WHO-EM/CEH/152/E

Report on the

Subregional workshop on environmental health in health care facilities with special focus on health care waste

Amman, Jordan
12–14 June 2012

World Health Organization
Regional Office for the Eastern Mediterranean

WHO-EM/CEHA/152/E

Report on the

Subregional workshop on environmental health in health care facilities with special focus on health care waste

Amman, Jordan
12–14 June 2012

World Health Organization
Regional Office for the Eastern Mediterranean

WHO-EM/CEHA/152/E

Report on the

Subregional workshop on environmental health in health care facilities with special focus on health care waste

Amman, Jordan
12–14 June 2012

World Health Organization
Regional Office for the Eastern Mediterranean

Document WHO-EM/CEHA/155/E

CONTENTS

ANNEXES

1. INTRODUCTION

A regional workshop on environmental health in health care facilities with special focus on medical waste was organized by the World Health Organization Regional Centre for Environmental Health Action in Amman, Jordan, from 12 to 14 June 2012. The meeting was attended by participants from Egypt, Islamic Republic of Iran, Jordan, Lebanon, Morocco, Oman, Pakistan, occupied Palestinian territory, Saudi Arabia, Sudan, Tunisia and Yemen, in addition to occupational and environmental health experts from WHO headquarters and WHO temporary advisers from Egypt, Jordan and Lebanon.

The objectives of the workshop were to:

- draw attention to the burden of diseases related to environmental health and occupational health in health care facilities in the Region;
- highlight the importance of ensuring environmental health and occupational health in maintaining patient safety and infection control and prevention, and providing safe workplaces for health care workers;
- emphasize the importance of "greening" health care;
- discuss proposed elements in the development of a strategic framework for environmental health and related occupational health in health care facilities in the Region and set priorities for low-, middle- and high-income settings;
- discuss and set key indicators for monitoring and evaluating the performance of health care waste management systems and related occupational health in health care facilities in the Region; and
- facilitate an exchange of experiences between regional and international environmental health and occupational health experts.

The opening message of Dr Ala Alwan, WHO Regional Director for the Eastern Mediterranean, was delivered by Dr Ahmad Basel Al Yousfi, Director, Regional Centre for Environmental Health Action. He said that health care-associated infections affected between 5% and 30% of patients. There were several risks related to health care environments, including airborne infections (e.g. tuberculosis and *Legionella*), which could be prevented by improved ventilation, waterborne infections (e.g. diarrhoea), which could be prevented by providing safe water supply, and vector-borne infections (e.g. malaria), which could be prevented by proper environmental management and adequate programmes on vector control. Improvement of the hospital environment, consistent, safe and sound water supply, basic sanitation, proper management of health care waste, safe food handling and adequate ventilation could contribute to the decrease or even elimination of transmission of infections in health care settings.

Dr Alwan made reference to the regional strategy for enhancing patient safety, which had been endorsed by the fifty-second session of the WHO Regional Committee for the Eastern Mediterranean. The strategy articulated that the main categories of patient safety were product safety (e.g. vaccines and blood), safety of services (e.g. infection control) and a safe environment of care (e.g. facilities, waste management and other environmental considerations). The recommendations in the regional strategy called on Member States to

introduce the concept of “patient safety” and to make it a top priority on the health agenda of policy-makers and within the organizational structure of the health system. Also, it called on Member States to develop suitable sets of standards and indicators for patient safety, including environmental safety. In response, CEHA had participated in the development of the WHO guidelines published in 2008, entitled "Essential environmental health standards in health care", along with other pertinent documents and initiatives in this regard.

The Chair was shared on a rotating basis. The agenda, programme and list of participants are included as Annex 1, 2 and 3, respectively.

2. TECHNICAL PRESENTATIONS

2.1 Environmental health in health care settings in the Region: challenges and prospects

Mr Raki Zghondi, CEHA

While some countries in the Region have made efforts to improve their health care systems and provide better health services, health care facilities have not always paid enough attention to environmental health within facilities, resulting in increased nosocomial infections, increased length of hospital stays, and thus increased health expenditures.

The effective functioning of health care settings depends on safe and sufficient water, basic sanitation, adequate management of health care waste, appropriate knowledge of hygiene, adequate ventilation, and occupational hygiene measures.

The challenges facing health care facilities are demonstrated in terms of the burden of diseases associated with environmental health in health care facilities. A study in Tunisia (Ministry of Health of Tunisia, 2009) showed that about 34% of water samples in surveyed hospitals were contaminated by *Legionella pneumophila*. There are several examples of diseases/infections/injuries caused by inadequate environmental health conditions in health care settings, such as airborne infections (e.g. legionellosis, tuberculosis); water and foodborne diseases (diarrhoea); bloodborne infections due to needle stick injuries (hepatitis B virus, hepatitis C virus, HIV).

Improving environmental health in health care facilities requires identification of the root cause of the problems, identification of the required improvements, development of a plan of action and prioritization of implementation.

2.2 Environmental occupational health in health care settings

Ms Suzan Wilburn, WHO/HQ

The WHO workers’ health: global plan of action (2008–2017) urges countries to take actions, as appropriate to their national priorities and specific circumstances, to devise national policy instruments on workers' health and improve the performance of, and access to, occupational health services. Therefore, countries are encouraged to develop specific programmes for the occupational health and safety of health care workers, including

immunization of health care workers against hepatitis B virus. No person should be injured or harmed at work, as this is a basic human right, and a fundamental principle on which occupational health is based.

Occupational health is considered a subcategory of environmental health. Without a healthy, safe, and motivated workforce the public health goals of the countries cannot be met. Therefore, working conditions have an impact on the workforce and the quality of patient care. Occupational health in health care settings relates to: biological, chemical, ergonomic, stress/violence, and physical hazards. Occupational exposure to bloodborne pathogens in health care workers due to needle stick injuries is very important; the highest chance of infection is for hepatitis B, followed by hepatitis C, then HIV. There are 2 million exposures per year in health care workers: hepatitis B (37%), hepatitis C (39%), and HIV (4.4%), due to needle stick injuries.

The most effective occupational health hierarchy of controls is the elimination or substitution of sharps, such as eliminating unnecessary injections, etc., followed by engineering controls, administrative and work practice controls, and personal protection equipment (PPE).

Hepatitis B virus immunization is effective (95% efficacy) and is of highest priority. Evidence shows that there was a decline in hepatitis B cases among health care workers; yet over 80% of health care workers remain unimmunized in many parts of the world. There were several international campaigns and projects on protecting health care workers by preventing needle stick injuries. Injury reporting is important, as well as near misses, to ensure proper treatment and follow up, financial compensation and engineering procedures changes.

The future steps are to develop and/or strengthen the information systems; build evidence for national policy; ensure accessibility to occupational health services; ensure availability of safe technology and PPE; develop and implement a research agenda; and disseminate and adapt best practices at the local level.

2.3 Importance of environmental health in the Patient Safety Friendly Hospital Initiative (PSFHI) in the Region

Dr Mahi Tehewy, CEHA

Patient safety is defined as the absence of preventable harm to a patient during the process of health care. The World Alliance for Patient Safety was launched in October 2004, in Washington D.C. in response to a World Health Assembly resolution in 2002 urging WHO and Member States to pay the closest possible attention to patient safety.

The indoor environment controls several important processes in health care facilities and without ensuring environmental safety, it is impossible to ensure the safety and care of patients and health care workers. Setting standards for environmental safety is currently one of the pillars of any accreditation programme. The only patient safety initiative that considers indoor environmental safety is PSFHI.

