



World Health Organization

**Safe Injection Global Network (SIGN)**

# **Report of the Global Infection Control and Injection Safety Meeting**



20-22 October 2004  
President Hotel, Cape Town, South Africa

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**Printed by the WHO Document Production Services, Geneva, Switzerland**

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## Executive summary

### Innovative approaches to injection safety and infection control

Since the last SIGN meeting, the partners of the alliance have engaged in a number of innovative approaches to assessment and implementation. Following the recent controversy over the proportion of HIV infections attributable to unsafe health care injections, South Africa has engaged in a careful, comprehensive assessment to evaluate a number of health care exposures as potential sources of HIV infection. Also, "interactional group discussion" (IGD) interventions were conducted in three new countries (Pakistan, Cambodia and Tanzania) to confirm that this intervention designed in Indonesia is effective in reducing unnecessary use of injections. Finally, groundbreaking applied research in Pakistan to examine the quality of disposable injection devices suggests that if illegal reprocessing and repackaging of used injection devices occur, these practices are probably uncommon. The bulk of the public health problem associated with unsafe injections in the country is in fact associated with the reuse in the absence of sterilization of syringes of acceptable quality standards. The increased availability of curative size single use injection devices with reuse prevention features will provide an opportunity to eliminate unsafe practices in Pakistan and elsewhere.

### Scaling up interventions for the safe and appropriate use of injections

For the first time since the inception of the SIGN alliance in 1999, there are serious hopes of implementing fully scaled up national plans for the safe and appropriate use of injections in a number of countries. First, India decided to switch from sterilizable injection devices to auto-disable syringes in immunization services, based on a high quality injection safety assessment. Second, within the framework of the United States Presidential Initiative for HIV/AIDS, substantial financial resources are being made available to implement fully scaled up plans in 15 countries, mostly located in the sub-Saharan region. A number of other countries present good perspectives in that they may follow the same path to implement national plans on the basis of evidence.

### Caring for those who care, protecting the environment

As SIGN partners are active worldwide to achieve the safe and appropriate use of injections, an increased focus is now being placed upon health care worker protection and appropriate sharps waste management. Pilot projects are showing the way to prevent needle-stick injuries. WHO offers clear policy guidance and a package of tools to manage sharps waste safely and in an environment-friendly way.

### Broadening injection safety activities to broader infection control issues

While injection safety issues are being addressed within the SIGN alliance, infection control remains by and large an unmet need in developing and transitional countries. Thus, SIGN wishes to further build upon the credibility achieved so far to convince stakeholders to engage in broader infection control programmes along the same guiding principles that have allowed progress so far. These include a comprehensive, evidence-based approach based upon (1) behaviour change, (2) provision of supplies and (3) waste management, as well as a networking philosophy that reaches out to all partners and stakeholders.

*Chairperson*

**Dr Mubina Agboatwalla  
Health Oriented Prevention Education (HOPE)  
Karachi, Pakistan.**

*Rapporteur*

**Dr Yvan Hutin  
WHO Resident Adviser  
India Field Epidemiology Training Programme (FETP)  
Chennai, India.**

## Day 1: 20 October 2004

### Opening session

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*Welcome address from the host*

*Dr Olive Shisana  
Human Science Research Council, Cape Town, South Africa*

The recent controversy about the proportion of HIV transmitted through nosocomial exposures in Africa led to a lively debate at the 2003 International Conference on AIDS in sub-Saharan Africa (ICASA) held in Nairobi, Kenya. To go beyond the controversy, HSRC decided to generate new evidence to go forward and direct prevention activities. HSRC therefore, conducted a number of studies to examine nosocomial exposure as a source of HIV infection in the Free State, South Africa. To share their experience with the global community, HSRC accepted WHO's invitation to host the 2004 Global Meeting on infection control and injection safety. The Republic of South Africa and HSRC are happy and proud to offer a warm South African welcome to the SIGN meeting.

*Welcome address from WHO*

*Dr Steffen Groth  
WHO, Geneva, Switzerland*

In his opening address, Director EHT/WHO thanked the hosts and the organizers of the meeting. He also thanked experts, programme managers, policy-makers, industry partners and NGOs from all over the world who, since the launch of the SIGN alliance in 1999, have come together every year to share their experiences, exchange ideas and discuss recent initiatives aimed at making injection practices safer and preventing bloodborne infections, particularly HIV/AIDS.

He noticed that, in the period since the last meeting, new initiatives have been launched to scale up injection safety. The U.S. President's Emergency Plan for AIDS Relief (PEPFAR) identified improving injection safety as one of the five key interventions that could reverse the tide of the HIV/AIDS epidemic in 14 countries in Africa and the Caribbean. The global infection control and injection safety meeting is the appropriate opportunity to report on these projects, their achievements and their challenges. While significant success has been achieved to obtain safe injections for immunizations, there is still much to be done to improve the safety of therapeutic injections. Thanks inter alia to the SIGN initiative we have now solid evidence to document poor injection practices, their determinants and their consequences; also thanks to SIGN, safe and appropriate use of injections have gained international visibility. However, increased public awareness about injections as a risk for HIV transmission should be followed by concrete efforts to establish cultures of safe injection practices. He mentioned that WHO sees SIGN as an extremely important vehicle to reach out to Member States in order to:

- facilitate the effective use of data for local decision-making;
- disseminate WHO policy management tools within countries;
- continue to educate health care providers and the general public about the risks associated with unsafe injections;
- and build up a broader infection control culture.

Director EHT/WHO pledged that WHO will continue its support at country, regional and global level for operational research and for the implementation of HIV prevention and health care programmes, and it will maintain its normative role in a broader infection control approach which includes injection safety, blood safety, patient safety and health care worker protection. WHO with the support of the United States Centres for Disease Control and Prevention (CDC) and the United States Agency for

International Development (USAID), will continue to host the SIGN Secretariat in close collaboration with other WHO departments involved in the global effort to prevent HIV and other bloodborne pathogen infections and to extend its activities to a more comprehensive approach towards infection prevention and control.

*Progress in the SIGN network since 2003*

*Dr Sophie Logez  
WHO, Geneva, Switzerland*

The WHO objectives for safe and appropriate use of injections include (1) policy, (2) quality and safety of injection devices, (3) access to injection devices and (4) appropriate, rational and cost-effective use of injections. In line with the “policy” objective (Table 1), WHO has recently developed a new Aide-mémoire for infection control, provided technical support to new epidemiological studies to generate new information regarding the risk of HIV infection associated with unsafe injections and nosocomial exposures and undertaken advocacy work to support scaled up injection safety initiatives with the United States presidential plan for HIV/AIDS in Africa. Relevant to the “quality and safety” objective, recent achievements include participation in the work to prepare ISO standards, finalization of a pre-qualification procedure for injection devices and the development of standardized clinical trial tools for the assessment of needle removing devices in the field. Concerning the “access” objective, recent achievements include finalization and dissemination of the WHO guiding principles to promote injection device security to ensure that all injectable drugs are supplied with injection devices worldwide. Regarding the “use” objective, recent achievements include the finalization and dissemination of the CD-ROM on injection safety, the finalization of “interactional group discussion” interventions to reduce injection overuse in Pakistan, Cambodia and Tanzania and the launch of an international project to prevent needle-stick injuries in collaboration with the United States Centers for Disease and Prevention (CDC) and the International Council of Nurses (ICN).

**Table 1: Review of the status of the action points formulated in New Delhi in August 2001.**

<i>Action point</i>	<i>Status</i>	<i>Comment</i>
Practical “Injection safety planning aid”	Achieved	<ul style="list-style-type: none"> <li>▪ “Managing injection safety” and costing tool</li> </ul>
Policy statements by professional associations	Achieved	<ul style="list-style-type: none"> <li>▪ International Council of Nurses (ICN)</li> <li>▪ World Medical Association (WMA)</li> <li>▪ Indian Medical Association (IMA)</li> </ul>
Improved mechanism for setting standards	Achieved	<ul style="list-style-type: none"> <li>▪ Final draft ISO standards for immunization auto-disable (AD) syringes available</li> <li>▪ Draft ISO standards for curative auto-disable syringes in preparation</li> </ul>
Policy for better access to injection equipment	Achieved	<ul style="list-style-type: none"> <li>▪ WHO guiding principles on injection equipment security</li> </ul>
Assistance to AD syringe introduction	Achieved	<ul style="list-style-type: none"> <li>▪ “V&amp;B” “First do not harm” document</li> </ul>
Waste management option database	Achieved	<ul style="list-style-type: none"> <li>▪ 30 new options added to the database</li> </ul>
Advocacy kit	Achieved	<ul style="list-style-type: none"> <li>▪ “First do no harm” brochure and CD-ROM</li> </ul>
National SIGN coalitions	In progress	<ul style="list-style-type: none"> <li>▪ New coalitions in many countries</li> </ul>
Health care worker protection working group	Achieved	<ul style="list-style-type: none"> <li>▪ Global Burden of Disease estimates, “Aide - mémoire” and pilot project in three countries</li> </ul>
SIGN working groups in WHO regional offices	Partially achieved	<ul style="list-style-type: none"> <li>▪ Focal point in WPRO. Other regional offices in the process of being organized</li> </ul>
Better communication with IASIT	Achieved	<ul style="list-style-type: none"> <li>▪ Collaboration for all key documents, including technology transfer</li> </ul>

