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Infectious diseases

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Contents

In a highly interconnected and mobile world, infectious disease knows no borders and outbreaks can cause huge upheavals in society. This was amply demon strated by the international panic and disruption caused by the severe acute respiratory syndrome (SARS) epidemic in 2002–2003. SARS also had the distinction of being the first new occupational disease described in the new millennium (1), as 20% of the cases were occupationally acquired by health care workers.

The SARS threat had barely been contained when another, potentially more severe, threat emerged. Since the first human H5N1 influenza patients were reported in 1997, cases had been infrequent and sporadic until 2003. The number of laboratory confirmed cases has increased markedly since then – from four cases in 2003, to 46 cases in 2004, 97 cases in 2005 and 116 cases in 2006.

As at 11 April 2007, 291 human cases have been reported from 12 countries; 172 of them have died. Most of the cases have originated from countries in the Asia-Pacific region, such as Indonesia, Vietnam, Thailand, China, and Cambodia. A global influenza pandemic may be imminent. Against this ominous backdrop, it is timely that the theme selected for this issue of the Asian-Pacific Newsletter is infectious diseases.

Given the above, a global response is needed to address the threat of infectious diseases. A few promising results and advances have been made. For example, the global outbreak of SARS was successfully contained within a matter of months in 2003. For the present, some hopeful results have been reported on the development of avian influenza vaccines for humans through the concerted efforts of the pharmaceutical industry, national and regional public health bodies and academia. (2)

However, much work remains to be done. The burden of other infectious diseases – such as HIV/AIDS, malaria, and tuberculosis (TB) – is still substantial. These three diseases combined kill approximately 6 million persons a year. Three out of eight Millennium Development Goals, eight of the 16 targets, and 18 of the 48 indicators relate directly to health. HIV/AIDS, malaria and TB feature prominently among these goals, targets and indicators.

According to an ILO report (3), an unprecedented 36.3 million persons of working age are now living with HIV/AIDS throughout the world, with over 3 million labour force participants unable to work because of AIDS-related illness. Prevention and treatment of this disease among people in this group can bring significant benefits to the global labour force and the economy.

350 to 500 million cases of malaria occur every year, causing over 1 million deaths (4). In terms of economic growth, it has been estimated that countries where malaria is intense grow 1.3% less per person-year, when initial poverty, economic policy, tropical location and life expectancy are taken into account. A 10% reduction in malaria was associated with a growth rate that was 0.3% higher (5). Impediments to the control of malaria (and other infectious diseases) include vector control issues, diagnostic challenges, and the emergence of drug resistance. At the same time, the proliferation of low-quality and counterfeit drugs, and the irrational drug use prevalent in the private sector, aggravate the situation.

Tuberculosis remains a major public health problem; approximately 2 billion people worldwide are infected with TB bacilli. Among these people, one in ten will develop active TB in their lifetime. While the highest rates per capita are in Africa (29% of all TB cases), half of all new cases are in six Asian countries: Bangladesh; China; India; Indonesia; Pakistan; and the Philippines (6). The emergence of multi-drug resistant (MDR) and extensively drug resistant (XDR) strains of TB pose additional challenges.

Other infectious diseases have also shown a resurgence. For example, the number and geographical distribution of dengue infections have increased rapidly in the last 25 years. It has been estimated that between 50 to 100 million cases of dengue fever, 500,000 cases of Dengue Haemorrhagic Fever/Dengue Shock Syndrome and over 20,000 dengue related deaths occur every year. (7)

In addition to being major public health concerns, many infectious diseases are also occupational diseases. As such, occupational health personnel, who look after the health of workers and their families, have an important role to play in their control and prevention. Occupational health personnel have a need for knowledge of the epidemiology, aetiology, diagnosis, management, and prevention of infectious diseases. By providing updated information from leading experts in various countries, this issue of the newsletter can hopefully be among the measures addressing that need.

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Asia Pacific Strategy for Emerging Diseases

and

International Health Regulations (2005)

Bee Lee Ong, Ailan Li, Takeshi Kasai, WHO Western Pacific Regional Office

Introduction

The Asia Pacific Region is home to over 3.4 billion people, or 53% of the world's population. Countries in the Asia Pacific Region have long-standing social, cultural, and economic ties, share common borders, and face similar threats to health. A country's ability to protect the health of its population is dependent not only on its own capacity, but on the ability of all countries in the Region to effectively and rapidly identify and respond to disease outbreaks.

The Asia Pacific Region has been the epicenter of many epidemics such as Nipah virus, SARS, and highly pathogenic avian influenza A (H5N1). The outbreaks of emerging infectious diseases have had a profound effect on human health and economic development in the Region. Lessons learnt from these outbreaks have taught us the value of proactive preparedness and rapid response in fighting emerging infectious diseases more effectively. Given the vulnerability of the Asia Pacific, the World Health Organization's (WHO) South-East Asia and Western Pacific regions have joined forces to develop a strategic framework, the Asia Pacific Strategy for Emerging Diseases (APSED), to confront these challenges. The vision of APSED is to minimize the health, economic, and social impacts of emerging infectious diseases in the Asia Pacific Region. Its goal is to improve health protection through productive partnerships for preparedness, planning, prevention, prompt detection, characterization, and containment and control of emerging infectious diseases. The scope of APSED is broad and includes the following interrelated objectives for the short, medium, and long-term capacity required to reduce the threat of emerging infectious diseases, and manage their consequences.

Objective 1 – reduce the risk of emerging diseases
Objective 2 – strengthen early detection of outbreaks of emerging diseases
Objective 3 – strengthen early response to emerging diseases
Objective 4 – strengthen preparedness for emerging diseases
Objective 5 – develop sustainable technical collaboration within the Asia Pacific Region.

It is anticipated that countries in the Asia Pacific Region and their regional partners will use the APSED in the following ways:

- As a strategic document, to guide the development or strengthening of national capacities required for health protection from emerging infectious diseases
- As a framework for the development of stronger collaboration with neighbouring countries, sub-regional, regional, and global networks, and other technical partners, to build a regional safety net for emerging infectious diseases
- As a regional strategy to achieve core capacity requirements for surveillance and response, under International Health Regulations [IHR] (2005)
- As a Strategy document for national and regional advocacy for adequate, equitable, and sustainable health financing arrangements (including resource mobilization and donor coordination), human resources development, and sustainable knowledge, skills and technology transfer.

WHO APSED Work Plan

A 5-year WHO APSED Work Plan, for the implementation of APSED from 2006 to 2010, has been developed to achieve the five strategic objectives, through prioritizing activities, and implementing them effectively. The work plan set out the following core-capacity building goals for the Asia Pacific Region. All countries and areas of the Asia Pacific Region will have the minimum capacity for epidemic alert and response by 2010. There are six programme areas in the APSED Work Plan: surveillance and response, laboratory, zoonoses, infection control, reducing vulnerability through effective communication, and WHO regional functions and activities. Urgent activities for responding to avian influenza, preparing for rapid response and containment of emerging pandemic influenza at the source, improving pandemic preparedness overall, and meeting core capacity requirements under IHR (2005), have been incorporated into the Work Plan.

The WHO Technical Advisory Group for Emerging Infectious Diseases, which met for the first time in July 2006, has been tasked with reviewing the Work Plan annually, and recommending changes to its scope and direction, if required. At its meeting, the technical advisory group recommended that APSED and the APSED Work Plan should act as a framework and guide for countries and partners to meet the IHR (2005), and to strengthen national and regional capacities for infectious disease surveillance and response.

In September 2006, the fifty-seventh session of the WHO Regional Committee Meeting for the Western Pacific reviewed the technical advisory group recommendations, and urged each of its Member States to develop a country APSED Work Plan, to achieve the above minimum capacity goal. The country plan should be developed and implemented, to meet the surveillance and response capacity development obligations required, under the International Health Regulations (2005). The APSED implementation cycle is summarized in Figure 1.