The PSFHI implements safe practices in health care facilities by assessing adherence to patient safety standards developed by WHO and other partners. Patient safety standards are a set of requirements for establishing a patient safety programme at the hospital level. They provide a framework that enables hospitals to assess patient care from a patient safety perspective, and build capacity of staff in patient safety.

The objectives of the PSFHI are to: raise awareness of patient safety at hospital and public levels; create an accountability framework for patient safety through external assessment of hospitals; benchmark hospitals to other hospitals in the Region from a patient safety perspective; demonstrate hospital's commitment and accountability regarding patient safety to public; motivate hospital staff to participate in improving patient safety; and create a culture of patient safety.

The PSFHI assessment is a voluntary measurement-based evaluation, which assesses hospitals to determine whether they comply with WHO patient safety standards. Its main domains are: 1) Leadership and management; 2) Patient and public involvement; 3) Safe evidence-based clinical practices; 4) Safe environment; and 5) Lifelong learning.

Each domain is formed of critical standards (20), compulsory criteria with which the hospital has to comply to become enrolled in the PSFHI. Core standards (90): these are a minimum set of criteria that the hospital should comply with to become safe for patients. Developmental standards (30): are the requirements that a hospital should attempt to comply with in the future within its capacity of resources to enhance safer care.

2.4 Environmental health management and related occupational safety in King Hussein Cancer Centre (KHCC)

Eng Dana Nashawati, CEHA

The KHCC has a culture of safety and environmental health, and established a Safety/Environment of Care Committee, whose main task is to ensure the safety of patients and staff. Environmental health issues addressed at the centre are: medical waste management, occupational health management, environmental measurements, hazardous materials management, water testing, food health and safety, recycling and waste-size reduction efforts, among other programmes and initiatives. Future plans include the designing of a new tower that utilizes renewable sources of energy.

Health care waste is treated via environmentally-friendly sterilization and shredding, thus, reduces the need for incineration by 90% of the waste produced at the centre, and reduces the volume of waste. Chemotherapy waste management is incomplete; thus, there is a need for final treatment and disposal of such waste and other hazardous chemicals.

Due to an increase in occupational injuries reported to the safety committee, a multidisciplinary task force was formed to study the issue. Extensive data analysis of past employee injuries was carried out. The situation was assessed and the cause of variation analysed. An improvement strategy was selected, which included educational campaigns for the two main categories of affected employees, nurses and housekeepers, immunization,

practices, and education. Planning, monitoring, and awareness have proven effective in reducing needle-stick injuries.

2.5 PSFHI Improvement Toolkit for the Region: PSFHI module on environmental health in health care facilities

Eng Maysoon Bseiso, CEHA

Patient safety is a global health concern in developed or developing countries; WHO has recognized the importance of patient safety and prioritized it as a public health concern through implementation of the PSFHI.

The main business of hospitals is to provide health care services for patients some of whom are immuno-compromised, sensitive, or vulnerable; thus improving patient safety is fundamental. In addition, hospitals are considered potentially hazardous workplaces; workers, as well as patients and visitors, are exposed to a wide range of physical, chemical, biological, and radioactive hazards. Some of the activities performed within a hospital can adversely affect the environment, such as incinerating medical waste, disposing of hazardous chemicals and discharging untreated sewage.

The Hospital Environment Improvement Toolkit is an important tool to assist health care facilities in advancing and developing environmental health by means of recommending guidelines for each element of the hospital environment. The Toolkit has seven modules covering seven key elements in the hospital environment: indoor air quality; water; wastewater; health care waste and spill clean-up; pest and disease vector control; food safety; cleaning and disinfecting environmental surfaces.

Improvements in the hospital environment, including safe and sufficient water supply, basic sanitation, management of health care waste, safe food handling, and adequate ventilation can contribute to decreased transmission of infections within health care facilities.

The objectives of the improvement Toolkit are: to control, manage, and improve indoor air quality of the hospital's environment to ensure a safe indoor air quality to protect patients, visitors, and health care workers against nosocomial infections and occupation-related diseases; to provide sustained access to safe and adequate water supply for the effective functioning of the hospital and the intended uses to improve patient safety; to improve hospital wastewater management practices to protect health and the environment; to manage health care waste in an environmentally-sound manner that minimizes the risk of injury or infection to the staff involved in its management and the community; to maintain satisfactory standards of pest and disease vector control in both clinical and non-clinical areas in the hospital to provide the optimum safe environment for the delivery of high-quality patient care; to ensure food safety and enhance quality of food for patients, staff, and visitors to minimize the risk of disease transmission and reduce the incidence of foodborne illness; to reduce the number of microorganisms that may come in contact with patients, visitors, and staff; and to provide a clean and agreeable atmosphere for patients and staff.

2.6 Elements for development of a strategic framework on environmental health in health care settings and related occupational health in the Region

Eng Maysoon Bseiso, CEHA

Environmental health as defined by WHO Regional Office of Europe comprises those aspects of human health, including quality of life, that are determined by physical, chemical, biological, social and psychosocial factors in the environment. Occupational health issues, including the anticipation, recognition, evaluation, and control of conditions arising in/or from a workplace, which may cause illness or which could have an adverse effect on the health of workers, are a very important environmental health concern for health care facilities.

The development of a strategic framework for environmental health in health care facilities will deal with staff protection, patient safety and protection, and community and environmental protection. Priorities of environmental health elements and the provision of essential environmental health services may differ in health care facilities situated in rural or urban areas, or in low-income or high-income settings. This difference should be borne in mind when developing the environmental health strategic framework.

An internet search was conducted to find evidence linking various environmental health issues to nosocomial infections and infections due to contaminated surfaces or handling of medical waste, food poisonings, as well as occupational exposure to hazardous chemicals. Numerous incidents and studies were found, in particular on hospital-acquired infections (Environmental *Legionella* and *Aspergillus*). Little evidence exists to demonstrate the link between other environmental health issues, such as medical waste management, chemicals management and handling, food safety, occupational exposure and their impacts on the health of health care workers, waste handlers, and others.

The search did not render any scientific nor anecdotal evidence on environmental health in health care facilities and its link to infections and injuries of patients and health care workers in the Region. This can be attributed to either the lack of documentation of such incidents on the internet from the countries of the Region, or absence/weakness of reporting or deficiency in the investigation of causes of such incidents, when they occur.

The improved performance of health care establishments in providing safer health care to patients, providing a safe environment to health care workers, and protecting the environment depends largely on a number of different environmental health and occupational health elements, whether in low-income settings or high-income settings.

The proposed environmental health elements in health care facilities are:

- Physical facilities (site, infrastructure, building design, ventilation (indoor air quality and outdoor air pollution), construction works and renovation, operational requirements, maintenance and repair, green building);
- Utilities - water (water quality and quantity, water safety requirements, specific structural requirements, water purification plants, water storage, conservation of

water), wastewater (wastewater disposal system, wastewater treatment (septic tanks), specific structural requirements, re-use of treated effluent), electricity (standby generator, conservation of energy);

- Hotel services (cleaning and housekeeping (environmental surface cleaning, spill containment, laundry), waste management (medical waste management, non-hazardous (general) waste management, hazardous/chemical waste management, mercury elimination, reduction/minimization of waste, maximize recycling);
- Food services (safe food supply, hygienic handling of food);
- Pest and rodent control (pest control programme, pest control measures, integrated pest management);
- Purchasing and Supply (less toxic products (disinfectants, detergents, cleaning materials), management of materials (first in/first out), supply of containment kits, medical waste bags and containers, autoclavable bags, green products).
- Occupational hygiene (noise pollution, control measures, PPE, hazard communication, MSDS);
- Environmental pollution prevention (greening of the hospital, air, water, and soil pollution reduction and control measures, measures to reduce climate footprint);
- Disaster management and emergency preparedness (emergency plan, fire escape and evacuation plan).

