Pacific Health Care Waste:

A Regional Strategy and Action Plan 2013-2015



Secretariat of the Pacific Regional Environment Programme (SPREP)

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Pacific Health Care Waste: A Regional Strategy and Action Plan 2013-2015

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Foreword

The management and disposal of health care wastes is currently a cause of concern in the Pacific region. Healthcare waste is an unavoidable by-product of community healthcare. Health care wastes can include sharps, non-sharps, blood, body parts, chemicals, pharmaceuticals, medical devices and radioactive materials. Poor management of these wastes exposes health care workers, waste handlers and the community to potential infections, toxic effects and injuries. These hazardous wastes also pose risks to the environment and require special treatment.

The quantities of the health care waste being generated in the region are increasing with increased population growth and with the improved medical services reaching the region. In order to protect Pacific communities from exposure to health care wastes we need to be careful to protect all individuals who will be exposed to potential risk, be they residents, workers in health care services, or in major hospitals and health care clinics.

Development and adoption of national health care waste policies throughout the region will establish a framework for the Pacific that improves management of health care waste and promotes and enforces responsible health care waste management.

This Pacific health care strategy and action plan outlines the steps that need to be taken to in order to do this. I am pleased to present to you a way forward for the region for the management of health care wastes.

David Sheppard
Director
SPREP

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Executive Summary

Healthcare waste is a by-product of healthcare. A majority of health care waste (i.e. 75-90%) is similar to domestic waste. This fraction referred to as healthcare general waste, is made of paper, plastic packaging, and other wastes that have not been in contact with patients.

A smaller fraction (i.e.10-25%) is infectious and/or hazardous waste that requires special treatment. It includes sharps, non-sharps, blood, body parts, chemicals, pharmaceuticals, medical devices and radioactive materials. Poor management of health care waste exposes health care workers, waste handlers and the community to potential infections, toxic effects and injuries. This hazardous waste fraction is the one this strategy deals with due to the risks that it poses to human health and the environment.

The extent of the health care waste problem in the Pacific has not been comprehensively documented, but the limited information available indicates that quantities of the waste are increasing significantly on an annual basis in Pacific island countries due to increasing population numbers and improved health services. Proper management and disposal of health care waste is important for the long-term protection of local and regional Pacific environments.

This regional health care waste management strategy:

- provides background information on health risks associated with health care waste;
- provides guidance on best practice in health care waste handling and disposal options;
- describes an integrated framework to collect, store (where necessary) and dispose of health care waste in the Pacific region;
- presents a draft of a model national health care waste management policy for further discussion and consultation prior to national adoption; and
- supports co-ordination and capacity building in health care waste management in the region.

The strategy is supported by an action plan (2013–2015) which presents a three year timeframe and framework in which to improve regional health care waste management.

Development and adoption of national health care waste policies will establish a framework for the Pacific that improves management of health care waste and promotes and enforces responsible health care waste management.

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The Need for a Regional Approach to Health Care Waste Management

Introduction

Health care (or medical waste) is defined as waste generated during the diagnosis, testing, treatment, research or production of biological products for humans or animals[1]. The main sources of biomedical waste in the Pacific region are hospitals, medical clinics, and laboratories. Fortunately, the majority of wastes produced by medical facilities are non-hazardous solid wastes, which can be disposed of safely through the domestic or municipal solid waste disposal system. These non-hazardous wastes include plastics, glass, metal, paper and cardboard, all of which maybe potentially recycled. The smaller portion of atypical medical or health care waste stream (usually around 20% of all waste produced by the medical facility), are hazardous to human health and the environment[2].

Human Health and Environmental Impacts

Medical care and the infrastructure associated with provision of this service are vital for a community's well-being. However, waste generated from medical services can be hazardous, and even lethal due to their high potential for diseases transmission[1] or their toxicity. The hazardous and toxic components of waste from health care establishments constitute a major health risk if they are not managed correctly (Table 1).

Improper management of hazardous health care waste (including syringes, live vaccines and cultures, laboratory samples, body parts and fluids, and sharps) poses occupational and public health risks to patients, health workers, waste handlers, waste transporters and communities[3]. Similarly, improperly managed health care waste can introduce damaging substances including pharmaceuticals, chemicals, ionising radiation, and heavy metals into the environment. The bi-products of some medical waste disposal practices such as waste incineration can also be potentially hazardous to human health and the environment[4]. These bi-products include stack emissions which include both "conventional" pollutants, e.g., particulate matter, sulfur oxides, nitrogen oxides, volatile organic compounds and carbon monoxide, as well as dioxins, furans, arsenic, lead, cadmium, chromium, mercury, and hydrochloric acid[5]. The incinerator ash will also usually contain dioxins, furans and heavy metals[4].