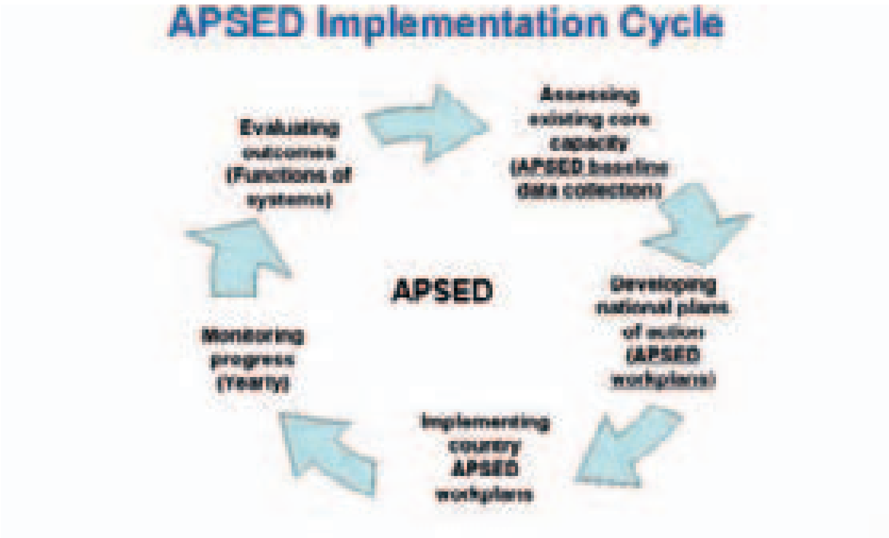

Figure 1. APSED implementation cycle

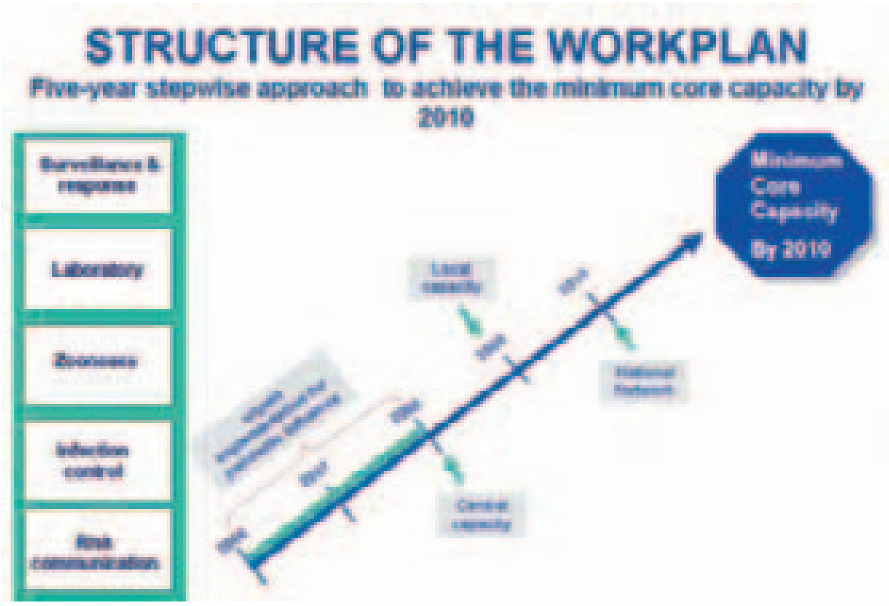

Figure 2. Structure of the workplan. Five-year stepwise approach to achieve the minimum core capacity by 2010

APSED and the IHR (2005)

The IHR is a legally binding international instrument for protecting global public health. The current IHR, in force since 1969, defines notification requirements and measures, only for three infectious diseases: cholera, plague and yellow fever. The IHR has undergone substantial revisions to enable an effective response to the challenges of infectious disease threats in the world today. The revised IHR (2005) was adopted by the Fifty-eighth World Health Assembly in May 2005, and will enter into force in June 2007. The revised IHR (2005) requires Member States to notify WHO, of any event that may constitute a public health emergency of international concern, and to respond to requests for verification of information regarding such events. National IHR Focal Points will provide and receive information from WHO 24 hours a day, seven days a week. This enables WHO to ensure that appropriate technical collaboration is provided for effective protection during such emergencies and, under certain defined circumstances, that other Member States are informed of public health risks that merit action on their part. The IHR (2005) also specifies the core capacities Member States must have for surveillance and response, and for designated airports, ports and ground crossings. The APSED has been developed to enable countries to fulfil many of the IHR (2005) obligations, especially the core capacity requirements for surveillance and response.

The relationship between the WHO APSED Work Plan and the National APSED Work Plans

To assist countries in aligning their APSED implementation plans with that of WHO, a checklist for countries has been developed which parallels the activities described in the WHO APSED Work Plan, for Programme Areas 1–5 (Figure 2). Under the IHR (2005), country assessments of existing capacities and capabilities for epidemic alert and response set the baseline for further capacity strengthening to meet these core capacities.

Work with partners

The implementation of APSED should be led by countries of the Asia Pacific Region and be based on well-developed country Work Plans and supported by continuing, strong political commitment. WHO will continue to play an important role in providing technical support to Member States.

The APSED has also been developed as a strategic framework for the development of stronger collaboration with neighbouring countries, sub-regional, regional and global networks, and other technical and supporting partners. Therefore, potential partners in implementation of the APSED include other organizations and institutions that can provide technical, financial and political support. WHO will continue to work closely with its existing partners and form new partnerships to support capacity-building of the countries.

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HIV/AIDS prevention in Malaysia

Contribution of the Department of Occupational Safety and Health

Faridah Amin, Veronica Lugah, Malaysia

AIDS is the number one killer of people in Africa and the number four killer of people worldwide. As of the end of 2005, an estimated 38.6 million people were living with HIV/AIDS worldwide. ASEAN Member Countries, with a total population of about 550 million people and varied demographic and socioeconomic characteristics, have an estimated 1.5 million people living with HIV/AIDS. In Malaysia, by December 2004, there were 64,439 reported HIV infections with 9,442 reported AIDS cases (Ministry of Health Malaysia, 2005).

The cases of HIV infection have primarily occurred in the high-risk groups, i.e., injection drug users (IDUs), sex workers and their clients, men who have sex with men and partners of people living with HIV/AIDS. The most frequent mode of HIV transmission is sharing of contaminated needles among IDUs, which contributed to 75.1% of all the reported cases. However, the spread of HIV is quickly gaining momentum through sexual intercourse, both heterosexual (13.6%) and homosexual (1.1%).

Important contributing factors to the wide spread of HIV include migration and mobility among the working population, especially those employed in the manufacturing and construction industries. In recent years there has been an influx of immigrants from the neighbouring countries into Malaysia whilst there was simultaneously a significant internal migration from rural to urban areas. Migrants and mobile people travelling to new, unfamiliar locations often without their families, living under duress, fighting loneliness, with a newfound freedom and access to disposal income, are more prone to engage in behaviours that make them vulnerable to HIV.

The Department of Safety and Health (DOSH) is responsible for ensuring the safety, health and welfare of persons at work and for protecting other people against the safety and health hazards arising from the activities in the workplace. Recognizing the significance of the link among the working population between mobility and HIV, DOSH set out to lead in:

i) Advocacy for the HIV/AIDS cause and sensitization of employers to the need to provide HIV-infected people with equal opportunity for employment
ii) Ensuring that the rights of HIV-positive persons to full employment and education opportunities are not eroded as a result of HIV infection
iii) Clearing up misunderstandings and misconceptions about HIV/AIDS that lead to prejudice and discrimination toward HIV-positive persons
iv) Discouraging the practice of compulsory HIV antibody testing.

During June and July 2000, DOSH carried out a survey on the perception and awareness among industries regarding HIV/AIDS at the workplace. The findings showed that the majority of employers in Malaysia perceived that the threat or problem of HIV/AIDS to the enterprise and the national economy is ***not*** significant and does not affect productivity. The employers seemed to believe that the most vulnerable group is the unskilled and lowly educated group. The survey also indicated that the percentage of workers infected with HIV/AIDS is very small.

DOSH had published the Code of Practice (COP) on Prevention and Management of HIV/AIDS in the Workplace which was officially launched on the 4th of September 2001. This COP, applicable to all employers and workers and any workplace, has three objectives: to serve as guidelines to employers and workers on ways of preventing and managing HIV in the workplace; to promote education and awareness pertaining to HIV and AIDS; and to promote a non-judgmental, non-discriminatory work environment. The key principles adopted are similar to those in the *ILO Code of Practice on HIV/AIDS and the World of Work*. The official launching was aimed at explaining the content of the COP in order to convince employers and employees of the need to formulate and implement policy on HIV/AIDS in the workplace.

Since publication of the COP, DOSH has organized road shows, including seminars on HIV at the workplace. These seminars, which have been conducted throughout the country, were targeted at employers, managers, workers, unions and NGOs. Up to the year 2004, seven seminars have been held: at Kuala Lumpur, Selangor, Johor, Pulau Pinang, Pahang, Sabah and Sarawak.

DOSH has also launched a pilot project to implement the COP in order to assist and guide the industries in implementation of the COP at their workplaces. Up to December 2006, 33 workplaces have participated in the project. In line with this activity on disseminating information about the COP, DOSH has developed four training modules on HIV/AIDS in the workplace:

i) A module on implementation of the COP (for use in seminars)
ii) A two-day training module for resource persons (DOSH officers and other government agencies)
iii) A module for worker education, developed with assistance of Malaysian AIDS Council, Malaysian Trade Union Cooperation and other NGOs
iv) A module to train the trainers for worker education.

An officer from the Department has also been on radio talk shows dealing with the subject of the Code of Practice on HIV in the workplace. The DOSH website also has a webpage on HIV/AIDS at the workplace (http://dosh.mohr.my).

From 2006 onwards, DOSH has planned to embark on implementing the second phase of the COP at workplaces. More industries would be involved in the promotion and awareness campaign on HIV/AIDS, with a special emphasis on industries where the migrant and mobile working population is greater, i.e. manufacturing and construction. In fact, each state in Malaysia has been asked to identify one factory or industry per year to be included in the second phase of the project. These activities would benefit a bigger group of workers by increasing their level of awareness on HIV/AIDS, and would therefore further prevent HIV infection among them.

Launching of the HIV/AIDS logo in a factory

Conclusion

The HIV/AIDS pandemic presents political, economic, public health, social and scientific challenges to nations worldwide. If more is not done to fight the HIV/AIDS pandemic, its course will make it one of the worst pandemics in history, with millions more people estimated to become infected by the end of this decade. Sustaining and increasing current efforts to meet the need remain significant challenges in the fight against HIV/AIDS.

