases reported in 2004, 20% involved cuts by sharp objects, followed by exposure to biohazards and fire, 16.7% (5 cases), respectively. While both needle prick injury and exposure to chemical was 13.3% (4 cases) and both fall/slip and hit by object was 6.7% (2 cases). Exposure to gases leak and locked in cold room was 1 case each 1.1%.

In 2005, the reported cases declined to 17 cases compared to the previous year where the major occupational accident was due to exposure to chemicals 35.3% (6 cases), followed by cuts from sharp objects, 29.4% (5 cases). There are 11.8% or 2 reported cases, each an accident was due to needle prick injury, fall/slip

and exposure to biohazard, respectively. The cases reported were remarkably similar to the study carried out by Karim & Choe (2000)<sup>6</sup>, which reported that cuts by sharp objects was the most common injuries followed by splashes and squirts by fluid such as blood or chemical.

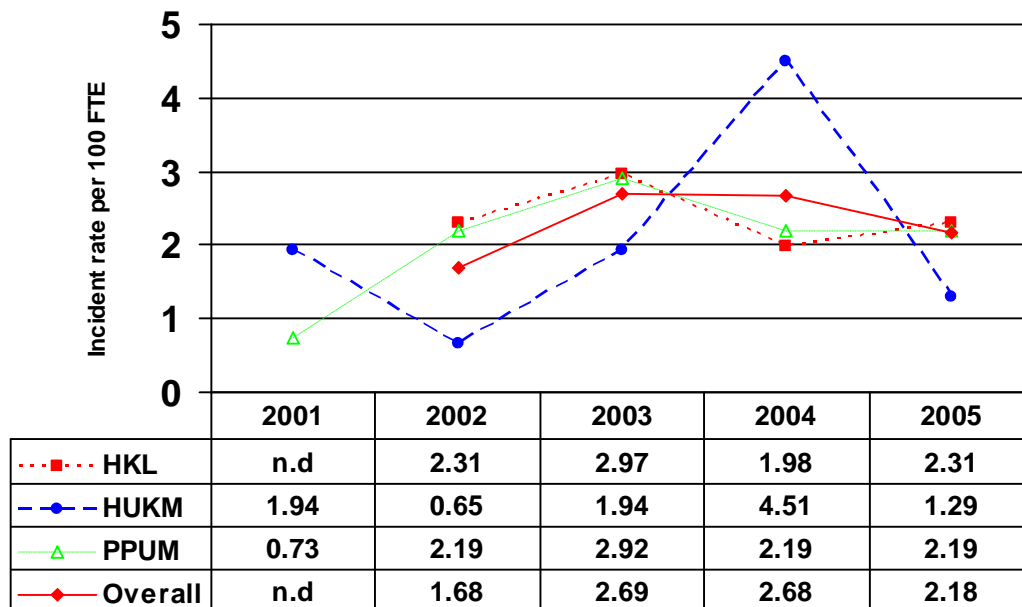
**Incidence of laboratory-acquired injuries**

Incident rate tend to be viewed as an indication of something that is lacking with the safety system. Total incident rate is a mathematical calculation that describes the number of recordable incident that the laboratory experiences per 100 full-time employees in any

given time frame. Recordable incident include all work related to death, illnesses, and injuries which result in a loss of consciousness, restriction of work or motion, permanent transfer to another job within the company, or that require some type of medical treatment or first-aid<sup>7</sup>.

Overall incident rate of recordable cases of injuries was increased in 2003 and steadily flat in 2004 and declined in 2005 (Figure 4). There is no concrete reason behind the decline in the number of recordable cases but it is probably due to the medical laboratory moving towards accreditation.

The overall annual incident rate for FTE medical employees was 2.05/100 FTE. In comparison, the incident rate reported for average medical laboratory and diagnostic in all sizes in the United States by BLS 2006 is 2.1/100 FTE. It shows that the incident rate is similar compared to the BLS 2006 report. The annual incident rate by individual medical laboratory shows that the lowest incident rate recorded by PPUM (2.04/100 FTE), followed by HKL (2.05/100 FTE) and HUKM (2.07/100 FTE).