Some of the environmental health priorities in health care facilities in the Region include: provision of safe drinking-water from a protected source as well as providing at least the minimum water requirement of 40–60 litres/day for each patient; adequate number of toilette and hand-washing facilities, with soap and hot water; hygiene promotion, and hazard communication, among health care workers; and adequate and safe ventilation, utilizing natural ventilation where possible.

2.7 Greening the health sector

Ms Susan Wilburni, WHO/HQ

Health is an important input to sustainable development as healthy people are better able to learn, work, and contribute to their economies and societies. Sustainable development can improve health. Opportunities in greening health care have not been fully exploited. Greening health care provides access to sustainable energy and water, reduces the carbon footprint, and protects patients and health workers.

The elements of a green hospital are:

- Sustainable energy for health care: access to sustainable energy, alternative energy generation, energy efficiency;
- Green building design: building hospitals that are responsive to local climate conditions and optimized for reduced energy; asbestos and lead-free, natural ventilation for infection control;
- Waste and water: reduce, re-use, recycle, compost; employ alternatives to waste incineration, conserve water; rain water harvesting, grey water reuse;
- Patient and worker safety: biological hazards and nosocomial infections, safer chemicals disinfectants, sterilants.

Greening health care facilities can expand electricity and water coverage to health care units in remote and rural areas. The health sector is already showing leadership "Light for Life", which are modular solar panels that charge LED lights and cell phone chargers for health centres in rural Africa.

There are several examples of leadership in greening health care, such as using biogas from food waste for hospital cooking, recycling plastic IV bottles, harvesting rainwater for hospital use, solar water heaters, and natural ventilation for infection control. Although the energy benefits of energy-waste systems are clear, it involves a health penalty (emission of dioxins, pollutants); the environmental benefits of mechanical/thermal treatment (e.g. autoclaving) are also clear, but energy aspects need more exploration.

The WHO Regional Office building in Amman is rated LEED Gold; Leadership in Energy and Environmental Design voluntary rating systems.

“Mercury-free health care” is an initiative by WHO and Healthcare without Harm, to phase out the demand for mercury-containing fever thermometers and sphygmomanometers by at least 70% and to shift the production of all mercury-containing fever thermometers and sphygmomanometers to accurate, affordable, and safer non-mercury alternatives by 2017.

2.8 Hospital accreditation with special focus on environmental health accreditation in health care facilities in Lebanon

Dr Mohammed Ali Hamandi, CEHA

In 1985, Lebanon started a hospital classification system, which had a strong financial incentive and helped hospitals to improve structure, technology and staffing. In 2001, hospital accreditation started with a process approach and stressed quality systems. Hospitals that fail accreditation are not allowed to contract with public guarantors.

Environmental health issues in the Lebanese accreditation system are found in chapters: Occupational health and safety, Environmental services, Infection control, Waste management, Pharmacy, Radiology, and Fire.

Policies and procedures related to occupational health and safety should include no recapping of needles, documenting the process for completing accidents and incident forms, providing appropriate indications for barrier equipment (e.g. gowns, gloves, masks, eye protection), blood exposure, spills management (e.g. chemicals, blood), and providing training related to occupational health and safety during orientation and continuous education.

Policies and procedures related to infection control should include universal/standard precautions, hand washing, prevention and control of outbreaks of infection, linen handling, waste handling, needle stick injury, hazardous spills, appropriate use of personal protective equipment (PPE), and evidence of a planned formal annual education programme for all staff.

Policies and procedures related to waste management should include waste segregation and transport, disposal system for all types of wastes which details frequency of collection, inspection of all waste holdings, infection control monitoring, staff education and training, employee safety, as well as colour coding, segregation, storage, sharp containers, data collection and audits, etc.

Policies and procedures related to environmental health and management should include specific cleaning for all areas outlining process, equipment, and chemicals required.

There are specific requirements for chemicals and chemicals storage, cleaning equipment use, fire, and radiology. Effluent waste chemicals from the development process must be contained/disposed of appropriately, film development/dark room area provides exhaust/extractor fan, leaded walls, doors and control booths present and their patency regularly monitored and documented, and radiation levels of staff and physicians monitored.

There are additional standards for water treatment programme and activities, specifications for water treatment and monitoring of water quality, appropriate provision for disposal of pharmaceutical waste, evidence of the introduction of hazard and critical control principles (HACCP), stand-by generator, disaster plan, QIP and KPI for most departments, etc.

The challenge is to sustain good practices between accreditation survey visits, to apply standards in ways that support sustainable development (balancing environmental, social, and

economic outcomes), and to manage sub-contractors. In addition, the challenge is to be able to measure the impact of a standard when multitudes of possible factors exist.

2.9 Water safety in health care facilities

Dr Susanne Lee, CEHA

It is increasingly recognized that water in health care facilities is a potential source of health care-acquired infections (HAI), caused not only by *Legionellae*, but also by a wide range of other waterborne opportunistic pathogens, including *Pseudomonas aeruginosa*, *Stenotrophomonas spp*., *Klebsiella pneumoniae*, non-tuberculous *Mycobacteria spp*. and *Aspergillus spp*. etc. These can pose serious threats to vulnerable patients, especially the very young, older people and immune-compromised individuals.

Many of these waterborne HAIs are difficult to diagnose and have limited treatment options; they may cause increased morbidity, mortality and higher treatment costs as a result of longer patient hospital stays, increased interventions; augmented care and drug use. Many of these opportunistic pathogens may also provide a reservoir of antibiotic resistance. Providing safe water is therefore essential both for the safety of patients and to reduce costs.

Within health care facilities, water is used not just for human consumption, which includes water used for drinking, food preparation and other domestic purposes, including bathing, laundry, but is used also for a range of patient diagnostic and treatment purposes so there are many potential routes of exposure, including by direct or indirect ingestion (contaminated water), contact with contaminated water (during bathing, cleaning wounds), inhalation of aerosols (*Legionellae* in the drift from evaporative cooling towers), and aspiration (contaminated water unintentionally entering the lungs while drinking).

Within public buildings, including health care facilities, the WHO's water safety plan approach is advocated. This is to ensure that all potential waterborne hazards are identified; the susceptibility of those exposed is determined, together with any possible routes of exposure. However, at present there is no unified approach to assessing the risk to health from all forms of water usage or in determining what are appropriate health-based targets for each type of system; associated equipment; use or patient within health care facilities. This is particularly difficult in the health care setting as there are many more potential opportunistic pathogens than are relevant for a normal population.

The first difficulty is to identify a multidisciplinary team, which takes responsibility for all aspects of water use within the health care premises. This team, with external expert assistance if required, should take responsibility for:

- a systematic and detailed risk assessment of each water system/piece of equipment;
- a management scheme to control the hazards, ideally using a multi-barrier approach together with any operational monitoring requirement;
- ensuring that there is adequate documentation and communication both for normal operation of the systems and following incidents which includes a plan for dealing with predictable/foreseeable problems; and

- overseeing training requirements for all those who could have an impact on water quality.