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Protecting health workers from occupational exposure to HIV, hepatitis, and other bloodborne pathogens: from research to practice

Photo by Susan Wilburn

Case studies

Waste worker injury in India: "It was a routine day for Kalish, until he put his hand to clear the plastic liner of a dustbin. He felt a sudden sting and jerked his hand back to see blood dripping from his finger. How had the needle found its way into a dustbin that was not meant for the purpose? Nobody knew" (1).

Health worker hepatitis B infections in Vietnam: A group of 5 health workers in a Vietnamese hospital stood around talking about their infection with hepatitis B. These four nurses and one physician remarked about the countless number of exposures to blood that they had experienced during the previous 10 years of work. These exposures were not reported nor documented and as a result there was no evidence of which of the occupational exposures, if any, had resulted in the infection.

Susan Wilburn
Gerry Eijkemans
World Health Organization

Introduction

Needlestick injuries and occupational exposures to the human immunodeficiency virus (HIV) and other bloodborne viruses are a common hazard faced by health workers. Despite low-cost, effective means of prevention, the occupational health of health care workers has not been prioritized. This article will discuss the nature of the risk to health care workers related to bloodborne pathogens, methods to control hazards, and address issues and barriers to prevention. It will furthermore describe the goals and successes of the WHO project Protecting health workers – preventing needlestick injuries, along with resources from WHO and other international agencies for health worker protection.

For these and millions of other health workers worldwide, needlestick injuries and other exposures to blood are all too common.

Needlestick Injuries (NSIs): nature and prevalence of the problem

It is estimated that worldwide, 12 billion injections are given annually and many of these injections are unsafe – for the patient if the needle is not sterile or the worker from exposure to a contaminated needle after its use (2).

Approximately 3 million health care workers (HCWs) experience needlestick injuries exposing them to bloodborne viruses each year. This results in an estimated 16,000 hepatitis C, 66,000 hepatitis B, and 200 to 5000 human immunodeficiency virus (HIV) infections annually (3). While more than 90% of these infections occur in low-income countries, most of the programmes for exposure control and data regarding occupational transmission come from high-income countries. Regardless of the setting, most of the exposures and infections are preventable.

Who is at risk of transmission?

All health workers who use sharps in the course of their work: nurses, doctors, and laboratory technicians are at risk of a needlestick injury or other occupational exposure to bloodborne pathogens. Cleaners and waste handlers are also at risk if they are required to handle sharps as part of their job, such as cleaning instruments or removing needles for disposal or when waste is not disposed into a puncture resistant container. Globally, nurses report the greatest number of needlestick injuries followed by laboratory workers and physicians (3, 4).

According to the WHO, the global burden of disease from sharps injuries to health care workers includes 40% of all hepatitis infections and 4.4 % of all HIV infections among health workers (3).

The risk of health care worker infection following a needlestick injury from an infected source patient depends on the virus. The Hepatitis B virus is about 10 times more transmissible than hepatitis C virus, which in turn is more easily transmitted than HIV.

Determinants of transmission of infection

The risks of transmission of infection from an infected patient to the HCW following a NSI are: (5, 6)

Hepatitis B 3–10% (up to 30%)
Hepatitis C 0.8–3%
HIV 0.3% (mucous membrane exposure risk is 0.1%)

Factors that can increase the risk of transmission of HIV include a deep wound, visible blood on the device, a hollow-bore blood-filled needle, use of the device to access an artery or vein, and high-viral-load status of the patient. (7, 8) Taken together, these factors can increase the risk of transmission of HIV from a contaminated sharp to 5%.

The most common injuries occur from syringes with needles used for injections. Two of the most common causes of the injuries are recapping needles and the lack of use of sharps containers (safety boxes) at the site of the injection (3, 4, 8, 9, 10, 11).

The highest risk exposures come from blood filled devices, such as those used to access an artery or vein, for example, phlebotomy needles and needles used for inserting intravenous access lines (6, 8, 9). Among the documented cases of occupational transmission of HIV by the U.S.CDC, 90% of the cases resulted from a needlestick injury from a hollow-bore blood-filled needle.

Factors that contribute to needlestick injuries (3, 5):

- Overuse of injections and unnecessary sharps
- Lack of supplies: disposable syringes, safer needle devices, and sharps-disposal containers
- Lack of access to and failure to use sharps containers immediately after injection
- Inadequate or short staffing
- Recapping of needles after use
- Lack of engineering controls such as safer needle devices
- Passing instruments from hand to hand in the operating suite
- Lack of awareness of hazard and lack of training.

Some data from Asia

In Asia in 2006, an estimated 8.6 million people were living with HIV including, over 1 million adults and children who were newly infected. In East Asia, South and South-East Asia, over ° million died from the virus. In the previous 2 years from 2004–2006, the number of people living with HIV increased in every region of the world with the most striking increases in East Asia, Eastern Europe and Central Asia, where the number of people living with HIV in 2006 was over 21% higher than in 2004 (12).

The WHO Burden of Disease from Sharps Injuries study reports that the prevalence of hepatitis C infection among hospitalized patients in China is 12.7% and the prevalence of hepatitis B infection is 16.7% (3).

It is estimated that only 39% of health workers in the Western Pacific Region that includes Southeast Asia and China are immunized against hepatitis B and that the proportion of hepatitis B and C among health workers attributable to occupational exposure is 36% and 41%, respectively. Hospitalized patients, in general, have a higher prevalence of these infections than the general population (3).

While it is the HIV epidemic that has stimulated attention and occupational health regulations to protect health workers from exposure to bloodborne pathogens, hepatitis is much more prevalent and more infectious than HIV. Although hepatitis B is preventable with immunization and HIV transmission is significantly reduced with post-exposure prophylaxis no immunization exists for hepatitis C so that prevention of exposure is even more important.

Preventing and controlling occupational exposures

Analysing the root cause of the injury or exposure is necessary to target specific measures for prevention. The most effective way to prevent the transmission of blood-borne infections is to prevent the needlestick injury and as a result prevent exposure to blood. Primary prevention of NSIs is achieved through the elimination of unnecessary injections and elimination of unnecessary needles. The implementation of education programmes, Universal Precautions, elimination of needle recapping, and use of sharps containers for safe disposal have reduced NSIs by 80%, with additional reductions possible through the use of safer needle devices (10, 13, 14).

Control measures to prevent NSIs are described in the table on page 10 (15) according to the traditional hierarchy of controls with the most effective control measures at the top of the table.

Universal or Standard Precautions

Universal Precautions (UP) are a set of measures taken to prevent exposure to blood. The definition of Universal Precautions means that all patients regardless of their known serological status should be considered to be infected with a bloodborne pathogen and treated as if infected. A new term, Standard Precautions, which includes precautions for airborne as well as bloodborne infection transmission, has come into practice in the past few years, superceding Universal Precautions (16, 17, 18).

These administrative controls have been widely promoted in high-income

Table 1. Hierarchy of controls applied to risk of bloodborne pathogen exposure reprinted from Joint ILO/WHO guidelines on health services and HIV/AIDS (15)

Method of control	Efficacy of control measure
Elimination of hazard – complete removal of a hazard from the work area. Elimination is the method preferred in controlling hazards and should be selected whenever possible. Examples include: removing sharps and needles and eliminating all unnecessary injections. Jet injectors may substitute for syringes and needles. Other examples include the elimination of unnecessary sharps like towel clips, and using needleless IV systems.	IV needleless systems were shown to be 78.7 per cent effective in reducing IV-line related needle-stick injuries over one year in a Canadian study.
Engineering controls – controls that isolate or remove a hazard from a workplace. Examples include sharps disposal containers (also known as safety boxes) and needles that retract, sheathe or blunt immediately after use (also known as safer needle devices or sharps with engineered injury-prevention features).	Sharps containers reduced injuries by two- thirds. A review of seven studies of safer needle devices demonstrated a reduction in injuries from 23–100 per cent with an average of 71 per cent.
Administrative controls – policies aimed to limit exposure to the hazard such as Universal Precautions. Examples include allocation of resources demonstrating a commitment to health-worker safety, a needle-stick injury prevention committee, an exposure control plan, removing all unsafe devices, and consistent training on the use of safe devices.	Poor safety climate and reduced staffing was associated with a 50 per cent increase in needle-stick injuries and near misses.
Work practice controls – reduce exposure to occupational hazards through the behaviour of workers. Examples include no needle recapping, placing sharps containers at eye level and at arms reach, emptying sharps containers before they are full, and establishing means for the safe handling and disposal of sharps devices before beginning a procedure.	Elimination of recapping resulted in a two-thirds reduction in needle-stick injuries.
Personal protective equipment (PPE) – barriers and filters between the worker and the hazard. Examples include eye goggles, gloves, masks and gowns. PPE will prevent exposures to blood splashes but will not prevent needle-stick injuries.	Double gloving in the surgical setting reduced puncture of the inner glove.

countries to protect health care workers (HCWs) from occupational exposure to blood and the consequent risk of infection with bloodborne pathogens. In low-income countries, the situation is very different: UPs are often practised partially, if at all, thereby exposing the HCWs to unnecessary risk. When health workers do not practise UP, they often minimize the risk of needlestick injury when they do not know that the patient is infected. Where Universal Precautions are not in place, patients infected with bloodborne viruses are more often labelled (even at the bedside with a loss of their confidentiality) and workers single out those patients in order to be "more careful" instead of treating all blood carefully because it is potentially infectious (18, 19, 20).