Synergies with other programme areas	Achieved	<ul style="list-style-type: none"> <li>Mainstreaming of injection safety within HIV, essential drugs, immunization and environmental health</li> </ul>
Progress towards plastic recycling	In progress	<ul style="list-style-type: none"> <li>Pilot projects initiated</li> </ul>
Joint resource mobilization efforts	Partially achieved	<ul style="list-style-type: none"> <li>US presidential initiative funding injection safety plans for five years in 14 countries, scaled up projects in India, Pakistan and Bangladesh</li> </ul>
Pilot projects on AD syringe introduction	In progress	<ul style="list-style-type: none"> <li>First projects being initiated in Africa and Asia</li> </ul>
Quantification of the importance of illegal recycling	Achieved	<ul style="list-style-type: none"> <li>Study completed in Pakistan</li> </ul>
National Regulatory Authority assessment tool	Achieved	<ul style="list-style-type: none"> <li>First assessment completed in China</li> </ul>
Option paper on waste management	Achieved	<ul style="list-style-type: none"> <li>New WHO policy paper on health care waste management</li> </ul>
Local production of sharps containers	In progress	<ul style="list-style-type: none"> <li>Countries reporting local production</li> </ul>
Environment-friendly syringes	Not achieved	<ul style="list-style-type: none"> <li>Objective needs to be clarified</li> </ul>
Engagement of environmental stakeholders	Not achieved	<ul style="list-style-type: none"> <li>Unmet need</li> </ul>
Centralized waste management	In progress	<ul style="list-style-type: none"> <li>New full-time focal point hired by WHO</li> </ul>

*Injection safety in India: From assessment to policy changes*

*Dr Yvan Hutin  
WHO, Chennai, India*

In India, concerns were raised in 2001 that unsafe injection practices could be a substantial public health problem. As a result, the Government of India commissioned the India Clinical Epidemiology Network (India CLEN) group to conduct an extensive assessment of injection practices. This assessment included a qualitative phase and a quantitative phase. During the qualitative phase, interviews were conducted with key stakeholders. During the quantitative phase, community surveys were conducted, health care facilities were assessed and prescribers were interviewed. The results suggest that a high proportion of injections are unsafe, and that unsafe practices occur in the whole country, in the private and public sector and in the curative and the immunization sector. Use of plastic syringes is common and associated with safer practices. Unsafe practices are common in immunization that still relies heavily on glass syringes. On the basis of the assessment, the Government of India decided to switch to auto-disable syringes for immunization services. An associated waste management plan is still being finalized but will be based upon (1) hub cutter and (2) centralized treatment of waste in the absence of incineration. Additional activities are ongoing to extend the efforts to achieve safe and appropriate use of injections in the Indian curative sector. The Indian Medical Association (IMA) and the Indian Academy of Paediatrics (IAP) have been active as partners in the process to support this initiative with strong, evidence-based policy statements. The Indian Injection Safety Coalition coordinated by PATH India remains an active mechanism to ensure that the efforts from all stakeholders are joined together in a common process.

***Giving injections in the informal private sector in Karachi***



*Examining health care exposures as a source of HIV infection in the Free State, South Africa*

*Dr Olive Shisana  
Human Science Research Council (HSRC), Cape Town, South Africa*

The Nelson Mandela/HSRC study of HIV/AIDS has pointed out that the prevalence of HIV infection might be higher than previously thought in South Africa. Concurrently, a debate was ongoing on the international scene about the proportion of HIV infections that may come from health care exposure in sub-Saharan Africa. As a result, the research team decided to investigate the risk factors for HIV infection among children in the Free State, South Africa. The study raised a number of ethical issues that were addressed through iterative submissions to the ethical committee. The whole project consisted of four studies:

The first study was a cross-sectional study of children in health care facilities to (1) estimate the prevalence of HIV infection, including the prevalence of “discordancy” (children infected with HIV whose biological mothers are HIV negative).

The second study was a case control study of HIV infected children whose biological mother was HIV negative to examine the potential sources of HIV infection (using HIV infected children who have an infected mother as controls).

The third study was an assessment of infection control practices in health care facilities.

The fourth study was a qualitative assessment of infection control practices among traditional healers.

The results of the studies, when available, should shed the light as to whether health care exposures are a potential source of HIV infection in South Africa.

*Interactional group discussions: An effective intervention to improve injection use in the formal private sector of Pakistan*

*Mubina Agboatwalla  
HOPE, Karachi, Pakistan*

The informal private sector accounts for a high proportion of health care services delivery in Pakistan. Health care providers in Pakistan practicing as general practitioners over-prescribe injections and reuse syringes commonly. A pilot intervention was conducted among general practitioners in the informal private sector in a densely populated part of Karachi with the objective of reducing injection overuse and improving injection practices. For this 12 month intervention, 20 general practitioners were assigned to an intervention and 20 others were used as a control group. The intervention consisted in (1) interactional group discussions between patients and prescribers on the topic of the use of injections to treat common ailments and (2) health education using pamphlets and posters. Exit interviews monitored injection use and injection safety before and after the intervention in both groups. Pre-intervention information indicated that the proportion of visits followed by an injection was 88.3% among patients in the control group and 84.4% among patients in the intervention group. Following intervention, this proportion remained stable (87.3%) in the control group but decreased to 51% in the intervention group ( $p < .05$ ). At baseline, 91.9% patients in the intervention and 85% in the control group were given an injection using a new single use syringe. Following the intervention, a newly packed syringe was used for 64.7% patients in the control group as opposed to 92% in the intervention group. Nearly 89% patients in the intervention group mentioned that the packed syringe was opened in front of them as compared to 55.6% in the control group ( $p < .05$ ).

*Interactional group discussions: From assessment to scaling up in Cambodia*

*Chean Men  
Consultant, Phnom Penh, Cambodia*

In 2002, rapid assessment data indicated that injections were overused to administer medications in Cambodia. Thus, the injection safety committee of the Ministry of Health conducted a randomized controlled trial aimed at (1) reducing overuse of injection in public health sectors through interactive group discussions, (2) determining whether interactional group discussions were effective in Cambodia and (3) addressing options to scale up this intervention in the country. Two strata were examined: Kompong Cham and Phnom Penh. The baseline data from the pre-intervention survey indicated that the proportion of encounters leading to the prescription of injections for the Kompong Cham strata were 82% for the intervention group and 77% for the control group. In the Phnom Penh strata, these proportions were 97% for the intervention group and 96% in the control group. Six interactional group discussions were conducted among the intervention groups in Kompong Cham and in Phnom Penh. They provided an opportunity for prescribers to be confronted with the actual absence of preference for injections in the population, as was reported in Indonesia. A facilitator clarified misunderstandings regarding injection use. To evaluate the impact of the interactional group discussions, an assessment of the frequency of injection prescription was conducted three months after intervention. Preliminary results of this evaluation suggest that the intervention was effective in reducing injection overuse, with an effective size of 22.3% percent in Kompong Cham and 20% in the Phnom Penh. Collaboration was now been initiated between the United States Agency for International Development (USAID) and WHO to scale up interactional group discussion as an intervention in Cambodia.

*New WHO policy on health care waste management*

*Yves Chartier  
WHO, Geneva, Switzerland*

WHO has developed a new document to frame main recommendations in the field of health care waste management (Appendix 1). The policy paper underlines the risks associated with the lack of health care waste management, mentions that inappropriate methods to manage health care waste can be dangerous (for instance through incineration that can lead to pollution). Overall, there is a need to balance the various risks and benefits to make sound policy decisions. The guiding principles include the prevention of the risks associated with exposure to health care waste, environmental concerns for the prevention of climate change, and support of the Stockholm and Basel conventions. WHO recommends short-, mid- and longer-term actions to address issues relating to health care waste management. In the short-term, and until better methods become available, small scale incineration may be an acceptable method when conducted appropriately.

***Unsafe milk kitchen can be a potential source of HIV transmission***



## Integrated approaches to infection control

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### *Coordinated strategy for the prevention of infections with bloodborne pathogens in health care settings*

*Yvan Hutin  
WHO, Chennai, India*

The prevention of infections with bloodborne pathogens in health care settings provides a heterogeneous picture in high-income and low-income countries. On the one side, we have success stories in high-income countries where the emergence of HIV in the 1980s led to prompt interventions for infection control and health care system strengthening. These interventions triggered more effective prevention of many infections with HIV, HCV and HBV. On the other side, in low-income countries, the HIV pandemic led to a response that had a strong focus on safer sex while persistence of unsafe health care practices remained. Bloodborne pathogens may be transmitted in health care facilities through (1) transfusion of infected blood, (2) unsafe injections, (3) unsafe other health care exposures and (4) needle-stick injuries of health care workers. Prevention activities targeting these four areas will require leadership from (1) the national blood transfusion services, (2) essential drugs programmes, (3) infection control committees and (4) occupational health programmes. However, collaboration from other stakeholders is required, including HIV/AIDS prevention and care programmes that have a key role to play in surveillance, outbreak investigation, advocacy, monitoring and evaluation. Overall, while the various components of a comprehensive programme to prevent infections with bloodborne pathogens need to be implemented through different mechanisms, coordination is required at the initial assessment stage and during monitoring and evaluation.

### *Using the WHO AFRO infection control toolkit in one country of the Caribbean*

*Una Reid  
Consultant, Kingston, Jamaica*

The population of Trinidad and Tobago is 1.4 million. Infection prevention and control is an integral part of patient care. It is the basis of patient, visitor and staff safety and forms the hallmark of quality. The Quality Management Group of the Ministry of Health directs infection prevention and control.

The WHO Infection Prevention and Control (IPC) Toolkit was adapted/adopted by the Ministry of Health. The Toolkit consists of (1) a Survey Questionnaire, (2) the IPC Manual of Policies and Guidelines, (3) Training Programme Curriculum, (4) Guide to Action Plan and (5) the WHO "Aide-mémoire". The work process included (1) the survey, (2) field visits and results, (3) the work group process and (4) meetings (Oversight Committee, Infection Prevention and Control Committees). To adapt the WHO AFRO Toolkit to the Caribbean region, few adjustments were required (removal of reference to Ebola that is not found in the region, adaptation of post-exposure prophylaxis strategies to the national protocol). Recommendations were included for implementation focussed on the domains of infection prevention and control, levels of responsibility and the infrastructure. Implementation includes short-, medium- and long-term goals, based on the budget cycle. Phase I includes the activities completed in the first mission. Phase II will lead to the completion of the manual, the diffusion and use in service. Phase III is the institutionalization of the project.

The intended outcomes are (1) improved patient care management, (2) efficient management of patient care environment and (3) decreased risk of liability.