Case Study 1. A 3-year study in a German hospital showed a marked improvement in water quality resulting in no new HAI cases of Legionnaires' disease; it also resulted in an overall decrease in neonatal sepsis.

Case Study 2. Following identification of a problem with colonization with *Pseudomonas aeruginosa* and *Legionellae* in a large teaching hospital water distribution system, a water safety plan approach to managing water quality resulted in improved communication between professionals and in staff awareness of waterborne hazards.

Implementing water safety plans in the health care environment has many advantages not only in reducing HAIs, but also in promoting active involvement of all staff. This ultimately results in a more effective use of funds used for water quality management (targeted at the highest risk areas). Where this approach has been implemented it can be seen that there follows an overall reduction in HAIs with improved outcomes for both patients' health and hospital budgets.

2.10 Planning health care waste management in health care facilities in the Region

Mr Raki Zghondi, CEHA

Health care waste management challenges in the Region vary depending on income settings. Low-income countries do not have health care waste management plans, and many hospital managers confuse waste management guidelines/standards with waste management plans. WHO has supported the development of hospital waste management plans in three low-income countries; however, they were not fully implemented due to lack of resources. Planning is based on the WHO minimal programme on health care waste management.

In middle-income countries, the majority of government hospitals do not have waste management plans, as they implement (partially) the national standards and/or the WHO guidelines. Some private hospitals implement quality improvement plans addressing health care waste management for the purpose of accreditation. Planning is based on the WHO minimal programme with some enhanced practices for gradual improvement towards the WHO guidelines.

In high-income countries, many large hospitals (private) are accredited and have a quality improvement plans addressing health care waste management. Some government-owned health care facilities do not have plans. Planning is based on the WHO guidelines.

Waste management plans must take into account global initiatives related to patient safety, green health care, climate change mitigation and other plans and protocols. Medical departments need protocols for waste transport, storage, treatment, etc.

The components of the protocol for implementing waste management improvements in medical departments are: methods and timetable for implementing improvements; definition

of roles and responsibilities; checklists; training; procedures and precautions; emergency procedures during health care waste spills and reporting; health hazards associated with mishandling health care waste; detailed information on safety practices and emergency response; health surveillance and control and provision of information on rapid access to post-exposure prophylaxis; contingency measures; evaluation of the performance of the health care waste management system and related occupational health using performance standards and performance indicators.

The performance standards can be the national standards, the WHO guidelines, the accreditation standards and requirements, etc. Whereas, the performance indicators need to be SMART, and can track improvement activities, pinpoint areas for improvement, measure day-to-day operations, provide strategic directions, compare performance to established norms, provide evidence for compliance to standards and reflect achievement of positive outcomes.

2.11 Case study: Al Basheer Hospital plan on health care waste management

Dr Mohammad Al Khalili, CEHA

A health care waste management plan was developed for Al Basheer Hospital in Jordan, which is the largest educational, training and referral public hospital in Jordan. The development stages consisted of gathering information, conducting evaluation, developing protocols and issuing recommendations.

The evaluation of the quality of consumables (coloured bags, sharp containers, detergents, cleaning agents, paper towels, etc.) indicated it was below acceptable standards; and the quantity is insufficient.

The quality of the fixed equipment, such as bins, trolleys, containers/wheeled containers, colour-coded barrels, bag holders, weighing scale, housekeeping wheeled containers, transportation vehicle was satisfactory, whereas the quantity was insufficient.

The evaluation process covered the knowledge and awareness of health care waste hazards among medical and nursing staff, administrative staff, workers, and technicians, the technical operations (segregation, collection, temporary storage, transportation, internal transportation, and treatment of waste). It was clear that there was mixing of hazardous and non-hazardous waste in both directions, as well as unjustified generation of large volumes of health care waste. In addition, the workers protection plans, education and training, pre-placement medical exam, immunization, accident and injuries record, and PPE availability and usage were evaluated.

Protocols were developed for the roles and responsibilities of staff, awareness and training, performance standards, and performance indicators. Specific protocols were developed for the emergency and radiology departments, gynaecologists/obstetrician, outpatient clinics, dental clinics, blood bank and nuclear medicine.

A health care waste management improvement plan was developed and monitored in terms of progress in meeting the targets, employees' performance, accidents and injuries record, spill management and contingency plan.

2.12 Case Study: King Abdullah University Hospital plan on health care waste management

Mr Mahmoud Al Taani, CEHA

King Abdullah University Hospital (KAUH) is located within the campus adjacent to Jordan University of Science and Technology (JUST) Medical Sciences Complex. 527 beds are routinely available with an occupancy rate between 53% and 77%. The Hospital is ISO 9001, HACCP and JCIA certified. KAUH has implemented all hazardous and waste management procedures required to obtain these international certifications and accreditation.

The Environmental Health Division is responsible for preparing the waste management plan, which is approved, reviewed, and routinely updated by the infection control and public safety committees. The plan includes all policies, methods, and procedures to achieve the waste management goals of the Hospital and the national laws and regulations. The aim of this plan is to attain cost-effective procedures, reduce generated waste and minimize potential risk.

The plan applies to KAUH as a guideline to all staff involved in the management cycle including: personal protection, emergency procedures, generation, identification, handling, packaging, storage, transportation, treatment and final disposal of all types of health care waste.

Between 10% and 30% of the hospital waste is considered medical. Waste generation is estimated to be 7 kg/bed/day, comprising of 0.46 and 6.64 kg/bed/day hazardous and general waste. These indicators vary by month, such as in Ramadan or during emergencies. The maternity and laboratory department was the largest producer of hazardous waste (35%). Different types of waste are produced by the Hospital, which is sent directly to landfill (domestic), to the incinerator (infectious), returned to supplier, disposed of through the Ministry of Environment (chemicals), or stored until radioactivity decays in the nuclear medicine department. Some of this waste also needs pre-treatment (autoclaving, neutralizing).

Improving the plan is currently under consideration and different modifications have been made to the procedures, such as replacing digital electronic thermometers instead of mercury, reusing plastic containers, recycling cardboard, cooked oil, and metal, and energy saving by using about 450 solar panels.

2.13 Pilot study on injection waste management and related health burden in Holy Family Hospital in Rawalpindi, Pakistan

Dr Muhammad Mughal, Pakistan

The objectives of the study were to stop reuse of contaminated syringes, reduce health burden among health care workers and the community, make the hospital sustainable to generate revenue to support its ongoing health care waste management plan, and encourage

research activities to support recycling of syringes to reduce the burden of disease at national and international levels.

The first survey included the assessment of exiting practices at the facility, in terms of the number of used syringes, needle stick injuries among health care workers, the availability of proper equipment, management practices, and recycling process.

The total used syringes in one week of 36 wards was 26 776 syringes which weighed 153 kg; therefore in one month, around 600–700 kg was produced which sells for PKR 38 500. Moreover, the total number of needle-stick injuries for one year reached 117 cases.

This step was followed by training, followed by the second survey, which investigated the health impact on health care workers, as well as management practices and generated revenue from recycling syringes. The recycling process included needle cutting, disinfection, shredding and reuse of plastic.

The study recommended conducting waste audits, improving record keeping, allocating financial resources, training staff, improving legislation, guidelines and policies, involving higher authorities, and adopting research-based intervention and solutions. The study will be replicated in other hospitals to fulfil the same objectives.