Reporting and stigma

The underreporting of needlestick injuries is a serious problem. 40–80% of all injuries go unreported (3–4).

This is a problem for three major reasons:

- The injured health worker does not receive appropriate care and follow-up.
- There is no opportunity to evaluate the circumstances of the injury to consider changes in policy, practices or products that could prevent similar exposures in the future. No injury data are available to be used for the purpose of prevention.
- There is no documented record of the injury in the case of later infection.

Common reasons are given as to why workers do not report their injuries:

- "Not a serious exposure"
- Uncertainty of confidentiality
- Did not know who to report to
- No access to post-exposure prophylaxis (PEP) or perceived lack
- Fear of discipline and job loss
- Fear of being tested and of results
- No relief from duty.

In the absence of access to post-exposure prophylaxis, there is little perceived benefit to reporting occupational exposures, especially when reporting can result in punishment, blame, job loss, and being forced to be tested for HIV with no guarantee of confidentiality. When on-site evaluation and treatment is not available, workers who are sent to the infectious disease clinic across town for follow-up may not be able to receive antiretroviral medication, if needed, on a timely basis.

In addition to fear of punishment and fear of testing, health workers commonly minimize the risk of the exposure: "I didn't think it was a significant exposure OR the patient did not have (documented) HIV or hepatitis". Supervisory personnel sometimes reinforce this when they should urge immediate evaluation and follow-up of the exposure and provide release time from their duties to report on a timely basis.

Barriers to reporting should be identified and eliminated in order to ensure appropriate care and treatment of health workers to prevent infection as a result of exposure.

Periodic anonymous surveys have been used to ascertain the rate of reporting prior to and after implementing programme changes to control exposures. In this way, an increase in the proportion of injuries being reported in response to improvements in the exposure control and post-exposure programmes will not be misinterpreted as an increase in the number of injuries to workers.

Health workers in many countries in the world, including Asia, have not been educated in occupational bloodborne hazards and lack knowledge about the risk and nature of occupational risk (11, 18, 20, 21). The lack of knowledge about HIV/AIDS is evidenced by the fact that many nurses surveyed believed that HIV could be transmitted from patients by sharing of tubs and toilet seats. This inaccurate information contributes to stigmatization of patients with HIV and fear of caring for them. Accurate information about the risk of HIV transmission from occupational exposure to needlesticks and the greater risk of hepatitis transmission to workers is necessary and should include information about the most effective measures to control exposure and infection. In a World Bank guidance note written for protecting health workers in Asia from bloodborne pathogen exposure and infection the authors state: "Healthcare worker fear of contamination by HIV, hepatitis, or opportunistic infections, such as tuberculosis has a direct impact on the provision of care and treatment to patients, their families and the community" (4).

Raising awareness among health workers of their true risk of infection, reducing exaggerated fears of HIV transmission, increasing knowledge of the impact of unsafe injections on patients and workers, and implementing exposure control programmes that demonstrate a commitment on the part of hospital management and ministries of health to health worker safety will improve both patient and worker safety. In this way the definition of a safe injection according to the WHO Safe Injection Global Network: "A safe injection does not harm the recipient, does not expose the provider to any avoidable risks and does not result in waste that is dangerous for the community" can be realized.

WHO project: Protecting healthcare workers – preventing needlestick injuries

The WHO project: Protecting healthcare workers – preventing needlestick injuries was developed in 2003 by the WHO occupational health programme in collaboration with the International Council of Nurses (ICN) utilizing and modifying tools from the SIGN tool box (http://www.who.int/injection_safety/toolbox/en/) which were then piloted in three countries: South Africa, Tanzania and Vietnam, to address the occupational health of health workers (22). Funded by the U.S. National Institute for Occupational Safety and Health (NIOSH), the goals of the project are to raise awareness of the problem of occupational exposure to bloodborne pathogens among health workers and decision-makers in national ministries, as well as in hospitals, to build a commitment among management and involvement of workers for occupational health of health workers and to capacity building for the implementation of policy, exposure control programmes, surveillance systems of sharps injuries, post-exposure follow-up and prophylaxis, and immunization of health workers against the hepatitis B virus.

Key elements of the project are listed below. The details, tools, and resources to assist countries and hospitals to implement these elements can be found in English and in Spanish on the WHO website at: http://www.who.int/occupational_health/activities/pnitoolkit/en/index.html.

Key elements

1. A national planning meeting is held. Management commitment and worker involvement are essential. The creation of a needlestick prevention committee or health and safety committee with representatives of frontline workers and responsible managers is key to the success and sustainability of the programme at the institutional level.
2. An initial assessment is conducted and includes interviews with workers and supervisors, surveys and observations of policy, products (adequacy of supplies of products), and policy. The written policy is reviewed to determine the existence or need for policy regarding prevention and post-exposure prophylaxis. Practices to be observed include: giving injections, drawing blood samples, and insertion of intravenous lines to note whether practitioners recap needles. The availability, placement, and use of sharps containers (safety boxes) should be assessed.
3. Set up or modify, as needed, a surveillance system for exposures to blood
4. Establish a written exposure control programme, including post-exposure follow-up and prophylaxis
5. Provide information, education, and communicate to all staff about the hazards, the exposure control programme and how they can participate in prevention
6. Ensure adequate supplies and access to: sharps containers, Post Exposure Prophylaxis (PEP), and the hepatitis B vaccine
7. Provide supportive supervision and monitoring of practices
8. Feedback to needlestick prevention committee and other stakeholders.

In Vietnam, the project established a partnership between professionals in infection control, occupational and environmental health, and nursing at the national and at the hospital levels creating a needlestick prevention committee for local implementation and monitoring of results. The results demonstrated an increase in knowledge and awareness of health workers about the hazards, changes in products (enhanced personal protective equipment and sharps containers) and practices (hand hygiene and elimination of recapping). Working conditions for health workers and waste management programmes were improved. The likelihood of sustaining these changes is increased through the ongoing monthly work of the on-site needlestick prevention committees (11, 22). As a result, the Ministry of Health drafted new regulations on safe injections and preventing needlestick injuries.

The project is now extending to Egypt and Venezuela as pilots for those regions, scaling up the results and incorporating occupational health principles and components into other injection safety and infection prevention and control programmes throughout southern Africa, and in Vietnam and Tanzania, expanding the topics to include all occupational hazards to health workers.

Since the initiation of this project and growing recognition of the need to support and protect health workers in order to provide quality health care, WHO has developed two additional projects, the Global Health Workforce Alliance and the HIV Treat, train, and retain programme both with components regarding working conditions that include attention to occupational health of health workers. (see http://www.who.int/workforcealliance/en/; http://www.who.int/mediacentre/news/releases/2006/pr37/en/index.html)

Hepatitis B Immunization Campaign

The WHO Occupational Health Programme is planning a global campaign to immunize health workers against the hepatitis B virus. Hepatitis B is the most common, most easily transmitted, and most easily prevented of the bloodborne viruses to which health workers are exposed. The 2003 WHO burden of disease report on sharps injuries revealed the high burden of hepatitis attributable to occupational exposure and the low rate of immunization among health workers. As a result, the WHO Global Plan of Action on Workers' Health that will be on the agenda of the World Health Assembly in May 2007 includes a campaign to immunize all health workers. WHO will develop guidelines for immunizing health workers similar to those guidelines for the successful campaign to immunize children under 5 years against hepatitis B, the 10th leading cause of death worldwide (23).

Summary

Health care workers are essential to the provision of quality health care services and should be protected from occupational hazards. In addition, the health workforce is entitled to the same rights as all workers – to a safe and healthful workplace. Unsafe working conditions contribute to global shortages of health care workers. The 2006 World Health Report calls on countries to protect and support health care workers. The WHO Global Plan of Action on Workers' Health which will go before the World Health Assembly in May 2007 includes a strong component on health workers and calls upon national health ministries to establish a programme of health worker health and safety.

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Introduction

A high thermal load in a tropical country combined with metabolic heat increases body temperature and may cause heat disorders in hot climates (1). Numerous studies have been carried out all over the world in the field of industrial heat stress, to find out its effect on industrial workers, which leads to degradation of performance, production and quality of work (2, 3, 4). In India there is still very little data in this area, and what is available is not recent, making it difficult for Indian researchers to explore further.

Industrial heat stress

This is a matter of great concern in India, the climate being hot and humid most of the time. Industries dealing with hot metals, glasses, etc. are unique examples. Hot summer months add greatly to this thermal stress (5), and due to high humidity and low air movement heat stress occurs. Such conditions prevail in the textile, tanning and paper industries (6). These can be controlled by design: e.g. factory design, with provision for natural air and ventilation helps remove heat from factory shop-floors (3). Apart from this, vertical and horizontal concrete fins prevent direct sun rays from heating up the factory walls (7).

Physiological effect of heat stress

Cardiovascular system

The effect of heat stress has been most significant on the cardiovascular system of the body as reported by different authors (3, 7, 8, 9, 10). These studies were mainly carried out on workers in steel rolling mills, glass factories soap manufacturing factories, etc. There was a significant increase in heart rate and blood pressure.

Respiration/Oxygen uptake/energy expenditure

It was observed that in industrial conditions in India, the limit of continuous stress work should be 50% of the

Heat stress in industry:
A problem in India

maximum oxygen uptake of the workers, this being applicable when working conditions are cooler (10). Sen (3) also observed a variation in energy expenditures in different industrial tasks performed by workers.