Incidence rates represents the number of injuries per 100 full-time workers and were calculated as (N/EH) x 200,000

Figure 4 Incident rate by year and medical laboratories

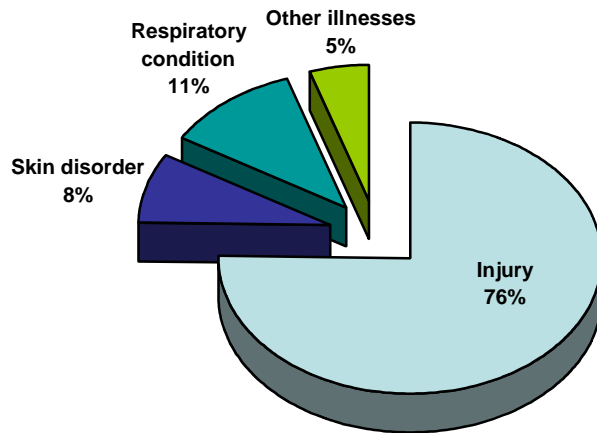


Figure 5 Percentage of incident injury cases by category

The major type of injuries seen in this survey were the injuries which accounted for 76% of needle prick injury, cuts by sharp objects, fall/slip, hit by object and etc., whereas the category of respiratory condition contribute about 11%, followed by skin disorder 8%, and 5% for all other illnesses. The results are not much different compared to the report by Donald & Heidi (1988)<sup>8</sup>, who reported that 63% of hospital laboratory injuries are due to needle stick injury, followed by 21% by cuts or scrapes.

#### CONCLUSION

In comparison, the average annual incident rate for this three medical laboratories are 2.05/100 FTE which is lower compared to the incident rate injury reported for the average medical laboratory and diagnostic in all sizes in the United States which is 2.1/100 FTE<sup>9</sup>. These three hospitals; Hospital Kuala Lumpur, Hospital Universiti Kebangsaan Malaysia and Pusat Perubatan Universiti Malaya act as a referral medical and diagnostic laboratory in Klang Valley and also in Malaysia, were used as benchmark for this survey. These survey report about the incident rates of injuries and illnesses allow us to compare safety record and evaluate the safety performance of a particular or between medical laboratories over time and to evaluate the safety program and identify areas needing improvements<sup>10</sup>.

#### REFERENCES

1. Pournaras S., Tsakris A., Mandraveli K., Faitatzidou A., Douboyas J. and A. Tourkantonis: *Reported needlestick and sharp injuries among health care workers in a Greek general hospital*. *Occup. Med.* 49, (7), 423-426 (1999).
2. Gerberding JL: *Management of occupational exposures to blood-borne virus*. *N Engl. J. Med*; 332:444-451 (1995).
3. David L. Sewell: *Laboratory Safety*. In: *Clinical Laboratory Management*. ASM Press, USA. Pg 446 (2004).
4. MS 1722:2003. Occupational Safety and Health Management System- Guidelines. Department of Standards Malaysia (2003).
5. Steven S. Sadhra: *Hazard identification techniques*. *Occupational Health: Risk Assessment and Management*. Blackwell Science Ltd (1999).
6. Karim N. and Cheo CK: *Laboratory accident- a matter of attitude*. *The Malaysian Journal of Pathology* 2000 Dec;22(2):85-9 (2000).
7. BLS 2006. *Occupational Injuries and Illnesses Incidence Rate Calculator and Comparison Tool*. <http://www.bls.gov/help/def/iirc.htm> (Mac 2007)
8. Donald Vesley and Heidi M. Hartmann: *Laboratory-acquired infection and injuries*

- in clinical laboratories. A 1986 survey. Am J Public Health 1988;78:1213-1215 (1988).*
9. BLS 2006. Bureau of Labor Statistics, US Department of Labor (<http://www.bls.gov/iif/oshwe/osh/ostb1623.txt>- October 2006)
  10. University of Massachusetts Lowell. *Sustainable Hospital Program. A project of the Lowell Center for Sustainable Production.* (<http://www.sustainablehospitals.org>)