3. COUNTRY PRESENTATIONS

3.1 Egypt

The Ministry of Health and Population in Egypt has the most excessive primary health care network in the developing world with 4656 health facilities that provide curative and preventive services. This includes environmental health activities. The Minister of Health and Population Decree No. 192/2001 classifies hazardous medical waste. In 2001, the Ministry began collecting and analysing data on medical waste arising from health care facilities. The medical waste management project was implemented in 2003, and re-evaluated in 2009.

The main objectives of the integrated system for the safe management of hazardous medical waste are to: contribute to infection control within health care facilities; provide a safe environment for patients, staff and the community; protect the environment; train medical staff on the safe disposal methods of hazardous and medical waste; and increase environmental awareness among the public.

The Ministry's strategy focuses on providing hospitals with incinerators and collection vehicles. The safe management of health care waste consists of: segregation and sorting at source; collection and transport (internal/external); and safe disposal (incineration/land fill).

The assessment of health care waste focused on evaluating the status of the hazardous waste management system at the Ministry of Health and Population, identifying the strengths and weaknesses, and the measures needed to overcome such weaknesses, and integration with the national strategy for solid waste management.

The results of the evaluation indicated that there is shortage of medical waste workers and lack of job description. There is also a need to review the guidelines, train staff, review the average weight of medical waste generated per day, provide vehicles for transporting and treating medical waste, as well as develop regulations to govern the fees for transporting and incinerating medical waste. Currently, there are 209 incinerators, 182 vehicles, 8 sterilization units. Future plans include completing the establishment of the 14 central incinerators, buying 51 vehicles and constructing 43 medical waste storage rooms.

3.2 Jordan

There are 103 hospitals in Jordan with 11 779 beds, 84 comprehensive health care centres, 368 primary health care centres, and 272 peripheral health care centres. The estimated total daily quantity of health care waste from hospitals is around 7 tonnes.

The Environmental Health Directorate at the Ministry of Health is responsible for regulating health care waste management, including inspection, developing guidelines, and conducting on-the-job training. At the governorate level, the health directorates follow up and inspect health care facilities.

The Ministry of Health issued Directive No. 1/2001, on the Management of Health Care Waste. In addition, Public Health Law No. 47/2008 considers the improper management of health care waste as a public health nuisance. By-law No. 30/2003 on licensing private medical laboratories requires all medical laboratories to adhere to proper and safe disposal of medical waste. By-law No. 24/2005 on the Management, Transportation and Handling of Harmful and Hazardous Materials was issued pursuant to the Environment Protection Law No. 52/2006, which classifies medical waste as part of the hazardous waste and is regulated according to Directive of 2003 on the Management and Handling of Hazardous Wastes.

The Ministry of Health has taken several steps in developing and improving health care waste management, including sensitization, awareness and upper management commitment, training of medical and non-medical staff, enforcement and routine inspection, conducting on-the-job training, assigning health care waste inspectors in all health directorates, producing awareness materials, introducing pollution prevention measures, initiating a campaign on “mercury-free health care” issuing policies and procedures for infection control in health centres and hospitals, assigning infection control and medical waste management liaison officers in health care facilities, and issuing temporary permits for health care waste transport vehicles.

Environmental health in public and private hospitals is the responsibility of various bodies, such as the Public Health Division (Al-Basheer Hospital); the Safety and Environment Department (Jordan University Hospital); the Services Department and Environment (Prince Hamzah Hospital); the Health Protection Department (King Hussein Medical City); the Health and Safety Committee (Specialty Hospital).

The key environmental health elements in hospitals that are monitored include: drinking-water quality and haemodialysis unit; waste management indicators; Compliance

with hygiene, sterilization, disinfection standards; cleaning procedures, cleanliness of the hospital environment; effective ventilation; vector control (mostly contracted to specialized companies or through the Municipality of Greater Amman or Municipalities); food safety; provision of PPE.

3.3 Morocco

The Ministry of Health has embarked on implementing measures to establish a system for medical waste management in health care facilities. The primary objective is to prevent accidental transmission of diseases and improve quality of care.

The legislation governing medical waste management are Law 28/00 (published 7 December 2006), defining the rules and principles relating to waste management; Decree No. 2.07.203 (18 July 2008) on waste classification and listing of hazardous waste; and Decree No. 2.09.139 (21 May 2009) on the management of medical and pharmaceutical waste. In addition, a draft decree establishing the technical requirements for the disposal and recovery of waste by incineration is under way.

The total number of beds is 33 000 beds, with an average occupancy rate of 56%. The quantity of medical waste generated from public and private hospitals is about 21 000 tonnes, including 5000 tonnes of high-risk waste. The generation rate is 1.5 to 4 kg/bed/day, with an average of 3 kg/bed/day. Some hospitals (26) use shredder-sterilizer units acquired by the Ministry of Health. Other hospitals incinerate their waste, landfill it, or outsource their medical waste treatment.

The cost of treating one kilogram of hazardous waste varies from US$ 0.568 to US$ 1.249. The Ministry of Health encourages outsourcing medical waste treatment. In 2009, the cost of managing and treating pharmaceutical and medical waste in public hospitals was estimated at US$ 1 164 331 (hospital university centres included).

Two guidelines on waste management – *Handbook of waste management facilities care* and *Management guide for sharps* have been published.

At the national level, the administration is developing a national master plan for hazardous waste management and there are national and regional commissions for authorization to transport medical and pharmaceutical waste.

At the regional level, each Region must be covered by a regional master plan for industrial waste management, medical and pharmaceutical nonhazardous waste and agricultural waste, which as not yet been established.

Generators of medical and pharmaceuticals waste are required to implement a system of internal medical waste management that includes establishing a unit responsible for managing wastes; qualified and trained personnel, etc. There are special requirements for small generators (≤10 kg/day).

3.4 Oman

The Ministry of Health manages medical waste through its Environmental and Occupational Health Department and units in the governorates. There are 176 health centres, 22 polyclinics, and 50 hospitals. Medical waste is segregated according to its classification, where infectious waste is disposed of in yellow bags, incinerated on-site or off-site. There is one central incinerator (Al Amirat). The hospitals generate more than 10 tonnes/day of infectious waste.

The proposed structure for managing medical waste within hospitals includes a waste management officer who collaborates with the infection control officer, engineers, nurses, heads of departments and cleaning.

The Ministry of Health follows the WHO *Guidelines on health care waste management* and the GCC's, yet there is no clear legislation in this regard.

It is recommended that a clear management structure is established with the involvement of the Environmental Health Department; more training implemented and educational materials provided on chemical waste management, segregation, occupational health, etc.

3.5 Pakistan

There are 919 hospitals in Pakistan with 101 490 beds (hospitals and dispensaries). It is estimated that hospitals generate 700 tonnes of waste a day. Studies have shown that around 2.0 kg of waste/bed/day is generated, of which 0.1–0.5 is categorized as risk waste.

In 2007, a survey was conducted by the Ministry of Health to assess the medical waste management practices and the role of Government institutions. More than half the surveyed hospitals did not have a special team, guidelines, or plans for waste management. Around 35 hospitals use plastic sharp containers. Fifteen hospitals have dedicated vehicles for off-site transport of waste, whereas around 38 hospitals use municipality vehicles for this purpose.

A large number of hospitals (around 48 hospitals) do not have any method for treating medical waste; around 14 hospitals have incinerators, and the remaining hospitals use open burning, chemical disinfection, and other methods. Most of the surveyed hospitals dispose of their treated or untreated medical waste in municipal dumpsites. In addition, 60 hospitals said that there was no local/provincial/district plan for management of medical waste, and that they did not have medical waste inspection in the hospital.