Temperature, humidity and performance

An easy job became difficult (8) at a temperature of 100^0 F and relative humidity over 85%. Sen and Sarkar (9) reported that the maximum physical work capacity of all workers was found to diminish gradually with an increase of temperature.

Age

The maximum working capacity of industrial workers decreased with age (11). Older workers were not able to tolerate high thermal stress as well as younger workers.

Sweat gland activity

In a study in three different departments of a soap factory in Mumbai, Sen et al. (12) found maximum sweat secretion (0.621 lit/hr) in the DPU of a pan room (one of the departments) and minimum (0.284 lit/hr) in the resin breaking department. In another study in a steel rolling mill in Mumbai, Sen et al. (13) observed that dehydration in hot humid conditions was 2.6%.

Protective measures against heat stress

Physical capacity of workers

The persons selected should have a good circulatory system and their physical condition should be such that they can perform the job. Generally, young and thin persons are better suited than overweight persons, as fat prevents heat loss (5).

Acclimatization

Workers should be gradually exposed to high environmental heat. It should be increased from 1 hour to 6 hours a day, increasing by one hour a day. This should take a week (5).

Replacement of water

In India a man working very hard in hot and humid conditions requires about 1 litre of water per hour; for a sedentary worker the requirement is almost half of this (14). High thermal loads in a steel rolling mill increase the chances of dehydration, leading in turn to lower efficiency. Thus, under such conditions, drinking of 200 to 400cc of water every 15 minutes is recommended (8).

Rest pauses

Frequent breaks while improving ventilation reduced the heat stress of the workers (4). This is necessary, as continuous work in high environmental conditions gives rise to strain. A good night's sleep is an important factor in trying to achieve maximum efficiency for working in a hot environment (5).

Conclusion

Industrial heat stress is a serious problem in India, leading not only to problems of health and work ability, but also to a decline in productivity and the quality of work. This needs to be tackled at the local level. Expensive solutions from the western world would not work in most cases, because of the huge cost factors involved. A solution which would benefit both the people and the country in the long run would be low cost and high technology based on locally available material.

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Evaluating the experiences of Vietnam in controlling human influenza A (H5N1)

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Introduction

The World Health Organization (WHO) has warned that a mutation of the H5N1 avian influenza virus may generate a new influenza virus strain that is highly pathogenic, easily spread among the population and fatal to mankind.

Since 1997, many Asian and African countries have confronted an avian influenza (A (H5N1) virus) pandemic threat. WHO has reported infections in 15 countries since the end of 2003, as well as several cases of infections and deaths in Asia and Europe.

A pandemic outbreak among humans could have a great impact on a country's economy, on the activities of society, and on the population's health and life. According to cautious estimates by WHO, in Vietnam if approximately 8.2 million people out of a population of 82 million (10%) would be infected with avian influenza, the number of fatal cases could be 820,000 (1%). Consequently, it would be necessary for 16 million people to have preventive treatment, and 8.2 million (10%) would be cured.

In late 2003 and early 2004, Vietnam had A (H5N1) avian influenza pandemic outbreaks among poultry, and at the same time, a pandemic of the subtype of A (H5N1) influenza occurred among humans. Since the first infection was recorded on 26 December 2003, three epidemic outbreaks have been reported in the country. These occurred four months apart and resulted in 93 infections (including 42 deaths) spread over 32 provinces/cities.

This article is a descriptive report of all infected cases of Influenza A (H5N1) in Vietnam in the period 2003–2005. We analyse 64 reports filed by the Provincial Centers of Preventive Medicine and describe four reports by Institutes of Hygiene and Epidemiology/Pasteur.

Results

Epidemiological characteristics of infected cases (H5N1) in Vietnam

Time and location of the infected cases:

- The first case was recorded on 24 December, 2003 in Ha Nam province
- The last case was recorded on 14 November, 2005 in Hai Phong province.

Infected cases were reported in a total of 32 provinces/cities.

Provinces with higher numbers of infected cases are: Hanoi city, Thai Binh province, Ha Tay province, and Haiphong city.

- The numbers of both cases and deaths were high in winter and spring (in the months of January, February and March). However, several cases were recorded in other months of the year.
- The year 2005 has the highest number of infected cases; 70.9% of the total. The case/fatality ratio decreased year by year.

Table 1. The infected cases classified by location and time

Waves	Time	No. of infected provinces	No. of infected cases	No. of deaths
Wave 1	24 Dec 2003–10 Mar 2004	13	23	15
Wave 2	19 July 2004–26 Aug 2004	3	4	4
Wave 3	16 Dec 2004–14 Nov 2005	27	66	23
Total		**32**	**93**	**42**

Table 2. The infected cases classified by year

Time	Number of infected cases	Percentage	Number of deaths	Percentage
2003	4	4.3	4	100.0
2004	33	35.5	16	48.8
2005	66	70.9	22	33.3
Total	**93**	**100.0**	**42**	**45.1**

Gender and age groups of the infected cases

Table 3. Those infected classified by gender

Gender	Incidence	Rate
Male	48	52.6
Female	45	47.4
Total	93	100.0

- The number of women was lower among the infected cases compared with men.
- The highest number of infected cases (23% of all infected cases) occurred among the age group of 21 to 30 years old.
- The average age of patients was 26 years, the youngest was 4 months old and the oldest was 81 years old.

The average duration of time between exposure and the date of hospitalization was 5 days, that from becoming ill to the time of death was 10 days and that from infection to recovery was 5 days. The number of days in hospital ranged from one day to 90 days.

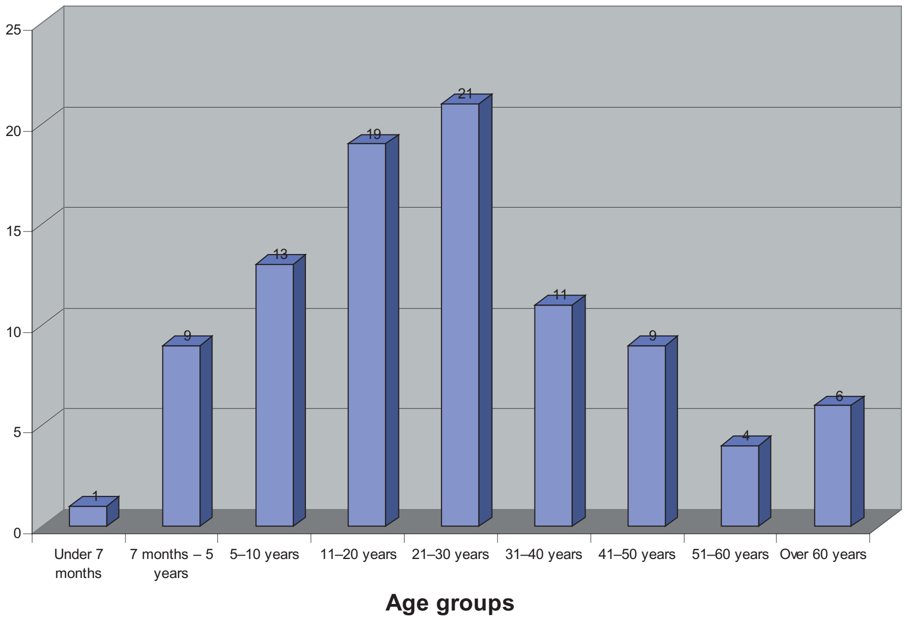

Figure 1. Those infected classified by age group

Table 4. History of the patients

History	Incidence	Rate
Eating meat or blood of infected chicken	35	37.6
Directly contact with poultry	6	6.4
Having infected poultry around the living quarters	20	21.5
Working directly with poultry	2	2.1
Unclear	30	32.2
Total	**93**	**100.0**

67.8% of the patients had been exposed to poultry; 37.6% had eaten meat or blood of infected chicken.

Table 5. Durations of symptoms and treatment

Duration	Average (days)	S.D. (days)	Longest (days)	Shortest (days)
From exposure to the date of hospitalization	5.03	± 2.9	15	1
From becoming ill to the time of death	10.5	± 5.2	23	1
From infection to recovery	4.8	± 11.9	90	1

Solutions for epidemic prevention and control

Organization

- Steering Committees have been established at all administrative levels (central, province, district, and municipal levels)
- The National Steering Committee for SARS and Human Avian Influenza Control and Prevention, chaired by the Minister of Health and including representatives of related ministries and governmental branches, holds weekly meetings in order to update the situation concerning the pandemic and to direct preventive measures.
- The Committee is comprised of four specific divisions:
  - Division of pandemic monitoring and controlling
  - Division of treatment
  - Division of information
  - Division of logistics.

Governmental direction

- Guideline documents have been promulgated by the Government, including Instructions 53/CT-TU, 34/CT-TTg, 29/2006/CT-TTg, Decree no. 37/NQ, which mobilize all political and social resources participating in epidemic prevention and control.
- Decision 1731/QD – TTg, which organizes supervisory groups of members of the Cabinet (of which the leaders are Ministers) with the tasks of checking, supervising and giving guidance for local areas.
- Decision 309/2005/QD – TTg, which provides financial support for activities to control and prevention epidemics.