*An assessment of the risk of transmission of bloodborne pathogens in dental care settings*

*Shaheen Mehtar  
Stellenbosch University, Cape Town, South Africa*

The objective of the study was to evaluate the current procedure to prevent the transmission of bloodborne pathogens in dental care settings. The methods included an observational health care facility assessment and a test for the detection of occult blood in the environment in direct items (that come in contact with the inside of the mouth, like forceps) and the indirect items (that do not come in contact with the inside of the mouth, like environmental surfaces). The test used to detect occult blood was called the "OBTI test" and is widely used in forensics. The authors assessed knowledge through a standardized interview of practitioners. All 24 dental care facilities in the Free State were evaluated. Results are being analyzed at the moment and final results will be made available at a later date.

*Examining the safety of the breast milk banks in the era of the HIV pandemic*

*Shaheen Mehtar  
Stellenbosch University, Cape Town, South Africa*

Unsafe wet nursing and milk banking practices are a potential source of HIV infection in children who are born to HIV negative mothers. In South Africa, most hospitals promote breastfeeding. In some cases, for various reasons, the breast milk is expressed, placed in a bottle and given to the baby later. Preparation of feeds can be handled through dedicated milk kitchens for large hospitals or just a designated area on the wards in other health care facilities. For this assessment, all facilities of one province having milk kitchens were assessed through (1) interviews, (2) observation and (3) sampling of breast milk for laboratory assessment (HIV RNA, using an assay for which the sensitivity is 50 copies). There is a possibility that milk bottles are used either for formula milk or breast milk. In addition, the identification process is based upon the cot and not on the basis of the child identification. Thus, if a child is moved, he could receive milk not originally allocated to him/ her. In conclusion, practices do not always reflect what is being taught and therefore infection control programmes are necessary to ensure that milk kitchens are safe.

*Key elements of an infection control programme*

*Mary Catlin  
Consultant, Tucson, Arizona, United States of America*

The most essential element in an infection control programme is a risk assessment. Infection control practitioners should identify the high risk procedures that their programme conduct, observe how facilities manage the devices involved in those procedures and assess the rates of complication that they are willing to accept. Thus the essential question for infection control committees is not "What commodities do we need to use this device or provide this service?" But "What are the risky procedures needed by our patients and what systems are needed to reduce the risk of health care related infections?" The risk management system must match the available infrastructure to devices and to patient needs if infections and injuries are to be prevented. The alternative is equipment in disrepair and/or the spread of infection. Infection control practitioners should first focus their attention on the most common risky procedures. The risk of nosocomial infections increases with the transplants and

implants, with the invasiveness of the procedures, if devices and supplies are shared on multiple patients, if device cleaning deviates from recommended practice, and with the frequency of the procedure or condition. Thus the injections, transfusions, infusions and childbirth services are all important first priorities in infection control.

Factors essential to the minimization of nosocomial infections include the:

- space to separate “clean” from “dirty
- reprocessing facilities including adequate volumes of water
- reprocessing supplies e.g. sterilizable brushes, indicators, and
- supervision of instrument reprocessing and of aseptic and sterile technique

*Preventing of the transmission of infections through unsafe blood*

*Neelam Dhingra  
WHO, Geneva, Switzerland*

There is a risk of transmission of infections through (1) lack of safe blood donors, (2) lack of screening of blood and (3) gross misuse of blood. WHO modelled the incidence of infections attributable to blood transfusions on the basis of the prevalence of the infection in the population, the probability of transmission of the infection following a transfusion with infected blood, the proportion of the population susceptible, the probability of exposure to an infected transfusion and the average number of blood transfusions received by a person each year. In 2000, 90 million transfusions were received worldwide. Overall, 31% of all blood donations were not screened for one or more of the three viruses under study. In the year 2000, infected blood transfusions may have caused 78 000 HBV infections, 500 000 HCV infections and 10 000 HIV infections, accounting for 0.12% 10% and 0.22% of all new infections, respectively. Under the “worse-case scenario” analysis assuming that countries overestimate the proportion of testing actually taking place, the number of new infections due to unsafe blood transfusions amounted to almost 800 000 for HBV, 1 200 000 for HCV and 135 000 for HIV, yielding attributable fractions of 1.2% for HBV, 22% for HCV and 2.8% for HIV. Despite the existence of effective measures to improve the safety of blood and blood products, the proportions of HIV, HBV and HCV infections due to unsafe blood transfusions remain substantial, especially in some developing regions. The low incidence of transfusion-associated infections where effective measures to ensure safe blood are in place suggest that this burden is highly avoidable. Safe and appropriate use of blood, blood components and blood products should be achieved through nationally coordinated blood safety programme that implement three-pronged approaches based upon (1) recruitment of safe blood donors, (2) testing and processing of blood units and (3) appropriate clinical use of blood. WHO supports countries’ efforts to achieve blood safety through four strategic objectives, including (1) support to the formulation of national blood safety policies, (2) quality and safety of blood transfusion services, (3) increasing access to safe blood and (4) appropriate clinical use of blood.

*Infection control among traditional birth attendants and traditional healers*

*Nompumelelo Zungu-Dirwayi  
HSRC, Cape Town, South Africa*

The objective of this study was to evaluate the potential role of traditional practitioners in the transmission of HIV among children. Methods used were qualitative, mostly in the form of focus groups. Recruitment was done using snowballing methods. Consent forms were obtained and confidentiality was ensured. Interviews conducted in local languages were translated into English, transcribed and analyzed using a computer software. The analysis is in progress and should be available shortly.

**Day 2: 21 October 2004**

A review of the injection safety projects conducted in Africa

*The United States President's Emergency Plan for AIDS Relief*

*Glenn Post  
USAID, Washington, DC, USA*

The President's Emergency Plan for AIDS Relief is a U.S. Government \$15-billion 5-year initiative that promises \$9 billion in new programme resources and covers 15 focus countries (12 in sub-Saharan Africa). The goals include treating 2 million HIV-infected persons, preventing 7 million infections and caring for 10 million individuals infected with or affected by HIV/AIDS. Over time 20% of funds will be devoted to prevention, which includes prevention through safer medical injections and safer blood supplies.

The objective of the safer medical injections component is to prevent HIV infections through safe and appropriate use of medical injections. This will be accomplished through expanding injection safety to the curative sector, strengthening provider practices, improving commodity management and helping to ensure sufficient injection supplies, strengthening sharps disposal, and reducing injection demand. Interventions include assessing current practices, field testing injection safety programmes in selected districts, advocating public support and assisting ministries of health to finalize and implement national plans.

The programme is supported through the United States Agency for International Development (USAID) and the U.S. Centers for Disease Control and Prevention (CDC), each assisting 7 countries. Funding available in fiscal year 2004 totalled \$24 million. The President's Plan is committed to safer medical injections, but according to the budget process, future funding levels are determined on a year-to-year basis.

The programmes are being implemented through various U.S.-based organizations (including John Snow, Inc., Chemonics International, University Research Corp. and Initiatives, Inc., who themselves work with other organizations such as JHPIEGO and PATH) plus other local and international partners, working with national governments. The President's Plan seeks to work with all stakeholders. The programme represents an important opportunity to prevent transmission of HIV and other infections through expanding injection safety, especially to the curative sector.

*The "Making Medical Injection Safer (MMIS)" project*

*Jules Millogo  
JSI, Arlington, VA, USA*

JSI works in Uganda, Nigeria, Ethiopia, Mozambique (with USAID) and in Haiti, Côte d'Ivoire, Rwanda, Tanzania, Kenya, Botswana and South Africa (with CDC). The project is based in Arlington, VA, USA. Sub-contractors include PATH (procurement, waste management), Academy for Educational Development (behaviour change) and country teams of four members. JSI's approach is based upon partnership, reinforcement of ownership by national government, building up national injection safety committees, technical support from experts and south-south collaborations. Progress to date includes (1) baseline assessment conducted, (2) pilot-testing of the approach in pilot areas (2-3 district, 5% of the population), (3) draft policies, plans, advocacy strategy and standards and (4) procurement and delivery of safe injection supplies for curative injections, including syringes, safety boxes and needle removers. Challenges are major, because of the emergency nature of the plan, and include the logistical and operational aspects, the lack of consensus over waste management strategies, the coordination of activities between stakeholders and the financial constraints. The project however has

much strength, including the availability of technical expertise and tools, the availability of models (e.g., Uganda), strong partnership among key players and strong political support in most countries. JSI has recently been awarded a CDC contract through September 2009 to consolidate the work under way. The technical focus areas are: 1) capacity building and developing health workers' skills, 2) communications and behaviour change to reduce unnecessary injections, 3) procurement of safer injection devices, and 4) development of waste management strategies.

*The MMIS project in South Africa*

*Bronwyn Pearce  
JSI, South Africa*

In South Africa, occupational health and infection control address injection safety. However, there are no national standards or regulations. There is a need to re-examine the emerging issues to set national priorities. At the moment, a desktop assessment and a review of evidence has been completed. Assessments have been completed in three provinces. This will set up a process by which a national convention will frame a national policy.

*The MMIS project in Tanzania*

*Dr Henock Ngonyani  
Ministry of Health, Dar es Salaam, Tanzania*

The injection safety programme is being conducted under the umbrella of a Ministry of Health unit that is in charge of health care quality issues. Following the initial assessment, a targeted pilot focuses on selected hospitals. This project is being implemented in close partnership with international and national stakeholders. The national Quality Improvement Committee pays particular attention to the sustainability of the plan.

*Using consumption data to inform supply management in Mozambique  
(MMIS)*

*Dr Arturo Sanabria  
Country Director, JSI, Maputo, Mozambique*

Supply forecast based upon consumption data is essential to create a sustainable delivery system in Mozambique. In Mozambique, the systems to supply drugs and devices are different, they do not match in timing and budgeting. When the initial assessment was conducted in March, investigators realized that there was no system to register and monitor the number of injections given in the country. To address this issue, JSI implemented register books to capture injections given in July 2004. Overall, the forecasting based upon the estimated number of injections per person and per year and the forecasting based upon the register do not match. One of the issues that came up was whether there was a need of one syringe and needle for each injection (i.e., plunger movements) OR one syringe and needle per application per patient (using the same syringe to reconstitute and inject). According to these scenarios, a health centre that gives 2500 injections per month could require 66000 or 48000 syringes. This raised the question of "a new syringe per person per application" or "a new syringe per person per injection?" When these points are clarified, the register book and the consumptions will certainly be of tremendous assistance to a national strategy to improve injection safety.