The major identified constraints are the negligence of implementing authorities, financial issues, job insecurity, and improper equipments/durability.

It is recommended that hospitals establish waste management committees, allocate separate budget for medical waste management, activate the role of the Environment Protection Agency and District Municipality Corporation, build the capacity of health care

workers and college and university students, and allocate a prize for health care facilities in an inter-city competition for good waste management system.

3.6 Occupied Palestinian territory

There are several laws in occupied Palestinian territory that deals with health care waste, namely, the Law of Environment No. 7/1999, Public Health Law No. 20/2004, and Medical Waste Law (2008).

The Palestine Medical Complex was established in 2009 and commissioned in 2010. It is considered the largest governmental medical centre in occupied Palestinian territory with 257 beds. It also includes a blood bank. The Complex is the only hospital that has a medical waste management system. The project was implemented in 2009, in corporation with the Ministry of Local Government, Environmental Quality Authority and the United Nations Development Programme, with full financial support from the Japanese Government.

The aim of the project is to standardize the mechanism of medical wastes disposal in order to maintain occupational health, patients', visitors', and community health; prevent pollution and protect the environment.

The project coordinator is responsible for ensuring the application of the medical waste management system, supervising the segregation, packaging, transport, and treatment processes, training staff, and providing medical waste bags and containers.

The infection control officer is responsible for following up of all related procedures and suggesting corrective actions, integrating the medical waste action plans with the infection control programmes, coordinating training sessions, and following-up work related incidents.

The role of the head of housekeeping is to allocate trained staff to collect and transport wastes, provide PPEs, and coordinate activities.

Medical waste in yellow bags are collected and transported to the autoclave. Placenta and biological wastes in red bags are stored in the refrigerator until the day of disposal outside the Palestine Medical Complex. The Ramallah Municipality transports the yellow containers to the landfill site.

There are several challenges that face the implementation of the project, namely, shortage of supplies and needs, no standby autoclave, lack of awareness, local experience, adequate legislation, suitable landfills, and financial resources to scale up the project at the national level. There is a need to include the private sector.

3.7 Saudi Arabia

The Ministry of Health, together with the Presidency of Meteorology and Environment (PME) issued regulations on health care waste definition, handling, segregation, disposal, and

treatment in 1998. In addition, Saudi Arabia endorsed the Gulf Cooperation Council unified code for the management and disposal of medical waste in 1999. Accordingly, all existing incinerators in Saudi Arabia at various on-site medical facilities were stopped. The regulation recommended that the private sector must be encouraged to invest in the treatment of medical waste; on-site incinerators must be decommissioned; and the Government and the private sector must provide training on health care waste management.

Currently, all health care waste is being disposed of and treated through specialized companies, licensed by the PME. Land disposal and incineration are not permitted except with special emission-cleaning equipment.

The Ministry of Health has 244 hospitals with 33 277 beds, whereas the other governmental sectors have 39 hospitals with 10 822 beds, and the private sector has 125 hospitals with 11 833 beds. At an average generation rate of 1.13 kg/bed/day, the total quantity of health care waste is estimated at 63.2 tonnes/day (23 068 tonnes/year). The total number of visitors to primary health care centres, dispensaries, private clinics and other hospitals is 13.12 million visitors a year. At an average generation rate of 0.08 kg/visitor/day, the total quantity is estimated at 10 496 tonnes/year. Therefore, the total quantity of health care waste generated in Saudi Arabia is 33 564 tonnes/year (92 tonnes/day).

The life cycle of waste consists of several stages. The first stage is management of health care waste within the establishment, which includes segregation of waste, collection and storage. The second stage is transport of health care waste, which is done by companies licensed by the PME. Dedicated vehicles are used, and the drivers and support staff are regularly trained to perform this job.

The Ministry of Health has contracted specialized companies, who are licensed by the PME, to treat its health care waste. The private companies have affiliations with local and internationally recognized environmental consultancy firms. The treatment centres are located in each region; the commonly used technologies are autoclaves, microwaves, and thermal oxidation. There are seven health care waste collection centres and 10 treatment stations.

3.8 Sudan

The Health Care Waste Unit at the Environmental Pollution Section in the Environmental Health Department in the Ministry of Health, at federal and state levels, is responsible for the management of health care waste.

In 2005, Khartoum state issued health care waste legislation. In 2009, the Environmental Health Law was issued. National guidelines for health care waste management were developed, as well as a national plan for health care waste management (2008). In 2011, a local plan for the management of wastes from immunization campaigns was developed in Khartoum state.

Health care waste is treated by means of incinerators and autoclaves in Sudan. The main achievements from 2008 to 2011 included assessing health care waste in different hospitals at the federal and state levels, developing a plan of action, and training medical staff.

The Decentralization of Health System project, funded by the World Bank, focused its work on four states, namely Kassala, Red Sea, Blue Nile, and South Kordofan States. The project assessed health care waste management, developed a plan of action, trained all cadres, and installed 45 incinerators. The challenges that face health care waste management in Sudan are lack of political commitment, the need for capacity-building, availability of flue gas measuring devices, and financial constraints.

3.9 Tunisia

Legislation covering health care waste in Tunisia includes Law No. 41 0f 1996, regarding waste, and decree No. 2745 of 2008, and publication No. 76 of 1992, which regulate health care waste management and handling.

In Tunisia, the public sector has 183 hospitals (regional, local and university) with 18 851 beds, and 2085 health care centres; the private sector has 87 hospitals with 2747 beds, 5368 clinics, and 263 medical laboratories.

At an average health care waste generation rate of 2.35 kg/bed/day, the total annual quantity of health care waste is estimated at 18 525 tonnes, of which 7200 tonnes (39%) are classified as hazardous waste.

Each health care facility is responsible for managing its health care waste (segregation, collection, transport and storage, and final disposal). On-site approved incinerators are used in hospitals for incinerating health care waste except for liquid and radioactive wastes, which are handled by specialized licensed companies. Shredding and sterilization of waste is an approved technology in Tunisia.

Segregation within the health care facility is the main constraint, as its efficiency fluctuates due to lack of awareness and commitment and the lack of the equipment needed to transport health care waste from the various wards and departments to the collection site. The other important constraints are poor maintenance of incinerators, the inefficiency of the sterilization units due to low operating temperatures, and the random disposal of hazardous health care waste in municipal dumpsites.

The national strategy for health care waste management must include the allocation of sufficient funds to procure the necessary equipment and establish regional treatment units for health care waste.

4. GROUP WORK

Participants were divided into two groups. The first group determined priorities for environmental health requirements and the second for environmental occupational health priorities in health care facilities in the Region.

4.1 Group work 1: Environmental health requirements

Group 1

Group 1 discussed and reviewed environmental health elements and sub-elements listed in the table and presented a list of basic environmental health elements required in health care facilities. The list included: ventilation, indoor air quality, construction work and renovation, maintenance and repair, water quality and quantity, water safety plans, water storage, standby generator, health care waste management, in particular safe disposal of sharps, environmental surface cleaning practices, spill containment, disposal of hazardous liquid waste, management of general non-hazardous waste, food safety, integrated pest management, fire escape and evacuation plans, etc. Greening health care facilities and climate footprint came last, although several greening activities could be implemented with minimum cost or with only behavioural change practices.