Prevention activities

- Just after the disease emerged in other countries, the Ministry of Health timely informed the border quarantine units, the provincial centres of preventive medicine and other health institutes, initiating active supervision, prevention and control of the disease nationwide.
- The Ministry of Health assigned responsibility for direct prevention and

control of the disease to four central institutes. These were:

- National Institute of Hygiene and Epidemiology: 29 provinces in the North.
- Nha Trang Pasteur Institute: 11 provinces in Central Vietnam
- Ho Chi Minh Pasteur Institute: 20 provinces in the South
- Tay Nguyen Institute of Hygiene and Epidemiology: 4 provinces in highland area.

• The national action plan was completed and approved by the Government, providing local governments with guidance in building local action plans.

• A pilot exercise for prevention and control of the pandemic was carried out in three areas: Northern, Southern and Central Vietnam.

• A laboratory with bio-safety degree 3 was built at the National Institute of Hygiene and Epidemiology and at Ho Chi Minh Pasteur Institute.

• Medicine and equipment were made ready for controlling the disease.

• Staff members in the preventive sector were trained in supervision, response and outbreak control.

• Four solutions were worked out for preventing transmission of the disease from poultry to humans.

Treatment activities

• Guidance for diagnostics, treatment and preventing virus (H5N1) infection were issued.

• Health workers working at all levels, especially those working directly with patients, received training.

• Hospitals responsible for admitting and treating patients were named.

• Locations were prepared for quarantine and isolation in the case of widespread transmission of the disease.

Information activities

Information was publicized about the rapid spread of the epidemic. The four solutions for preventing transmission of the disease from poultry to human, recommendations, and messages for controlling the epidemic were publicized in the mass media, especially through broadcasts on the Vietnam television.

Internal cooperation

• Tight cooperation among the members of the National Steering Committee has been pursued in working to prevent the spread of the disease.

• The medical sector and the veterinary sector have cooperated densely supervising households and keeping each other informed timely in order to have suitable responses.

International cooperation

Intensive, effective support and cooperation, both technical and financial, are needed from international organizations and NGOs.

Lessons learned

1. The highest political commitment. The Politburo issued a Directive to provide guidance on the implementation of emergency measures to contain the highly pathogenic avian influenza (HPAI) in poultry and influenza in humans and to mobilize all available resources.
2. The establishment of the National Steering Committee. The aim was to prevent a pandemic of HPAI (H5N1) among humans. This Committee is chaired by the Minster of Health and the National Steering Committee (NSAI), chaired by the Minister of Agriculture and Rural Development.
3. Good collaboration and coordination between the Ministry of Agriculture and Rural Development, the Ministry of Health, other ministries and organizations to implement preventive activities and large-scale information education campaign by all mass media channels.
4. Good experiences of preventing and controlling infectious diseases that could cause pandemic, especially in responding to SARS.
5. The preventive medicine system, from the central level to the local level, was utilized well, involving prevention measures, surveillance and early detection of infected cases so they would receive appropriate treatment. Good experience in sharing information and mobilizing support from international organizations, and other Governments.

Major challenges

The following major challenges in controlling infectious epidemics have been recognized:

1. Avian influenza (H5N1) is a new and emerging disease. There is a lack of full knowledge about the transmission mechanism, the clinical spectrum, treatment and prevention.
2. The bulk of poultry is raised by households in the backyard.
3. Vietnam has a long boundary and no efficient way to stop illegal importation of poultry and animal products. Veterinary resources are not strong enough to fight the diseases. Capacity and resources for surveillance, research and response are limited.
4. There is no vaccine for human protection at present.
5. The public needs to be aware of the importance of the disease.
6. There are no efficient measures to prevent transmission of the disease from wild and migrating birds.

Conclusions

Vietnam has learnt valuable lessons of exploring, responding to, treating and developing a vaccine for prevention of human avian influenza (H5N1). As in all public health programmes, primary prevention is the most effective strategy. In addition, the following points were concluded in Vietnam:

1. It is important to have a nationwide alert system for communicable diseases, from central to local level, and especially to acquire the participation of the people in community, most of whom have actively implemented the activities to control the epidemic.
2. It must be ensured that the first infected cases are found so that all control activities can be carried out, such as quarantine, protection of health workers, isolation, and strict supervision of persons coming into contact with the infected. It is also important to strengthen health quarantine in border areas; this includes transport by air, land and waterways.

3. High-level involvement and effective consideration by the Party and the Government is needed in directly guiding activities to control the epidemic. Close cooperation among ministries, sectors of society, and organizations is also needed to control the epidemic. The National Steering Committee was established in a timely manner, with a tight co-operative organization to direct the activities. The subcommittees for supervision, treatment, information, and logistics worked very effectively. This timely political commitment at high level played an important role in controlling the epidemic effectively at short notice.
4. Communication activities aiming for communicable control were implemented well. These included the publicizing of information about the rapid spread of the epidemic to people in communities, recommendations and messages for controlling the epidemic were published in the mass media and, especially, were broadcast on the Vietnam television. These made the spread of information more effective.
5. Intense and effective support and cooperation from international organizations and NGOs, in both technical and financial issues, were also important.

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Congresses

European NanOSH Conference – Nanotechnologies: A Critical Area in Occupational Safety and Health

Helsinki, Finland
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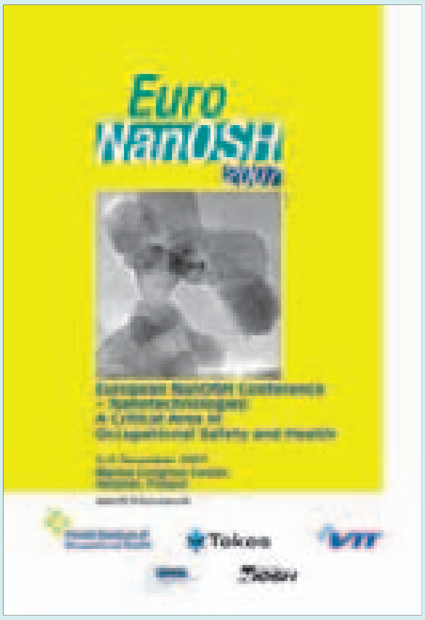

The EuroNanOSH Conference will discuss global safety issues surrounding nanoparticles and nanotechnologies, in occupational safety and health in particular; and will provide insight into future actions for assuring the safety, and thereby the future success of nanotechnologies. Safety is the key for future success of nanotechnologies.

More information on the Conference is available at **http://www.ttl.fi/euronanosh**.

Organizers: Finnish Institute of Occupational Health in collaboration with the TEKES – Finnish Funding Agency for Technology and Innovation and VTT Technical Research Center in Finland. The Conference is supported by the ISPESL, Italy, and the National Institute for Occupational Safety and Health in USA.

XVIII World Congress on Safety and Health at Work

Safety and Health at Work: A societal responsibility

Seoul, Republic of Korea
29 June – 2 July 2008

The XVIII World Congress on Safety and Health at Work is to be held at the COEX Convention Centre, Seoul, Rep. of Korea, from 29 June to 2 July 2008. It is organized jointly by the International Labour Office (ILO), the International Social Security Association (ISSA) and the Korea Occupational Safety and Health Agency (KOSHA).

World Congresses on Safety and Health at Work take place triennially and provide an important opportunity for decision-makers, safety and health professionals, employers' and workers' representatives, as well as experts from social security to learn from each other and to exchange information with peers from around the world. For the first time in the history of the World Congress, a safety and health summit will be held, to which high-level leaders and officials, corporate chief officers, senior employers' and workers' representatives and noted academics will be invited with a view to placing safety and health at work high on the world agenda.

The programme will include an international safety and health exhibition, a film and multimedia festival, technical sessions, symposia and other events. The official languages of the Congress will be English, French, German, Spanish and Korean.

Further information is available from:
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Tuberculosis among garments workers: magnitude of the problem in Bangladesh

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Introduction

Tuberculosis is increasing globally, partly because of concomitant HIV infection; poverty and a lack of social welfare and public health services contribute substantially (1). In the USA there were 26,246 tuberculosis cases in 1991, a rise of 18% since 1988 (2). The situation in Third World countries is even worse.

In Bangladesh, two nationwide epidemiological surveys on tuberculosis were carried out in the years 1964–65 (3) and 1987–88 (4). These two surveys showed that there has been no substantial change in the prevalence rate for tuberculosis over a 25-year period. At present the incidence of sputum-positive tuberculosis in Bangladesh is 99 per 100,000 and that for cases of all forms of tuberculosis is 221 per 100,000 (5).

Tuberculosis is prevalent in an overcrowded and unhealthy atmosphere (6). Inhalation of tubercle bacilli from droplet nuclei is a common mode of spreading of the disease (7).

Factories producing ready-made garments are the main industry earning foreign currency in Bangladesh. One million people are working in about 4,000 garment factories in Dhaka city. In almost all of these factories, workers of a low socioeconomic class work in overcrowded conditions, owing to paucity of floor space. In such conditions, the spread of tubercle bacilli from an infected worker to another is most likely.

Methods

This was a cross-sectional study which quantified the distribution of tuberculosis among garments workers of Dhaka city, Bangladesh. In total 2,400 garments workers were recruited for the study. At first, 30 garment factories were selected by using the stratified random sampling method. In this process, two garment factories from each of 15 Thanas (administrative unit) were selected in order to cover all garment factories of Dhaka city. At each factory included in the sample, 80 garment workers were then selected by a simple random sampling technique.