*The policy formulation process: Ugandan experience (MMIS)*

*Dr. Jacinto Amandua and Engineer Sam Wanda  
MoH, Entebbe, Uganda*

In Uganda, injection use is high and the prevalence of infection with bloodborne pathogens is high. In addition, abscesses and neuritis associated with injections are common. For these reasons, the political profile of injection safety is high in Uganda. To better address the problem, Uganda formed a multidisciplinary national coalition. The task force reviewed the evidence, conducted a national survey, formulated a national policy and lobbied for an intervention project. Today, the achievements include a national policy, standards, device selection, a pilot project in four districts, programme launch and procurement process. Incinerators have been constructed and training is ongoing. Future plans include the phasing in of new devices, the phasing out of old devices, safe waste management, improvement of practices, improvement of behaviours and the reduction transmission of bloodborne pathogens. This will be achieved through a commitment of the highest level stakeholders, including the president.

Waste management is a major challenge to overcome in the practical implementation of injection safety plans. Coordination is lacking and segregation is poorly done. Uganda has a legislative framework for sharps waste management upon which the project will implement its sharps waste management plan. The government will take responsibility for sharps waste management and provide guidance to the various levels. Final disposal methods will depend upon local facilities, which will include incinerators in some areas.

*The injection safety project in Kenya (MMIS)*

*Susan Otieno  
MoH, Nairobi, Kenya*

Factors leading to injection use in Kenya are numerous. In Kenya, the project is led by the Ministry of Health. It is conducted with the assistance of JSI. The project conducted a qualitative assessment of injection practices, using the WHO tool A to identify the determinants of injection use. Women and the elderly seem to demand injections. The goals of the behaviour change strategy are to (1) reduce unnecessary injections, (2) improve the safety of injections and (3) manage sharps waste. Plans include obtaining a national policy, defining national standards, revising the essential drug lists, supplying injection devices in sufficient quantities, supplying safety boxes and developing an infrastructure for sharps waste management. The approach proposed for the behaviour change strategy is directly modelled after the WHO behaviour change strategy.

The behaviour change and communication (BCC) strategy promotes: prescription of oral medication wherever possible, safe disposal of syringes and needles in a safety box immediately after use without recapping and management of injection waste safely and appropriately. The advocacy measures promoted by the BCC strategy include: the development and implementation of the national policy for the safe and appropriate use of injections, dissemination of revised standard treatment guidelines, revision of the essential drugs list, and supply of injection equipment in appropriate quantities. Programme communication, training of health workers on Interpersonal Communication and Counselling (ICC), mass media campaigns, and evidence-based community interventions are some of the proposed interventions targeting health workers and the community on injection safety.

*Safe Injections Project, Namibia*

*Christine Gordon  
MoH, Windhoek, Namibia*

In 1986, the first four cases of HIV/AIDS were reported in Namibia. By 31st December 2003, there was a cumulative number of 136,068 cases reported by Ministry of Health and Social Services. The crude HIV prevalence ratio is 22.0% and HIV/AIDS has been the leading cause of death in Namibia since 1996. The goal of the injection safety project in Namibia is to prevent the transmission of bloodborne infectious diseases (HIV, HBV and HCV) by reducing unsafe and unnecessary injections. The strategy is to support the Government of Namibia, in particular the MOHSS, to develop a National Injection Safety Policy, establish a National Injection Safety Workgroup (NISG), perform a rapid assessment of current practices, develop an intervention plan, implement the improvement plan and establish a sustainable monitoring and evaluation system. For the assessment, the WHO toolkit was adapted and used. The questionnaires were long, detailed, not very country/user-friendly and focused on reuse. Several questions were open to misinterpretation by respondents and the language could be more straightforward. Several questions were double-barrelled, requiring two or more answers and several questions were Euro-centred. Progress to date includes the fact that the National Injection Safety Workgroup has been established, the rapid assessment has been completed with findings disseminated, national and regional workshops have been held, improvement plans have been drafted, tenders have been issued for safe sharps disposal containers, post exposure prophylaxis guidelines have been disseminated in two regional workshops and five pilot regions/districts have been identified, 90 health care workers have been trained in injection safety. Next steps include the dissemination and planning with other three pilot areas, the operationalization of the improvement plans in two pilot areas, the finalization and operationalization the National Waste Management Policy, the improvement of compliance to the national treatment guidelines, the improved access to post-exposure prophylaxis and hepatitis B vaccination and the change of provider and client perception with respect to demand for injections to reduce unnecessary injections.

*Safe Injections Project, Zambia*

*Christopher Mazimba  
IHG, Lusaka, Zambia*

As part of the President's Emergency Plan for AIDS Relief, the objective of this programme is to prevent the medical transmission of HIV in Zambia. Numerous assessments and studies have documented poor infection prevention and injection safety practices in Zambia. However, a rapid assessment of injection safety was conducted in two districts in Zambia in May 2004. Gaps in practice persist and a more comprehensive approach is needed. It is likely that rapid changes in behaviour are possible through (1) providing adequate supplies and materials, (2) ensuring providers are aware of guidelines and (3) motivating personnel to follow guidelines. The TIPs approach (Trial of Improved Practices) consists in a formative research technique that involves the individual whose behaviour needs to change in the process. It identifies changes in behaviour that are effective, acceptable and feasible. In practice, one observes providers' practices, discusses observations, agrees on the behaviours they will try to change and conducts follow-up observations. To facilitate implementation, commodities are necessary. These include disposable needles and syringes, cannulas, IV giving sets, sharps boxes, infection prevention, gloves (all types), chlorine for decontamination and alcohol-based waterless hand rub preparations.

**Table 2: Areas of noticeable improvement, before and after the intervention, Zambia, 2004.**

Observed Practices	Initial visit	Follow-up	Positive Change
	N=57	N=68	
Prescribe any injections for which there is an equivalent oral medication?	45%	23%	22%
Let the patient see the needle and syringe being taken out of the package?	37%	75%	38%
Reassure the patient that the injection is safe?	23%	51%	28%
Wash hands with soap before injecting?	10%	66%	56%
Re-cap used needles?	26%	4%	22%
Not fill the safety box more than three quarters full	25%	9%	16%

In conclusion, medical transmission of HIV is largely preventable through the application of standard injection safety and infection prevention guidelines. Provision of adequate supplies, information and skills, as well as supervision and motivation are essential. Long-term maintenance of positive changes must be supported through continued follow-up, supervision and more in-depth training. Finally, government and donors' commitment and support are imperative.

*The WHO pre-qualification process for single use injection devices*

*Sophie Logez  
WHO, Geneva, Switzerland*

WHO and other United Nations (UN) agencies, as potential supply agencies for developing countries, may have a role in procuring single use injection devices. The purpose of the quality assessment for single use injection devices is to verify that injection devices meet the specifications of the relevant UN agencies and are produced and controlled in accordance with product standards or WHO procurement specifications and quality system standards recommended by WHO. The assessment will determine reliable sources of procurement of single use injection devices to ensure quality and to guide other UN agencies in sourcing of such devices. The quality assessment procedure is based upon three main principles, (1) conformity with the UN agencies' specifications and ISO product standards and/or WHO template specifications; (2) documentation of the quality system in place for production of medical devices, through compliance with acceptable quality system standards and (3) monitoring by WHO, in collaboration with the manufacturers, of verified complaints from the field and/or from UN agencies. At present, the proposed procedure relies mostly on the regulations formulated by the five founding members of the Global Harmonization Task Force (GHTF), as most developing countries do not have national regulations for medical devices. WHO is assessing all manufacturers who wish to have their products pre-qualified for procurement of single use injection devices by UN procurement agencies. The conformity of auto-disable syringes selected according to WHO procurement specifications will still be tested by WHO accredited laboratories until the ISO standard is finalized and approved. While the initial WHO pre-qualification document was produced in October 2003 by the WHO department of Essential Health Technologies (EHT), the revised version will be issued by the WHO department of Immunization, Vaccine and Biologicals (IVB) and the pre-qualification process will integrate the IVB Performance, Quality and Safety (PQS) process.

*WHO agenda for the assessment of effectiveness and safety of  
needle removers*

*Mary Catlin  
Consultant, Tucson, Arizona, United States of America*

Current WHO best infection control practices for injections do not address the use of needle-removing devices. While needle removers/cutters are a potentially promising way to reduce the volume of sharps waste, evidence regarding the safety and effectiveness needs to be documented before recommending them or not as a best practice standard for routine use.

Of particular concern is the need to assess the trade-off between adding a step in the collection of sharps waste that could result in more handling of dirty needles and thus more needle-stick injuries among health care workers (HCW) and decreasing the volume of infectious sharps waste through (a) disposing of syringes as regular waste and (b) handling needles only as infectious sharps waste to be incinerated or encapsulated. This may result in fewer needle-stick injuries among waste handlers and the community. Needle removal may be considered as part of a comprehensive solution to prevent reuse of injection equipment and improve waste management. However, the impact that such an option could have on needle-stick injuries among HCW, waste handlers and the community is not documented. In January 2004, a WHO working group on needle removal formulated the following recommendations regarding the

proposed agenda to evaluate the risks and benefits associated with using needle-removing devices. Recommendations include:

1. WHO and its partners planning field assessments of needle-removing devices will attempt to follow the terms of references proposed in this document.
2. The WHO occupational health group will finalize a guidance document on the surveillance and management of needle-stick injuries in collaboration with the International Council of Nurses (ICN). This guidance will be used in the field evaluation of needle-removing devices.
3. WHO will prepare a standardized protocol for the field evaluation of needle removers during measles campaigns. This template protocol will include data collection instruments, consent forms and a budget and will be submitted for ethical committee review.
4. WHO will propose field evaluation of needle removers to the partners in the global efforts to reduce measles-associated mortality. This could leverage funding sources and lead to trials soon (e.g., Nepal, West Africa).
5. WHO will develop draft specifications for needle removers to be evaluated in the field.
6. Bench methods of assessing splatter production of needle removers need to be developed so that needle removers can be assessed for splatters in parallel to the field assessment.
7. WHO will attempt to recover experience regarding the rates of needle-stick injuries in industrialized countries where needle-removing devices are used (e.g., Germany).