Group 2

Group 2 recommended that occupational health policy in health care facilities should be at the country level; the objective of the policy is to maintain the health of health care workers, and safe and healthy work environment and working conditions. The policy addresses eliminating and controlling occupational hazards, and must name the person/ committee responsible for implementing the policy. Allocating financial resources is fundamental in implementing the occupational health policy. Safety culture must be instilled.

Occupational health requirements were divided into basic and supplementary requirements. Examples of the basic requirements included: training of all workers on occupational health policy, hazards and risks, methods of control and process of reporting, focal point and occupational health committee, hand hygiene, post exposure, incident reporting, follow up and prophylaxis protocols, PPE according to activity and risk, immunization, water access and soap, ventilation, sharp containers, laboratory MSDS, etc.

Examples of supplementary occupational health requirements include: appointing occupational health officer, monitoring of exposure, provision of N95 mask with fit testing, pre-employment exam and screening, alcohol-based hand rub, engineering injury preventive devices, respiratory testing, lifting devices, ergonomics, etc.

4.2 Group work 2: Monitoring health care waste management and related occupational health in health care facilities

Participants were divided into two groups. Group 1 evaluated performance indicators for monitoring the health care waste management plan; Group 2 evaluated the performance indicators for monitoring occupational health associated with health care waste management.

Group 1

Group 1 discussed the elements of performance and key performance indicators for monitoring health care waste management in health care facilities in the Region: health care waste management policy, organization, minimization, segregation, storage of health care waste, on-site and off-site transportation of health care waste, treatment and disposal, monitoring and reporting, and emergency; and identified SMART indicators as well as their potential use in evaluating the performance of health care waste management.

In addition, the Group provided a brief description of two health care waste management monitoring indicators, namely, quantity of hazardous health care waste treated and disposed of safely (kg/day) and quantity of hazardous health care waste generated (kg/day).

Group 2

Group 2 discussed the elements of performance and key performance indicators for monitoring occupational health associated with health care waste management in health care facilities in the Region, in particular, staff health protection and promotion, training and awareness raising, and monitoring and reporting, and identified SMART indicators, as well as their potential use in evaluating the performance of health care waste management.

In addition, the group provided a brief description of two occupational health indicators, namely the number of reported needle-stick injuries per day; and the number of staff trained on health care waste management and associated hygiene, occupational health and infection control procedures.

5. CONCLUSIONS

- There is a need for national environmental health and occupational health policies to make hospitals safer places for patients and workers. It was noted that there are some initiatives in Member States in the Region, such as the PSFHI and health care accreditation, which cover a range of environmental health and occupational health elements that may pave the way towards development and implementation of national policies.
- Many health care facilities of the public sector in the Region are slow in implementing environmental health and occupational health guidelines, whereas the private sector responds faster, applies recommendations, and performs better. Therefore, motivating the public sector’s health care workers is of utmost importance. Behaviour is a major

issue, and behavioural change is fundamental in achieving goals in improving environmental health and occupational health in health care facilities.

- Development of environmental health and occupational health improvement plans in health care settings against national or international environmental health and occupational health standards would help to improve environmental health and occupational health services in health care facilities and catalyse/facilitate the development of future national accreditation systems with regard to environmental health and occupational health aspects in Member States of the Region.
- Participants expressed the need for development of national environmental health and occupational health standards and interim targets for gradual improvements of environmental health and occupational health in health care settings.
- Training, education, and raising awareness are essential tools to improve performance of health care facility staff and reduce the number of needle-stick injuries, as well as other occupational and environmental health risks.
- Needle cutters/needle removers/needle destroyers are used in managing syringes to prevent needle stick injuries of the exposed population. In view of the lack of evidences regarding the health risks associated to the use of such devices, WHO has not yet adopted a position on the use of such devices.
- Development of water safety plans in health care facilities is of utmost importance in the reduction of the burden of diseases in health care settings in the Region.
- There is a clear lack of epidemiological data and information on environmental health and occupational health issues in health care facilities. The conducting of studies and research should be encouraged in Member States of the Region.

6. RECOMMENDATIONS

Environmental health and occupational health in health care facilities

To WHO

1. Finalize the document “Elements for development of a strategic framework on environmental health in health care facilities and related occupational health in health care facilities”, incorporating feedback from the meeting.
2. Provide technical support to Member States to review and update national standards related to environmental health and occupational health in health care facilities.
3. Support Member States in the development of national standards/targets and interim targets for gradual improvements of environmental health and occupational health in health care facilities.
4. Assist health care facilities in Member States in the development of environmental health and related occupational health improvement plans against national standards/targets.
5. Support adaptation of all relevant WHO environmental health and related occupational health guidelines at the country level.
6. Support integration of data on morbidity and mortality trends in health care facilities due to environmental health-related injuries/infections/diseases within national health information systems.

7. Support capacity-building of nationals in the field of environmental health and occupational health in health care facilities, including special training courses on water safety plans in health care facilities targeting relevant personnel.
8. Provide technical assistance in prioritizing research needs in environmental health and related occupational health in health care facilities.
9. Conduct a regional workshop, in cooperation with the League of Arab States, on the impact of, and adaptation to, climate change on health in the Region with a focus on infection control patterns.

To Member States

10. Integrate environmental health and occupational health elements in pertinent national health policies, programmes and plans.
11. Encourage and enforce health protection and promotion legislation for health workers, including hepatitis B virus immunization.
12. Strengthen coordination and collaboration between infection control programmes, environmental health and safety, occupational health, patient safety programmes and national accreditation bodies to promote and develop environmental health in health care facilities.
13. Prioritize environmental health elements, and prepare national strategies and action plans for improvement and action.
14. Implement and encourage adoption of green and safe practices and cost-effective climate change mitigation measures.

Health care waste management

To WHO

15. Support health care facilities in the Region in the development of key indicators for monitoring, evaluating, and reporting the performance of their health care waste management systems and related occupational health practices.
16. Mobilize resources to conduct a regional situation analysis of health care waste management and related occupational health.
17. Continue sensitizing policy-makers about the importance of health care waste management in alleviating the related health burden of disease.
18. Continue strengthening its capacity-building programme to support Member States in the area of health care waste management.
19. Work with the League of Arab States to adapt WHO guidelines for implementation in the Region.

To Member States

20. Encourage information experiences and expertise sharing at national and regional level, especially success stories in health care waste management, such as recycling of used syringes.
21. Conduct a national situation analysis on health care waste management.

Annex 1

AGENDA

1. Environmental health in health care settings in the Region: challenges and prospects
2. Environmental occupational health in health care settings
3. Importance of environmental health in infection control in health care settings in the Region
4. Importance of environmental health in the PSFHI in the Region
5. Environmental health management and related occupational safety in King Hussein Cancer Centre in Jordan
6. PSFHI improvement toolkit for the Region: PSFHI module on environmental health in healthcare facilities
7. Elements for development of a strategic framework on environmental health in healthcare settings and related occupational health in the Region
8. Greening the health sector
9. Water safety in health care facilities
10. Hospital accreditation with special focus on environmental health accreditation in health care facilities in Lebanon.
11. Country presentations
12. Group discussions
13. Planning health care waste management in health care facilities in the Region
14. Al Bashir hospital plan on health care waste management, Jordan
15. Pilot study on injection waste management and related health burden in Holy Family Hospital in Rawalpindi, Pakistan
16. Hospital plan on health care waste management, Jordan University of Science and Technology
17. Group sessions on monitoring health care waste management and related occupational health in the Region
18. Conclusions and recommendations