Consent from those selected for the sample was obtained after the investigation procedure had been fully explained. Persons not providing consent were excluded from the study. Two teams were formed for data collection. All members of the teams were physicians led by a pulmonologist. Data were collected from the selected garment workers through face-to-face interview using a pretested structured questionnaire. Based on the predetermined criteria, suspected pulmonary tuberculosis cases were screened. The criteria for suspected tuberculosis cases were:

1. Persistent cough, with or without sputum, and having lasted for more than 2 weeks
2. Fever for more than 2 weeks
3. Pain in the chest for more than 2 weeks
4. Single episode of haemoptysis
5. Unexplained weight loss during a 1-month period
6. Unexplained loss of appetite for more than 1 month.

A patient having one or more of the above was considered as a suspected case (8).

All suspected cases were taken to the National Institute of Diseases of the Chest and Hospital (NIDCH) for thorough physical examination, chest X-ray (P/A view), erythrocyte sedimentation rate, Mantaux test and sputum for acid-fast bacilli (3 consecutive samples).

A definite diagnosis of pulmonary tuberculosis was then made on the basis of the following protocol:

- AFB present in the sputum (9)
- Any shadow suggestive of pulmonary tuberculosis in chest X-ray, with Mantaux test ≥ 16 mm (10).

The presence of either of the above two criteria was considered as indicating a definite case of pulmonary tuberculosis.

Results

Out of the 2,400 garments workers initially selected, 2,281 workers participated in the study. Table 1 shows the characteristics of the garments worker population. More than two-thirds of the garments workers were female and the majority were under 21 years of age. The mean duration of garment workers' schooling was 4.98 years. Figure 1 shows the nature of work of the study population. Sewing/linking was the main job of garments workers (46.3%) followed by weaving/knitting (14.4%)

9.3% of the workers had no idea about tuberculosis as an important disease. Only 3.4% of the workers knew correctly that tuberculosis is transmitted through inhalation. 10.5% of the workers had a history of contact with tuberculosis. Only 27.4% of the workers had evidence of a BCG scar, indicating that despite the extensive drive of the Expanded Program on Immunization (EPI) in the country, a considerable population of workers had not received BCG vaccination. Table 2 shows the prevalence of suspected pulmonary tuberculosis. 10.5 % of the workers had clinical features suggestive of pulmonary tuberculosis (95% confidence interval 9.2-11.8). No significant difference was observed between male and female workers suspected of having the disease.

9.6 per 1,000 workers had definite pulmonary tuberculosis. Sputum-positive cases numbered 1.75 per 1,000 workers. All were new cases who had not received any treatment for tuberculosis in the past.

Except for age, no significant difference was observed between the group with suspected tuberculosis and those not suspected. It was demonstrated that workers aged 31 years or more have a significantly greater chance of developing tuberculosis or tuberculosis-like presentations than workers in the age group of 20 years or less.

Discussion

This cross-sectional study confirmed that the incidence of pulmonary tuberculosis among garments worker in Dhaka, Bangladesh is relatively higher than among the general population. The chance of new cases was greater among the group of workers aged 31 years than among those 20 years of age or less. Gender characteristics, the nature of the work, the level of education, monthly income, working hours, the number of persons living per room, the number of persons per bed and smoking history did not increase the chance of tuberculosis in the same way as the features of garments workers. As the total number of definite cases of pulmonary tuberculosis cases was 22 out 2,281 subjects, the risk of tuberculosis among the workers could not be calculated. Most of the workers were between 16 and 30 years of age, and the number of female workers was twice that of males. 76.7% workers were literate, of them about 69% workers were educated up to primary or secondary school level. This group of

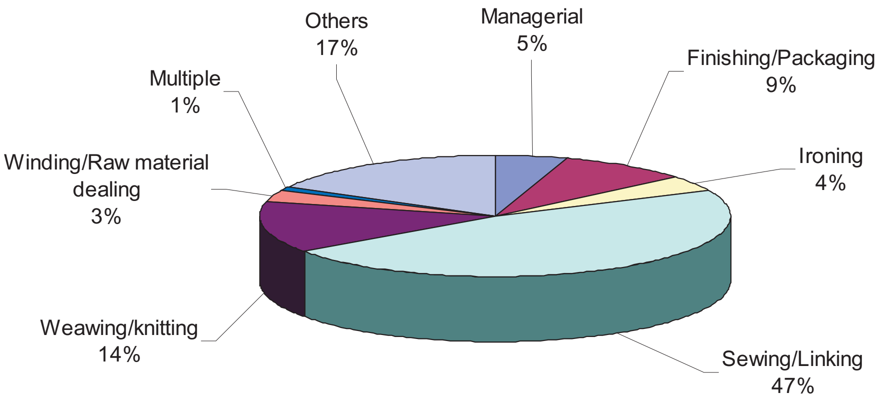

Figure 1. Nature of work of the garments workers

Table 1. Socio-demographic characteristics of the garments workers studied

Variables	Number (n=2,281)	Percentage
Age		
20 years and less	1,300	57%
Mean age + SD	21.9 years + 6.5	
Sex		
Female workers	1,575	69%
Education		
Literacy	1,749	76.7%
Mean years of schooling + SD	5 years + 3.8	
Income		
Monthly income < 2500 Taka (USD 50)	1,737	76.2%
Immunity status		
Evidence of BCG scar	625	27.4%
Living and working conditions		
Average number of persons living in same room + SD	4 + 1.7	
Average number of persons sleeping in same bed + SD	2.5 + 1.0	
Average daily workhours + SD	10.9 hours + 1.6	

Table 2. Incidence of pulmonary tuberculosis among garments workers in Dhaka city, Bangladesh

Tuberculosis	Frequency	Percent	95% confidence interval
Suspected cases	239/2,281	10.5	9.2–11.8
Males	73/706	10.3	8.1–12.5
Females	166/1,575	10.5	9.0–12.0
Definite pulmonary tuberculosis	22/2,281	0.96	0.62–1.48
Sputum-positive pulmonary tuberculosis	4/2,281	0.18	0.06–0.48

Table 3. Crude and adjusted odds ratio (OR) and 95% confidence interval (CI) for the association of selected risk factors and suspected TB among garments workers

Variables	***No***	***Suspected TB***	***Non-suspected TB***	***OR****	***95% CI***
Age (years)					
20 or less	1,300	122	1,178	1	
21–25	473	50	423	1.16	.80–1.67
26–30	320	41	279	1.45	.97–2.17
31 and above	188	26	162	1.63	1.00–2.68
Gender					
Male	706	73	633	1	
Female	1,575	166	1,409	.91	.61–1.36
Nature of work					
Managerial	122	12	110	1	
Finishing/Packaging	208	19	189	.95	.43–2.12
Ironing	82	8	74	.97	.35–2.64
Sewing/Linking	1,056	127	929	1.30	.64–2.66
Weaving/Knitting	329	32	297	.99	.47–2.09
Winding/Raw material dealing	75	8	67	1.14	.42–3.09
Education					
HS+	169	15	154	1	
Primary	860	92	768	1.88	.93–3.78
Secondary	720	66	654	1.57	.80–3.08
Illiterate	532	66	466	1.23	.65–2.33
Monthly income (US $)					
More than 50	544	59	485	1	
Less than 50	1,737	180	1,557	1.04	.72–1.49
Working Hour					
8 hrs or less	231	23	208	1	
9–10 hrs	889	82	807	.95	.57–1.56
11–12 hrs	855	91	764	1.10	.67–1.79
More than 13 hrs	306	43	263	1.45	.83–2.51
No. of person per room					
1–2	528	60	468	1	
3–4	987	102	885	.83	.57–1.21
5 and more	766	77	689	.81	.52–1.33
No. of person per bed					
Single	218	25	193	1	
Double	1,200	121	1,079	.83	.52–1.32
Three or more	863	93	770	.94	.57–1.56
Smoking History					
No smoking	2,120	216	1,904	1	
Active smoking	161	23	138	1.57	.92–2.69

* Variables mutually adjusted for each other

workers was thus better educated than the general population since according to the national population census of 2001, the literacy rate in Bangladesh is only 48% (11).

Since no corresponding study had been carried out in Bangladesh in the past, there were no data for comparisons. However, the Institute of Nutrition and Food Sciences of Dhaka University had carried out a survey on the nutritional status of the female garment workers in Dhaka city in 1997. It showed that 15.5% of the workers were underweight. 56% had an inadequate serum level of vitamin A, with 14% having pronounced vitamin A deficiency. 44% of the study subjects were found to be anemic. This survey clearly indicated that garment workers in Bangladesh have a poor nutritional and health status (12).

Another case-control study that assessed the magnitude of respiratory problems among garments workers in Dhaka city revealed that 42% of the garments workers had some sort of respiratory ailment; this was higher than the prevalence among the controls (15%). The garment workers also showed lower results in pulmonary function measurements such as FVC, FEV1 and PEFR (13).

It is important to note that about 89% of the workers were working more than 8 hours a day, were living in overcrowded conditions and more than 90% shared a bed. Though 90.7% of the workers recognized the word tuberculosis as a dreadful disease, only 3.4% answered correctly that it is transmitted by airborne route, indicating an unsatisfactory level of health awareness.

Although 10.5% of the garments workers reported a history of exposure to tuberculosis, we were unable to correlate their reports with the incidence of tuberculosis, as the sample size was small.