*Proposed trials for the assessment of needle removers in the field*

*Dina Pfeifer  
WHO, Geneva, Switzerland*

While some countries use needle-removing devices, some others have banned them on the basis of safety concerns. The experience so far addressed user acceptability and failure rates. However, none of these assessments have measured the incidence of needle-stick injuries or the reduction in the volume of waste. As a result of the meeting of the WHO working group on needle-removing devices, WHO decided to organize field trials of needle removing devices in the setting of mass immunization campaigns. The proposed template trial is a randomized controlled trial clustered by vaccination posts. It uses 200 clusters per study group. The equipment used includes two manual needle cutters, auto-disable syringes and standard safety boxes. The template protocol was approved by the WHO ethical committee, but also needs to be approved in each country where the trial is to be assessed. Ideally, two or three trials would be conducted, but those may be stopped if one of them point to an unacceptable rate of needle-stick injuries. While the first trial was completed in Madagascar (results not available yet), two or three more trials might be planned for next year. As the first trial was conducted, a few practical field questions came up that will have to be addressed before the other trials are implemented.

*Assessing newer injection devices in Pakistan*

*Mubina Agboatwalla  
HOPE, Karachi, Pakistan*

Use of standard single use syringes and needles in developing and transitional countries may lead to the possibility of their reuse in the absence of sterilization. This exposes injection recipients to infections with bloodborne pathogens. New syringes and needles that use a technology to prevent reuse are widely available today in immunization services. However, the challenges of the 90-95% of therapeutic injections require new types of technologies that will not interfere with the variety of therapeutic applications,

of injection techniques and of clinical settings. Various technologies for reuse prevention syringes have been developed that meet the WHO template specifications for reuse prevention devices. Currently, the WHO guiding principles for injection device security state that syringes with a reuse prevention feature offer the highest level of safety for injection recipients and that they should be considered for use for therapeutic injections where local data indicate that unsafe practices are particularly common. Two issues need to be addressed before WHO could formulate a policy recommending their generalized use in developing and transitional countries. First, there is a need to assess the usability of these syringes and their acceptability by clinicians in various settings. Second, the field effectiveness of these devices in eliminating reuse of injection equipment needs to be documented to justify their higher price. Pakistan is a country where injections are particularly common and where practices are particularly unsafe, leading to large-scale transmission of hepatitis B virus and hepatitis C virus. Thus, use of safer injection devices is being considered by the Ministry of Health as a policy option. However, more information is needed regarding their use in Pakistan before they can be recommended for general use. With this first field assessment, we intend to address the first of the two issues and evaluate the use of five reuse prevention injection devices in Karachi. This assessment has three objectives. First, it will assess the usability and acceptability of five different curative syringes with reuse prevention features under intended use by physicians and nurses in Karachi. Second, it will identify the specific characteristics of the various syringes that could represent a challenge from a user acceptability point of view. Third, it will determine whether the methods proposed are valid to compare various syringes in terms of usability and acceptability. The proposed assessment will take place in Karachi with five different types of syringes made available by manufacturers. Data collection will be conducted using the new WHO tool to assess injection devices in the field.

*Terms of reference for WHO's role in technology transfer activities*

*Sophie Logez  
WHO, Geneva, Switzerland*

Following discussions held with the International Association for Safe Injection Technology (IASIT), WHO finalized the terms of reference for technology transfer. These terms of reference that were pilot tested in Mongolia and Bangladesh are reproduced in Appendix 2.

*The International Association for Safe Injection Technology  
(IASIT)*

*Cecilia Jimenez  
IASIT, Geneva, Switzerland*

IASIT groups together safe injection manufacturers and inventors interested in the spread of safer injection technologies in order to promote the use of the most immediate and the most efficient methods to ensure safe injections worldwide. Today, a large range of technologies is commercially available from many manufacturers to address the needs of the immunization and curative markets, while further technologies are being developed. As a policy organization, IASIT provides industry members' input on standard setting and regulations, promotes innovation and proliferation of safe injection technology and disseminates information. As such, IASIT collaborates closely with United Nations agencies and with the ISO on policy and technical issues relevant to safe injection standards and practices, and co-operates with other initiatives such as PEPFAR to promote safe injections. IASIT continuously advocates for simple, transparent and open bid processes by all procuring organizations, including the UN and national government authorities. Finally, IASIT encourages innovation and healthy competition among its members in ensuring the supply of safe syringes for the markets, based on the SIGN "No Harm" principle.

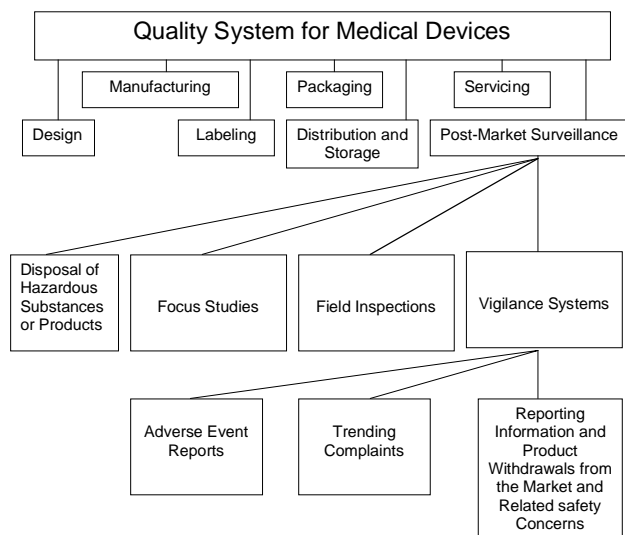
Mary Catlin  
Consultant, Tucson, Arizona, United States of America

Because medical devices are one part of a tightly coupled health care system, the potential to do harm is always present. The risk that any given device may cause harm depends on the vulnerability of the patients and users, the complexity of the device, the invasiveness of the procedures and the ability of the health care systems to minimize the possible risks. The risks decrease if the devices are manufactured under good manufacturing practices with a quality management system. Quality or risk management systems aim to minimize adverse events from the design control through disposal. In such a system, regulatory agencies require that manufacturers demonstrate that both the medical device and the manufacturing process are safe and effective prior to approving the sale of the device.

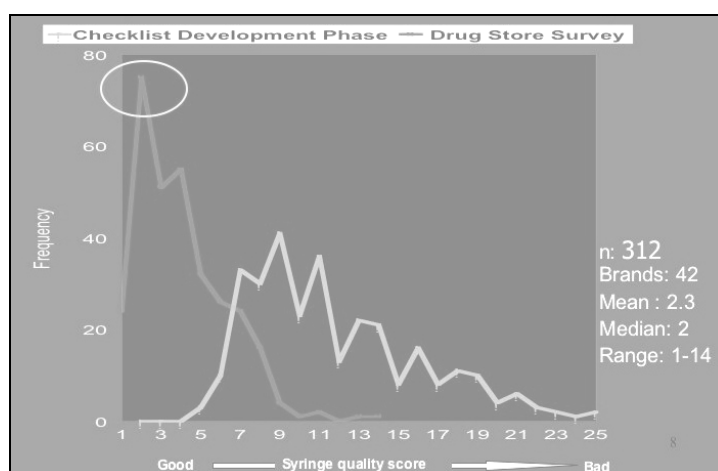
In developing countries that purchase unregulated devices, device-related problems may occur either because the device fails, or because the facilities fail the device. For example, facilities may not have enough water to clean the device, or may lack essential chemicals for disinfection. Users may think that devices “fail”, if they do not meet the patients’ needs, regardless if they meet specifications or claims. Reporting device failures is important since devices which passed regulatory trials may fail in real world settings with uncontrolled temperatures, cleaning, reprocessing, maintenance, instruction or supervision.

Patient safety requires that all types of device-related injuries be corrected. The objective of this session was to encourage infection control practitioners to report device-related problems to manufacturers, purchasing bodies, national regulatory agencies. Another objective is to inform SIGN participants that WHO and UNICEF, as part of the PQS system, are discussing formalizing a medical device surveillance system to report devices that fail WHO specifications when used in the field.

**Figure 1: Quality System for Medical Devices.**



Two studies were conducted in Pakistan to assess the safety of injection devices and to determine whether illegal reprocessing and repackaging of injection devices occurs. In the first study, investigators followed up used syringes and needles from dumps located close to health care facilities to find out what would happen to them. The study concluded that rag pickers indeed search dumps for used injection devices and that these are sold to various dealers until they find their way to wholesalers on the market of Karachi. However, interviews with various key informants suggested that most of these used syringes and needles were shredded for recycling with the plastic ware industry (e.g., to make buckets and coat hangers). Key informants could not exclude that a proportion of used injection devices were indeed reprocessed and repackaged for re-sale. However, this could not be directly observed and this did not account for the majority of the plastic recycling ring. In the second study, investigators used the ISO standard 7886 for single use syringes to develop an observational checklist and evaluate the quality of injection devices. Two sampling strategies were used to collect syringes. A first sample aimed at collecting as many different types of syringes possible from the largest possible range of outlets so that a case definition could be formulated to define a sub-standard syringe. The second sample aimed at capturing a representative sample of retailers of injection devices in the country so that it would represent the market share of various types of syringes. The results of the analysis of the first sample (Figure 2, checklist development phase) suggest that a wide variety of different syringes are available on the market in the country. Some of these syringes have scores indicating a low quality, suggesting that they might have been reprocessed and repackaged for re-sale. Some of these syringes were of high quality. The results of the analysis of the second sample (the drug store survey) suggest that in fact these few syringes of higher quality have the largest market share in the country (Figure 2). Overall, illegal reprocessing for repackaging may occur in Pakistan and this issue should be addressed through the formulation of a National Regulation for disposable medical devices that would make it mandatory to enforce international quality standards. However, the largest public health problem is associated with the reuse by health care workers of the high quality syringes that have the largest market share. This second issue should be addressed through a national injection safety policy that may include a recommendation for the universal use of single use injection devices with reuse prevention features and / or through a regulation that would make it mandatory to use single use injection devices with reuse prevention features.