Annex 2

PROGRAMME

Tuesday, 12 June 2012

08:30–09:00	Registration	
09:00–09:45	Opening session	
	Message of Dr Ala Alwan, Regional Director, WHO/EMRO	*Dr Ahmad Basel Al-Yousfi, Director, CEHA*
	Address by H.E. Dr Abdullateef Wraikat, The Minister of Health, Jordan	
	Group photo	
09:45–10:15	Introduction of participants, election of officers and adoption of agenda and programme	
10:15–10:30	Objectives of the workshop	
10:30–11:00	Environmental health in health care settings in the Region: challenges and prospects	*Mr Raki Zghondi, CEHA*
11:00–11:30	Environmental occupational health in health care settings	*Ms Suzan Wilburn, WHO/HQ*
11:30–12:00	Importance of environmental health in infection control in health care settings in the Region	*Dr Mamunur Malik, WHO/EMRO*
12:00–13:30	Discussions	
13:30–14:00	Importance of environmental health in PSFHI in the Region	*Dr Mahi Tehewy, WHO Temporary Adviser*
14:00–14:30	Environmental health management and related occupational safety in King Hussein Cancer Centre	*Eng Dana Nashawati, WHO National Temporary Adviser*
14:30–15:30	Discussions	
15:30–16:00	PSFHI improvement toolkit for the Region: PSFHI module on environmental health in health care facilities	*Eng Maysoon Bseiso, WHO National Temporary Adviser*
16:00–16:30	Discussions	

Wednesday, 13 June 2012

08:30–08:50	Elements for development of a strategic framework on environmental health in health care settings and related occupational health in the Region	*Eng Maysoon Bseiso*
08:50–09:10	Greening the health sector	*Ms Suzan Wilburn*
09:10–09:30	Hospital accreditation with special focus on environmental health accreditation in health care facilities in Lebanon	*Dr Mohammad Ali Hamandi, WHO Temporary Adviser*
09:30–10:30	Discussions	

10:30–11:30	Group work	
	Group 1: environmental health priorities in health care facilities in the Region	*Eng Bseiso and Dr Tehewy*
	Group 2: Environmental occupational health priorities in health care facilities in the Region	*Ms Wilburn and Dr Malik*
11:30–12:00	Group presentations and discussions	
12:00–13:00	Country presentations (Islamic Republic of Afghanistan, Egypt, Jordan, Lebanon, Morocco, Oman)	
13:00–14:00	Discussions	
14:00–15:00	Country presentations (Pakistan, occupied Palestinian territory, Saudi Arabia, Sudan, Tunisia, Yemen)	
15:00–15:30	Discussions	

Thursday, 14 June 2012

08:30–08:50	Water safety in health care facilities	*Dr Susanne Lee, WHO Temporary Adviser*
08:50–09:10	Discussions	
09:10–09:30	Planning health care waste management in health care facilities in the Region	*Mr Raki Zghondi*
09:30–10:00	Case study: Al Basheer Hospital plan on health care waste management	*Dr Mohammad Khalili, WHO Temporary Adviser*
10:00–10:30	Case study: King Abdullah University Hospital plan on health care waste management	*Mr Mahmoud Al Taani, WHO National Temporary Adviser*
10:30–11:30	Pilot study on injection waste management and related health burden in Holy Family Hospital in Rawalpindi, Pakistan	*Dr Muhammad Mughal, Pakistan*
11:30–13:00	Discussions	
13:00–13:30	Group work: Monitoring health care waste management and related occupational health in health care facilities in the Region	
	Group 1: Monitoring health care waste management in health care settings in the Region	*Dr Kahlili and Dr Mughal*
	Group 2: Monitoring occupational health associated to health care waste management in health care facilities in the Region	*Ms Wilburn and Dr Malik*
13:30–14:00	Group presentations and discussions	
14:00–15:00	Conclusions and recommendations	
15:00–15:30	Closing session	

Annex 3

LIST OF PARTICIPANTS

EGYPT
Dr Olivia Hussein El Shafey
Director, Water Sanitation Department
Ministry of Health and Population
Cairo

EGYPT
Dr Khaled Fawzy
Director, Infection Control Department
Ministry of Health and Population
Cairo

JORDAN
Dr Najwa Ja'roor
Department of Communicable Diseases
Ministry of Health
Amman

Mr Ameen Tahboub
Environmental Health Directorate
Ministry of Health
Amman

LEBANON
Ms Ghada Chuaib
Rafic Hariri University Governmental Hospital
Head of Infection Control Division
Beirut

MOROCCO
Mr Mustapha Kaddaf
Head of Environmental Health Service
Directorate of Epidemiology and Diseases Control
Ministry of Health
Rabat

Dr Mohammed Wadie Zerhouni
Division of Hospitals
Directorate of Hospitals and Ambulatory Care
Ministry of Health
Rabat

OMAN
Mr Mohammed Al Salti
Occupational Health and Safety Specialist
Department of Environmental and Occupational Health
Ministry of Health
Muscat

Mr Tawfiq Al Harthi
Public Health Supervisor
Department of Environmental and Occupational Health
Ministry of Health
Muscat

PAKISTAN
Dr Jamal Abdul Nasir
Scientific Officer / Officer in charge of environmental healthL
National Institute of Health
Islamabad

Dr Muhammad Ibrahim Mughal
Technical Officer
National Institute of Health
Islamabad

PALESTINE
Mr Yaser Issa
Environmental Health Department
Ministry of Health
West Bank

Mr Ayman Abu Mohsen
Quality Assurance Manager
Palestinian Medical Complex Hospital
West Bank

SAUDI ARABIA
Mr Abdullah Khalid Al Oniadeel
Ministry of Health
Riyadh

Mr Hamad Al Suwayl
Ministry of Health
Riyadh

SUDAN
Mr Altayeb Mohammed Ibrahim
Directorate of Environmental Health
Ministry of Health
Khartoum

Ms Asia Azrag Dahab
Directorate of Environmental Health / Food Safety
Ministry of Health
Khartoum

TUNISIA
Ms Hedia Gdour
Senior Technician
Directorate of Environment and Health Protection
Ministry of Public Health
Gafsa

Mr Charfeddine Essayhi
Primary Technician
Directorate of Environment and Health Protection
Ministry of Public Health
Kasserine

YEMEN
Dr Mohammed Muthana Salem
Environmental and Occupational Health Coordinator
Ministry of Public Health and Population
Sana'a

Dr Nasr Ali Ahmed
Focal Point of Patient Safety Programme
Ministry of Public Health and Population
Sana'a

OTHER ORGANIZATIONS

League of Arab States
Ms Eman Mohammed Hassan
Cairo
Egypt

WHO SECRETARIAT

Ms Suzan Wilburn, Technical Officer, Interventions for Healthy Environments, WHO, Geneva
Dr Ahmad Basel Al-Yousfi, Director, CEHA, Amman
Mr Raki Zghondi, Urban Health and Environment Officer, CEHA, Amman
Dr Susanne Lee, Temporary Adviser, London
Dr Mahi Tehewy, Temporary Adviser, Cairo
Dr Mohammed Khalili, Temporary Adviser, Amman
Dr Muhamad Ali Hamandi, Temporary Adviser, Beirut
Eng Dana Nashawati, National Temporary Adviser, Amman
Eng Maysoon Bseiso, National Temporary Adviser, Amman
Mr Mahmoud Al Taani, National Temporary Adviser, Amman

World Health Organization
Regional Office for the Eastern Mediterranean
P.O. Box 7608, Nasr City 11371
Cairo, Egypt
www.emro.who.int