Out of 2,281 workers, 239 (10.5%) had features suggestive of tuberculosis. The male to female ratio was 1:1. After additional examinations, 22 cases were confirmed as definite tuberculosis (9.6/1,000). This finding is about four times greater than the estimated national figure of tuberculosis in Bangladesh in the year 2000 [9.6/1,000 versus 2.38/1,000 (9)]. The sputum-positive rate among the subjects of this study was 4/2,281 (1.75/1,000), which is also about 1.6 times more than the estimated national figure [1.75/1000 versus 1.06/1,000 (9)].

A large-scale survey of tuberculosis among 2,592,541 textile workers in China detected 7,294 active tuberculosis cases (14). The prevalence rate was 181 per 100,000. There were 1,100 smear-positive cases, the prevalence rate being 42 per 100,000. There were more sputum-positive cases in our series (175 per 100,000 versus 42 per 100,000). The incidence rate was determined in our series; still the rate was much higher (960 per 100,000) than the total prevalence rate of tuberculosis (181 per 100,000) among textile workers in China. Although similar working conditions prevail in both countries, the poor primary health care system and a low level of health awareness may be additional risk factors for this higher incidence rate in Bangladesh. Further study should be carried out in order to determine the risk factors of tuberculosis among garment workers of Bangladesh.

Conclusions and recommendations

The work environment and health monitoring system in garment factories should be improved and expanded to include detection of tuberculosis as a priority. Garment workers should be brought under the national TB Control Program. Internationally-recommended TB Control Strategy, DOTS should be implemented in the places of work, particularly where clusters of workers are working together.

Effective health education programmes should be conducted regularly among garment workers. Smear-positive patients should be asked to abstain from work until conversion. Moreover, the employers should be convinced not to terminate the employment of tuberculosis patients. They should be allowed to work after completion of the intensive phase or sputum conversion. Otherwise the workers will refrain from seeking health care, for fear of losing their jobs.

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Occupational exposure to hepatitis B virus among Korean health care workers

Bo-Moon Shin, Korea

Introduction

Hepatitis B virus (HBV) infection is highly prevalent in Africa and East Asia, occurring among 5 to 20% of the population. In Korea, its prevalence has decreased since the HBV vaccination was introduced. Nevertheless, the prevalence of HBV infection is still higher than that among health care workers in America and Western Europe, where it ranges from 2 to 6%. Moreover, health care workers are exposed to patient's blood occupationally, through needles and sharps injuries (NSI) and through direct contact with mucous membranes or skins. The most prevalent bloodborne pathogen associated with NSI in Korea has been found to be HBV (30.4–55.8%), followed by hepatitis C virus (HCV; 3.8–13.1%), syphilis (4.5–11.4%) and HIV (2.7–3.2%). Therefore, health care workers in Korea are more frequently exposed to HBV than to any other bloodborne pathogens.

Characteristics of NSI exposures among Korean health care workers

Registered nurses have been reported to be the most frequently exposed occupational group, followed by doctors, housekeepers, aid nurses and technicians. One study reported that almost 95% of Korean nurses may be exposed to NSI at some point in their career, and that younger than average nurses incurred an NSI risk 3.1 to 4.5 times higher than that of nurses who were older than average. Therefore, the proportion of exposed women is higher than that of men among the working population, and more than 50% of exposures have occurred among health care workers working less than three years.

Table 1. Distributions of HBsAg and Anti-HBs results according to occupations

	HBsAg (+)/ Anti-HBs (-)	HBsAg (-)/ Anti-HBs (+)	HBsAg (-)/ Anti-HBs (-)	Total
Doctor	0 (0%)	36 (64.3%)	20 (35.7%)	56 (100%)
Nurse	9 (3.1%)	230 (79.6%)	50 (17.3%)	289 (100%)
Technician	2 (1.8%)	88 (77.9%)	23 (20.4%)	113 (100%)
Aid nurse	3 (2.7%)	85 (75.2%)	25 (22.1%)	113 (100%)
Total	14 (2.4%)	439 (76.9%)	118 (20.7%)	571 (100%)

The types of procedures associated with NSI were blood sampling, recapping and disposal of the syringe/needle, giving injections and opening an ampoule or vial, operation, invasive procedure and procedures for blood sugar tests. The major instruments of exposures were a syringe/needle, blade and suture needle. Direct contact with blood by splashing was another cause of exposure. The places where NSI exposure occurred were usually the operating room, intensive care units, the emergency room, the laboratory and general wards.

Seroprevalence of HBV among health care workers in Korea

It is necessary to consider how NSI can be managed and prevented among health care workers. Health care workers having NSI should be counselled and tested promptly to determine their seroconversion status. It is also necessary to determine the current HBV, HCV and HIV status of the person from whom the NSI originated.

A survey done in 2003 revealed that the prevalence rates of HBsAg in Korea showed a decreasing tendency, from 1.9% among adults to 0.2–0.3% among elementary school children. A study done in 2006 reported that the positive rates of HBsAg and anti-HBs of Korean health care workers were 2.4% and 76.9%, respectively (Table 1). The anti-HBs positive rates of Korean health care workers were reported to be about 70–75% when they had been exposed to NSI. Therefore, the overall HBsAg and anti-HBs positive rates among Korean health care workers were similar to those among the general Korean population. However, the positive rate of HBsAg and anti-HBs were the highest among the group of nurses (3.1% and 79.6%). On the contrary, the positive rate of anti-HBs was the lowest among the group of doctors (64.3%) (Table 1). This was most likely due to the fact that nurses are more frequently exposed to the NSI or other infectious body fluid from patients than any other occupational group. According to the anti-HBs titers, titers exceeding 1,000 mIU/mL anti-HBs were prevalent among the doctors' and nurses' groups, when compared against the groups of aid nurses and technicians (25 and 23.2% vs. 17.7 and 12.4%) (Table 2).

The rate of anti-HBs negative cases

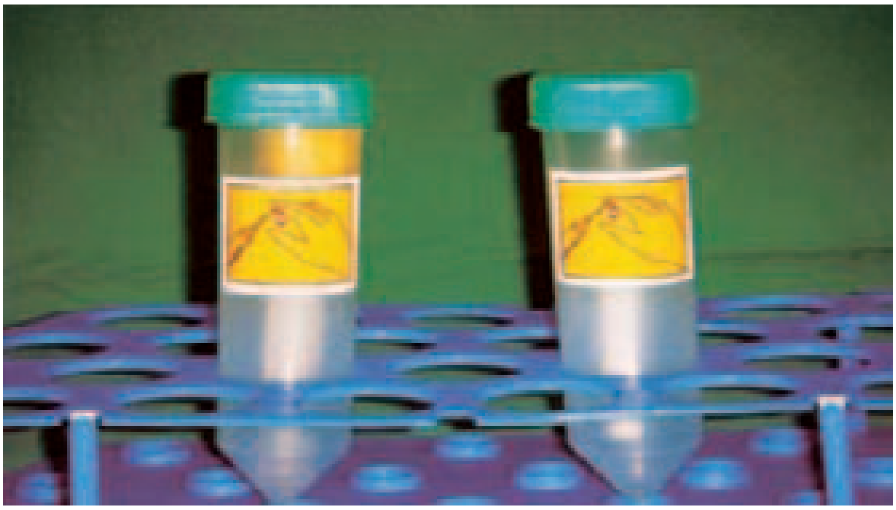
Table 2. Distribution of Anti-HBs titers according to occupations

titers	<10	10–<100	100–<1000	>1000	Total
Doctor	20 (35.7%)	7 (12.5%)	16 (28.6%)	13 (23.2%)	56 (100%)
Nurse	59 (20.4%)	56 (19.4%)	108 (37.4%)	66 (22.8%)	289 (100%)
Technician	25 (22.1%)	23 (20.4%)	51 (45.1%)	14 (12.4%)	113 (100%)
Aid nurse	28 (24.8%)	32 (28.3%)	33 (29.2%)	20 (17.7%)	113 (100%)
Total	132 (23.1%)	118 (20.7%)	208 (36.4%)	113 (19.8%)	571 (100%)

among Korean health care workers was reported to be about 20–25%. HBV is the only bloodborne pathogen that can be prevented by post-exposure injection of immunoglobulin and vaccination. Therefore, HBV vaccination was strongly recommended for health care workers whose anti-HBs were negative.

Anti-HBc is an important HBV viral marker revealing previous HBV exposure. Among Korean health care workers, the positive rate of anti-HBs was higher among anti-HBc negative cases (73.1%) than among the anti-HBc positive group (26.9%). These results suggested that anti-HBs induced by HBV vaccination is dominant among Korean health care workers.

Photos by Hyeon Mi Yoo R.N.



One of the biohazard symbols advocating careful handling of HBV, HCV or HIV blood samples with needles and lancets.

Image from a guideline for prevention of needle stick injury in operation room: Carrying of individual needles should be discouraged. The use of pan is encouraged during operation.

Conclusion

About 70–75% of Korean health care workers were positive for anti-HBs and 75% of them had an anti-HBs level exceeding 100 mIU/mL, which suggests long-lasting immunity. About 20–25% of health care workers were reported to be anti-HBs negative cases and may need vaccination against HBV infection to protect them from exposure to HBV, for instance, by means of a needle stick injury or infectious body fluids.

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