**Figure 2: Comparison of Syringe Quality Scores from checklist development phase and drug store survey. Higher scores associated with sub-standard syringes.**

*Immunization safety in the Americas and the Caribbean:  
Current situation and perspective*

*Paulo Froes  
UNICEF, Panama city, Panama*

An overview of immunization safety practices in Latin America and the Caribbean (LAC) is presented based on a UNICEF Immunization Plus TACRO quick evaluation conducted in 2004 through the means of a questionnaire addressed to the Ministries of Health from 27 countries. A total of 43 core questions were included addressing specific areas such as national policies and coordination; injection equipment; budgeting and financing; sharps waste management and training.

The results are further complemented by qualitative findings from field visits conducted by UNICEF Immunization Plus TACRO in eight LAC countries during 2003 and 2004. Out of the 27 countries, 16 (59%) reported having updated policies (revised within the last 5 years) on immunization safety but only 7 (26%) reported having a national coordinating structure that addresses immunization safety issues on a regular basis. Only four (15%) of the 27 countries make exclusive use of A-D syringes during SIAs and one country still makes use of reusable syringes for routine and supplementary immunization activities.

Although 21 (78%) of the 27 countries have their injection equipment financed exclusively by their own government, only 13 (48%) reported allocating specific resources to sharps waste management. Of the 27 countries, 19 (70%) report the use of other waste disposal practices (such as burn and burial) in addition to the use of incinerators or as the only option available for final disposal of sharps.

The findings show that outdated injection safety policies and unsafe immunization injection practices still seem to be common in LAC. An urgent need exists to use injections safely and appropriately in LAC immunization programmes. The presentation further discusses recommendations and perspectives for the region. It should be taken as a call for action.

## Day 3: 22 October 2004

### Health care worker protection

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*The WHO-International Council of Nurses (ICN) project on health care worker protection*

*Gerry Eijkmans  
WHO, Geneva, Switzerland*

In the area of globalization, the focus is often placed upon competition, and occupational health is not a priority. There is little inspection and few regulations. With respect to nursing, a number of push and pull mechanisms lead to substantial brain drain. The perception that the work place is not safe is one of the determinants of this brain drain. Occupational risks to health care workers include biological exposures, chemical hazards, stress, violence, radiation and heat. Needle-stick exposure is only part of the picture, but it is particularly worrying. In 2002, the WHO World Health Report estimated that worldwide, occupational needle-stick injuries account for 40%, 40% and 2.5% of new hepatitis B virus (HBV), hepatitis C virus (HCV) and HIV. The prevention approach is the one of the hierarchy of controls, starting with the elimination of sharps and unnecessary injections. When they can be afforded, engineered technologies may help reducing the risk of needle-stick injuries. In addition, vaccination against hepatitis B, an integral part of health care worker protection, is under-used and should be implemented on a larger scale. With the support of NIOSH, the occupational health branch of the United States Centers for Disease Control and Prevention (CDC), a project was initiated a year ago to develop health care worker protection intervention in three countries: South Africa, Vietnam and Tanzania. At this stage, phase I was completed, workshops were held, coalitions are formed and plans of actions are being developed. Engagement of occupational health bodies is important to translate the knowledge about the risk into successful prevention programme.

*A personal testimony...*

*Mary Magee  
San Francisco, CA, USA*

In 1987, I was 25 years of age and I was working in a dedicated unit involved in the clinical care of AIDS in San Francisco. I experienced a needle-stick injury from an infected source patient. Five days after the injury, I developed a febrile illness and while my baseline HIV test was negative, I sero-converted six weeks later. I was afraid I would die within five years; suddenly I felt I was 80 years of age. While I obtained worker compensation, which allowed me to receive good medical care, I expressed the wish that my status remained confidential. I am sorry to say that one of the reasons for this decision was that I did not want to be perceived as being sexually promiscuous. I was also afraid that if my colleagues or my patients were to know my status, I could be discriminated against. Being able to continue working was an important component of my ability to live on. While my employer was able to pay lots of money for my medical care, I think some of that money could also have been invested in prevention activities. In honour of all the unknown health care workers who have died of HIV and other infections with bloodborne pathogens worldwide, I would like to name my colleagues who have experienced occupational HIV infection in the United States. Peggy, Melissa, Larry and Joanne are no longer with us. Helen, Pat, Shannon, Cindy and I continue to live with HIV.

*Infection prevention and control, injection safety in Tanzania*

*Dr Stella Chale  
MoH, Dar el Salam, Tanzania*

Tanzania in collaboration with the Occupational and Environmental Health Unit of WHO, the International Council of Nurses, CDC, and John Snow Inc. implements a program on Infection Prevention & Control and Injection Safety. Muhimbili National Hospital was the selected initial pilot site. This hospital is the apex of clinical care in Tanzania, the capacity is 1324 beds. It is the only government teaching hospital in the country. To initiate the work, we conducted an assessment to examine the situation. In our assessment conducted using WHO tools, two-handed recapping was conducted for 45% of injections. Only 6.4% of health care workers were able to quote three pathogens that could be transmitted through needle-stick injuries. Overall, our hospital has no policy, no supplies, no record keeping and no training. Our recommendations included (1) conducting a three-day sensitization workshop, (2) identifying coordinators and supervisors and (3) conducting orientation training workshops. We developed action plans and budgets, a training manual, a training of the trainer course and a training course for health care workers. Supplies for infection control are to be supplied. In addition, our hospital has provided post-exposure prophylaxis to 20 health care workers who reported needle-stick injuries between January and September 2004.

*The health care worker protection project, South Africa*

*Dr Nelouise Geyer and Busiswe Nyantumbu  
DENOSA, Pretoria, South Africa*

This project has been conducted in a hospital in Pretoria. The project consists in three cross-sectional surveys. Phase 1 is about statistics on infection control, anonymous reporting of needle-stick injuries and observations. Our hospital had a surveillance system for needle-stick injuries that captured about 100-150 injuries each year. In our survey, we used six questions to measure needle-stick injuries. We then realized that many needle-stick injuries were not reported, that a high proportion of them did not lead to care and that most health care workers were not aware of any policy. Observations of practices led to spot unsafe practices that could have exposed the injection recipient or the provider to infections. Equipment and supplies are insufficient: There are stock outs of disposable injection devices and safety boxes. As a consequence, needle-stick injuries do occur. The next step will address training of all health care workers using the tools from the WHO toolkit.

*The health care worker protection project, Vietnam*

*Susan Wilburn, on behalf of Pham Duc Muc  
Vietnam Nurse Association, Hanoi, Vietnam*

The Vietnam project is a collaboration between the Ministry of Health, the occupational health institute and the national nursing association. As per the 2002 World Health Report, in the region where Vietnam is located, 41% of hepatitis C virus infections, 36% of hepatitis B virus infections and 3.7% of HIV infections are caused by needle-stick injuries. One of the first steps was to identify champions for the project. The key elements of the plan include (1) a planning meeting, (2) an initial assessment, (3) the set up of a surveillance reporting system, (4) and exposure management programme, (5) Information, Education and Communication (IEC), (6) provision of equipment and supplies (7) supportive supervision and monitoring tool and (8) monitoring and

evaluation plans. Activities completed include the adaptation and translation of the assessment tool, the three assessments, the training of trainers and the development of IEC material. As per the results of the assessment, strengths include the absence of reuse and high awareness of HIV and weaknesses include the lack of hand washing, two-handed recapping and lack of sharps boxes. A total of 29% of health care workers reported a needle-stick injury in the last 12 months. Next step include post exposure prophylaxis, coordination of the new project being initiated by the United States Presidential initiative and the engagement of health care workers in the analysis of data so that action can take place.

*Immunizing health care workers against hepatitis B*

*Dr Steve Wiersma  
WHO, Geneva, Switzerland*

Despite tremendous global progress in making hepatitis B vaccine available to infants, many health care workers (HCWs), an important risk group for this bloodborne infection, have not been immunized. The over 35 million HCWs in the world have a high occupational risk of being infected with hepatitis B virus and developing subsequent acute and chronic disease. It is estimated that 5.9% of these workers are exposed to HBV annually, resulting in 66,000 HBV infections per year. Despite many global recommendations calling for vaccination of health care workers, many countries do not have policies encouraging this practice. In addition, while hepatitis B vaccine has been made available to many developing countries through the efforts of partners in the Global Alliance for Vaccines and Immunization (GAVI), these doses are restricted for use in infants and are not available for others at risk. It is ironic that many of the HCWs providing this vaccine to their clients have not been vaccinated themselves, despite their high risk status. There is a strong need (1) to promote policies that call for the vaccination of those at risk for hepatitis B including HCWs, (2) to seek sustainable financing for vaccination programmes that target at-risk adults and (3) to create demand for vaccine in these same populations through effective health communication activities. The WHO "Aide-mémoire" for health care worker protection recommends vaccination of health care workers of health care workers early in their career.

***Demonstrating the use of safety boxes, Vietnam, 2003***



*Assessing small scale incinerators*

*Yves Chartier  
WHO, Geneva, Switzerland*

Small-scale incinerators may produce emissions, including toxic substances and permanent organic pollutants (POPs). Until countries in transition and developing countries have access to health care waste management options that are safer to the environment and health, incineration may be an acceptable response when used appropriately. Key elements of appropriate operation of incinerators include effective waste reduction and waste segregation, placing incinerators away from populated areas, satisfactory engineered design, construction following appropriate dimensional plans, proper operation, periodic maintenance, as well as staff training and management. To guide decision-making, it is important to assess exposure. Methods that are based upon (1) an assessment of emissions and (2) an assessment of exposures to emissions. This exposure assessment considered best practices, expected practices and worst case scenario on one side and different usage scenarios on the other hand. Overall, best practices and low usage scenarios are unlikely to produce unacceptable risks but the likelihood of achieving and maintain best practices is doubtful. Emission guidelines or standards require some sort of monitoring and permitting programme to be effective. Data gaps are large and uncertainty is substantial, so more applied research is needed to clarify these issues.

*Experience of the Philippines in alternatives to incinerations*

*Mercedes Ferrer  
Health Care Without Harm, Manila, Philippines*

During the recent mass measles immunization campaign in February 2004, the Philippines disposed of 19.5 million syringes using alternative non-incineration methods. The waste disposal complied with the ban on incineration under the Philippine Clean Air Act. Four basic methods were used: (1) treatment in centralized autoclaves, (2) treatment in centralized microwave facilities, (3) encasement in concrete vaults, and (4) burial in controlled waste pits with clay floors. The use of centralized treatment required a good infrastructure of transport and centralized storage. A wide range of transport methods were employed. Health Care Without Harm collaborated with the Philippine Department of Health to mobilize community support, provide technical assistance on waste management, monitor and document waste management practices in 19 documentation sites representing a wide range of geographic and socioeconomic conditions. No major problems related to transport and storage were reported in the documentation areas. The study showed the importance of planning, training, coordination, and waste tracking.

The costs (in US dollars) of transport, treatment and disposal of 120 safety boxes were: \$137 for a concrete vault, \$91 for a waste burial pit with a cement floor, \$74 for centralized autoclaving or microwaving, and \$2 for a waste burial pit with a clay floor. The costs for encasement or burial included construction materials and labour; the costs for centralized treatment included transport, storage, and treatment costs at the regular treatment prices (the actual costs for centralized treatment were lower than \$74 per 120 boxes since the centralized facilities offered their services for free or at a discount for this campaign). The Philippine experience demonstrated safe and effective sharps waste management from a mass immunization campaign without incineration. Copies of the full report entitled "Waste Management and Disposal During the Philippine Follow-Up Measles Campaign 2004" are available at [www.noharm.org](http://www.noharm.org).

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The study aim was to identify context-appropriate strategies for promoting safer management of contaminated needles and sharps in rural north Indian health settings, in order to reduce the risk of nosocomial bloodborne virus (BBV) transmission. Methods included (1) participant observation of high-risk areas (immunization clinics, laboratories, labour rooms, operating theatres, emergency rooms, dental clinics, etc.) and health care waste management systems at two hospitals over a four-month period; (2) forty in-depth interviews with health care workers (HCWs); (3) a cross-sectional survey of 266 HCWs from 7 hospitals regarding occupational blood exposure, compliance with Universal Precautions (UPs), and other factors potentially influencing these two outcomes. Disposable needles and syringes were widely used but reuse persists in particular situations (with and without sterilisation). Unsafe injection practices involving multi-dose vials, blood-sampling, sterilisation and disinfection and health care waste management were observed. HCWs were regularly occupationally exposed to blood e.g., 63% reported at least one needle-stick injury in the last year. Predictors of occupational exposure were hospital site, job category, risk perception and compliance with UPs. Compliance with UPs was sub-optimal (e.g., 40% reported recapping needles). Predictors of UP compliance were duration of employment, knowledge of BBV transmission, perception of barriers and organizational safety climate. Unsafe injection practices are placing patients and staff at risk of nosocomial BBV infection in rural north India. HCWs cannot practise safely in the absence of demonstrable organizational commitment to infection control generally and HCW safety in particular. Interventions targeting organizational capacity to create a safe environment are needed.

*Implementing health care waste management options: the good, the bad and the not so ugly*

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We now have a lot in hand to implement safe health care waste management. There are assessment tools, guidance manual, management tools, policy papers, training guidelines, examples of action plans, evaluation and monitoring tools and lists of recommendations. What is now needed is: facilitating the development of national strategies, respecting global protocols and legislations, helping in the development of safe and sound technologies and respecting environmental regulations. To ensure effective implementation, one needs to consider the political context, the willingness to invest, the lack of clear national policies / action plans, the lack of resources, habits, culture, attitude and lack of concerns regarding health care waste management. Local constraints are numerous. They include the lack of respect of good and safe practices, the absence of recognition of health care waste workers as key players, the absence of real segregation / waste minimization, the lack of trained staff, the shortage of permanently appointed staff, the lack of appropriate equipment, the lack of staff facilities and the lack of motivation. Overall, tools exist. However, they are underused or may create confusion. The lack of technical options is not the problem even if there is no perfect option. The lack of resources and awareness can be constraints but the difficulties in implementation is the major factor leading to poor health care waste management. To lift these roadblocks, the WHO recommendations are to support countries in the development of national plans within a regulation framework, to raise awareness and concerns at all levels, to make use of availability user-friendly practical tools, to allocate resources to health care waste management, to emphasize training at all levels, to appoint permanent and well considered health care workers and to

reinforce collaboration in between key players for a better use of resources and the development of sustainable national plans.

***Protected pit to dispose of sharps waste during the measles campaign in the Philippines***



## Appendix 1: New WHO policy on health care waste management

### 1 - Unsafe health care waste management leads to death and disability

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Health care activities lead to the production of waste that may lead to adverse health effects. Most of this waste is not more dangerous than regular household waste. However, some types of health care waste represent a higher risk to health. These include infectious waste (15% to 25% of total health care waste) among which are sharps waste (1%), body part waste (1%), chemical or pharmaceutical waste (3%), and radioactive and cytotoxic waste or broken thermometers (less than 1%).

Sharps waste, although produced in small quantities, is highly infectious. Poorly managed, they expose health care workers, waste handlers and the community to infections. Contaminated needles and syringes represent a particular threat and may be scavenged from waste areas and dump sites and be reused. WHO has estimated that, in 2000, injections with contaminated syringes caused:

- 21 million hepatitis B virus (HBV) infections (32% of all new infections);
- Two million hepatitis C virus (HCV) infections (40% of all new infections);
- 260 000 HIV infections (5% of all new infections).

Epidemiological studies indicate that a person who experiences one needle-stick injury from a needle used on an infected source patient has risks of 30%, 1.8%, and 0.3% respectively to become infected with HBV, HCV and HIV. In 2002, the results of a WHO assessment conducted in 22 developing countries showed that the proportion of health care facilities that do not use proper waste disposal methods ranges from 18% to 64%.

### 2 - Health care waste management may also represent a risk to health

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Health care waste management options may themselves lead to risks to health and no perfect readily achievable solution to manage health care waste exists. Health care waste, whether generated at smaller rural clinics or larger facilities, can be managed where adequate well-operated infrastructures exist. However, the volumes of waste generated within large facilities and targeted public efforts (e.g., immunization campaigns) are more challenging, particularly in developing countries where resources may be limited. In these difficult situations for which waste disposal options are limited, small-scale incinerators have been used and are still used as an interim solution in less developed and transitional countries. However, small-scale incinerators often operate at temperatures below 800 degrees Celsius. This may lead to the production of dioxins, furans or other toxic pollutants as emissions and/or in bottom/fly ash. Transport to centralised disposal facilities may also produce hazards to health care handlers, if not safely managed.

### 3 - Balancing risks to make sound policy decisions in health care waste management

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In addition to risks to health from infectious agents, long-term low-level exposure of humans to dioxins and furans may lead to impairment of the immune system, and impaired development of the nervous system, the endocrine system and the reproductive functions. Short-term high level exposure may result in skin lesions and altered liver function.

The International Agency for Research on Cancer (IARC) classifies dioxins as a “known human carcinogen”. However, most of the evidence documenting the toxicity of dioxins and furans is based upon studies of populations that have been exposed to high concentrations of dioxins either occupationally or through industrial accidents. There is little evidence to determine whether chronic low-level exposure to dioxins and furans causes cancer in humans. Overall, it is not possible to estimate the global burden of diseases from exposure to dioxins and furans because of large areas of uncertainty.

In the last 10 years, the enforcement of stricter emission standards for dioxins and furans by many countries has significantly reduced the release of these substances into the environment.

In several Western European countries where tight emissions restrictions were adopted in the late 1980s, dioxin and furan concentrations in many types of food (including breast milk) have decreased sharply.

WHO has established tolerable intake limits for dioxins and furans, but not for emissions. The latter must be set within the national context.

#### 4 – Guiding policy principles

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In view of the challenge represented by health care waste and its management, WHO activities are oriented by the following guiding principles:

- preventing the health risks associated with exposure to health care waste for both health workers and the public by promoting environmentally sound management policies for health care waste;
- supporting global efforts to reduce the amount of noxious emissions released into the atmosphere to reduce disease and defer the onset of global change;
- supporting the Stockholm Convention on Persistent Organic Pollutants (POPs);
- supporting the Basel Convention on hazardous and other waste; and
- reducing the exposure to toxic pollutants associated with the combustion process through the promotion of appropriate practices for high temperature incineration.

#### 5 – Strategy

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To better understand the problem of health care waste management, WHO guidance recommends that countries conduct assessments prior to any decision as to which health care management methods be chosen. Tools are available to assist with the assessment and decision-making process so that appropriate policies lead to the choice of adapted technologies. WHO proposes to work in collaboration with countries through the following strategies:

##### *Short-term*

- Production of all syringe components made of the same plastic to facilitate recycling;
- selection of PVC-free medical devices;
- identification and development of recycling options wherever possible (e.g.: for plastic, glass, etc.); and
- research and promotion on new technology or alternative to small-scale incineration;

Until countries in transition and developing countries have access to health care waste management options that are safer to the environment and health, incineration may be an acceptable response when used appropriately. Key elements of appropriate operation of incinerators include effective waste reduction and waste segregation, placing incinerators away from populated areas, satisfactory engineered design, construction following appropriate dimensional plans, proper operation, periodic maintenance, and staff training and management.

*Medium-term*

- Further efforts to reduce the number of unnecessary injections to reduce the amount of hazardous health care waste that needs to be treated;
- research into the health effect of chronic exposure to low levels of dioxin and furan; and
- risk assessment to compare the health risks associated with: (1) incineration; and (2) exposure to health care waste.

*Long-term*

- Effective, scaled-up promotion of non-incineration technologies for the final disposal of health care waste to prevent the disease burden from: (a) unsafe health care waste management; and (b) exposure to dioxins and furans;
- support to countries in developing a national guidance manual for sound management of health care waste;
- support to countries in the development and implementation of a national plan, policies and legislation on health care waste;
- promotion of the principles of environmentally sound management of health care waste as set out in the Basel Convention; and
- support to allocate human and financial resources to safely manage health care waste in countries.

## Appendix 2: WHO role in technology transfer

Local production of injection devices with reuse prevention features including auto-disable syringes: Terms of reference for assistance by WHO in technology transfer activities

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### *Background*

- Single use syringes are manufactured in many countries around the world. Conversion of local production capacity to a capacity to produce injection devices with reuse prevention features for general purposes (including reuse prevention syringes and auto-disable syringes for immunization purposes) may help in ensuring sustainable and widespread access to these products;
- Local production of reuse prevention injection devices that meet international standards of (1) product design and (2) quality systems may be a viable alternative to imported products for national health care programmes;
- The assistance of the World Health Organization (WHO) in technology transfer must fit in with its broader public health mandate. It must be compatible with WHO rules, regulations, policies and practices and is provided in accordance with the terms of the Basic Agreement in force between WHO and the government of the country concerned.
- These terms of reference propose a framework for WHO to act as a resource for countries interested in the various options available to introduce injection devices with reuse prevention features into their health care services.

### *Objectives of WHO assistance in technology transfer:*

- Provide advice to the Ministry of Health in making decisions regarding transfer of technology to produce reuse prevention injection devices locally;
- Assist governments in ensuring that national regulations on single use injection devices are consistent with international norms and standards;
- Facilitate contacts between local manufacturers and various parties from industry willing to transfer technology in the field of reuse prevention injection devices.

It is understood that:

- WHO does not become involved in the negotiation of any agreements between such local manufacturers and the companies willing to transfer their technology;
- It is and will at all times remain the responsibility of the local manufacturer to ensure that the local production, sale and use of reuse prevention injection devices does not infringe any provisions of national or international laws, including but not limited to those relating to intellectual property rights such as patents.

### *Proposed activities for WHO:*

#### **Assessment**

1. WHO can assist the Ministry of Health and the National Regulatory Authority in an assessment of local production capabilities, by:

- Discussing overall policies and priorities of the Ministry of Health and the various health programmes as the potential users of reuse prevention injection devices;

- Reviewing country data, strategies, planned activities and proposed expansions for all health programmes to forecast quantities and types of reuse prevention injection devices needed over time;
- Reviewing the capabilities (including financing) of the National Regulatory Authority in the area of injection devices, with respect to its capacity for inspection, testing, licensing and post-marketing surveillance;
- Reviewing (a) quality system standards and (b) product standards used for regular single use injection devices produced locally with a view to assisting the Ministry of Health in determining the need for alignment with international standards.

### **Information exchange**

2. Presenting information to the Ministry of Health and other national stakeholders regarding:

- The burden of disease associated with unsafe injections;
- The effectiveness and cost-effectiveness of the provision of standard single use syringes to prevent injection-associated infections;
- The effectiveness of introduction of reuse prevention injection devices;
- The global market situation of reuse prevention injection devices in terms of supply and demand;
- The expected benefits of regulating medical devices - including single use injection devices - on the basis of international norms and standards;
- The WHO procedure for assessing the acceptability, in principle, of single use injection devices for procurement by United Nations agencies;
- The integration of potential technology transfer plans within national injection safety strategies.

### **Contact facilitation**

3. Facilitating contacts between (1) local manufacturers and (2) the International Association for Safe Injection Technology (IASIT) who may provide updated and public information regarding the various technology options available from all IASIT members.

### **Quality assurance**

4. WHO can offer assistance to countries in addressing quality issues relating to the production of single use injection devices by:

- Providing information to the Ministry of Health and local manufacturers regarding the WHO recommended (1) product standards and (2) quality system standards that local production of single use injection devices need to meet;
- Providing information to the National Regulatory Authority regarding the measures that should be adopted to regulate medical device safety, using WHO recommendations as a reference (Medical devices regulations: global overview and guiding principles, WHO 2003).

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## Appendix 4: Programme of work

Day 1- 20 October 2004

<i>Time</i>	<i>Title</i>	<i>Presenter</i>
<i>8:00-9:00</i>	<i>Registration</i>	
<i>Opening session</i>		
9:00-9:30	Welcome remarks	Olive Shisana, HCRC
	Opening address	Steffen Groth, WHO
9:30-10:00	Progress on injection safety since 2003	Sophie Logez, WHO
<i>Scaled up initiatives</i>		
10:00-10:30	India: From a national assessment to policy changes	Yvan Hutin, WHO
10:30-11:00	<i>Break</i>	
<i>Innovative approaches in assessment and implementation</i>		
11:00-11:30	Risk factors for HIV infection among children in the Free State, South Africa: Comprehensive investigation plans	Olive Shisana, HSRC
11:30-11:45	Interactional group discussion: An effective intervention to improve injection use in the informal private sector of Pakistan	Mubina Agboatwala, HOPE
11:45-12:00	Interactional group discussion: From assessment to scaling up in Cambodia	Chean Men, Consultant
12:00-12:15	A new WHO policy for waste management: Balancing risks, protecting the environment	Yves Chartier, WHO
12:15-14:00	<i>Lunch</i>	
<i>Afternoon: Integrated infection control strategies</i>		
14:00-14:30	Group discussion	
14:30-14:45	A comprehensive strategy to prevent infections with bloodborne pathogens in health care setting	Yvan Hutin, WHO
14:45-15:00	An update on the AFRO infection control project	Evelyn Isaacs, WHO
15:00-15:15	Adaptation of the WHO/AFRO/CRHCS infection prevention and control toolkit in one country of the Caribbean	Una Reid, Consultant
15:15-15:30	Infection control practices in dental offices in the Free State, South Africa	Shaheen Mehtar, SUN
15:30-15:45	Examining the safety of breast milk banks in the era of the HIV pandemic	Shaheen Mehtar, SUN
15:45-16:00	Essential components of an infection control programme	Mary Catlin, Consultant
16:00-16:30	<i>Coffee break</i>	
16:30-16:45	Risk of disease transmission through unsafe blood	Neelam Dhingra, WHO
16:45-17:00	Infection control among traditional birth attendants and traditional healers	Nompumelelo Zungu-Dirwayi, HSRC
17:00-18:00	Group discussion	

<i>Time</i>	<i>Title</i>	<i>Presenter</i>
<i>Morning: Reviewing progress in African injection safety pilot projects</i>		
8:30-8:45	US Government Emergency Plan for AIDS relief and Injection Safety	Glenn Post, USAID
8:45-10:45	Overview of the "Making Medical Injections Safer (MMIS) Project"	Jules Millogo, JSI
	Injection safety project in:	
	Kenya	Susan Otieno, MoH
	Mozambique	Antonio Mussa, MoH
	South Africa	Bronwyn Pearce, JSI
	Tanzania	Zachary Berege, MoH
	Uganda	Jacinto Amandua, MoH
10:45-11:15	<i>Break</i>	
11:15-11:45	Injection safety project in Namibia	Christine Gordon, MoH
11:45-12:15	Results from "Trials of Improved Practices" to improve injection safety in Zambia	Christopher Mazimba, IHG
12:15 -13:00	Group discussion: What lessons for scaled up approaches	
13:00-14:30	<i>Lunch</i>	
<i>Afternoon: Quality and access to injection devices</i>		
14:30-14:45	WHO pre-qualification procedure for injection devices	Sophie Logez, WHO
14:45-15:00	WHO agenda to assess the effectiveness and the safety of needle removers	Mary Catlin, Consultant
15:00-15:15	Proposed field trial of needle removers in mass campaign settings	Dina Pfeifer, WHO
15:15-15:30	Assessing newer injection technologies in Pakistan	Mubina Agboatwala, HOPE
15:30: 16:00	Group discussion	
16:00-16:30	<i>Coffee break</i>	
16:30-16:40	WHO terms of reference for technology transfer activities	Sophie Logez, WHO
16.40-16.50	IASIT: Ensuring the supply of safe injection technology	Cecilia Jimenez, IASIT
16:50-17:05	Medical Devices and health care associated infections in developing countries	Mary Catlin, Consultant
17:05-17:20	Quality of injection devices in Pakistan: From assessment to legislation	Naveed Janjua Zafar, AKU
17:20-17:35	Immunization Safety in the Americas and the Caribbean: Current situation and perspectives	Paulo Froes, UNICEF
17:35-18:00	Group discussion	

<i>Time</i>	<i>Title</i>	<i>Presenter</i>
<i>Health care worker protection and waste management</i>		
8:30-8:45	The WHO-ICN project on health care worker protection	Gerry Eijkemans, WHO
8:45-9:00	Tanzania presentation on Infection Prevention and Control-Injection Safety project	Stella Chale, MNH
9:00-9:15	Viet Nam presentation on health care worker protection project	Susan Wilburn , ICN
9:15-9:30	South Africa presentation on health care worker protection project	Nelouise Geyer, DENOSA Buiswe Nyantumbu, NHLS
9:30-9:45	Immunizing health care workers against hepatitis B	Steve Wiersma, WHO
9:45-10:30	Group discussion	
<i>10:30-11:00</i>	<i>Break</i>	
11:00-11:15	Assessing small scale incinerators	Yves Chartier, WHO
11:15-11:30	Alternatives to incineration: Experience in the Philippines	Mercedes Ferrer, HCWH
11:30-11:45	Injection safety and waste management in rural North India	Michelle Kermode, DU
11:45-12:00	Implementing health care waste management options successfully: The good, the bad and the not so ugly	Yves Chartier, WHO
12:00-13:00	Round table and recommendations	
<i>13:00-13:15</i>	<i>Closure</i>	