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[1] Pasupathi*et al.* (2011).Biomedical waste management for health care industry.*J Biol Med Res.* 2(1): 472-486 (www.biomedscidirect.com).

[2] Stringer (2011).*Medical waste and human rights.*Submission to the UN Human Rights Council. 58pp.

[3] Emmanuel (2007). *Best Environmental Practices and Alternative Technologies for Medical Waste Management*. 8th International Waste Management Congress and Exhibition, Botswana.

[4] Batterman (2004). *Findings on an assessment of small-scale incinerators for health care waste.* WHO, Geneva.

[5] EPA (1996). *Emission Factors for Medical Waste Incinerators (MWI's).*

Table 1. Examples of hazardous health care waste

Category	Examples
INFECTIOUS WASTE	Laboratory cultures, waste from isolation wards, tissues (swabs), materials or equipment that have been in contact with infected persons, excreta.
PATHOLOGICAL WASTE	Body parts, blood, and other body fluids, and fetuses.
SHARPS	Needles, infusion sets, scalpels, blades, knives, bro-ken glass, and broken plastic.
PHARMACEUTICAL WASTE	Pharmaceuticals that have expired or that are no longer needed, and bottles or boxes contaminated by or containing pharmaceuticals.
GENOTOXIC WASTE	Waste containing cytotoxic drugs often used in cancer therapy, and waste containing genotoxic chemicals. Genotoxic waste is highly dangerous and may contain mutagenic, teratogenic, or carcinogenic properties.
CHEMICAL WASTE	Laboratory reagents, photographic chemicals, and disinfectants that are expired or no longer needed, solvents. Health care facility chemical waste may be similar to conventional hazardous industrial waste in that they may be toxic, corrosive, flammable, and reactive. Some chemicals typically used at health care facilities include formaldehyde, photographic chemicals, solvents, and other chemicals.
WASTE WITH HIGH CONCENTRATIONS OF HEAVY METALS	These materials can be highly toxic such as is the case with waste with high concentrations of mercury including batteries, broken thermometers, blood pressure gauges, etc.
PRESSURIZED CONTAINERS	Many different types of gas are used in health care. These gases are often stored in pressurized containers such as cylinders, cartridges, and aerosol cans. The containers themselves must be handled carefully since they may explode if incinerated or accidentally punctured during handling.
RADIOACTIVE WASTE	Unused liquids from radiotherapy and laboratory research, contaminated glassware, packages or absorbent paper. Urine or excreta from patients treated, or tested with unsealed radionuclides, and sealed radionuclide sources.

Examples of discarded health care wastes (D.Haynes)









A Pacific Approach to Health Care Waste Management

Due to the presence of a range of substances, health care waste is generally considered a hazardous waste, which, if improperly managed, may pose significant environmental and human health risks. Consequently, planned management and disposal of health care waste in the Pacific region is important for the maintenance of long-term community and environmental health. This Pacific regional strategy provides background information on the health risks associated with health care waste and their disposal and describes an integrated framework to progressively assess, collect and dispose of health care waste, as well as implement mechanisms to sustainably fund long-term health care waste collection and disposal.

Strategy vision

All health care wastes are managed in way that minimizes environmental and public health impacts in Pacific island countries.

Strategy goals

This health care waste management strategy has the following goals:

- to minimize the adverse effects of health care waste on the environment and human health in the Pacific Region;
- to minimize duplication of effort and maximize coordination of health care waste management activities;
- to build capacity of stakeholders to promote effective health care waste management; and
- to ensure national policy objectives are being met.

Scope

This strategy covers management of all types of health care waste consistent with the classification of hazardous waste under the Basel[6], Waigani[7] and Stockholm Conventions[8].

Guiding Principles

The objectives of this regional strategic framework are compatible with the objective of sustainable development. Management of health care waste in the region should be in accordance with the following policy principles:

[6] Basel Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal

[7] Waigani Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Waste and to Control the Transboundary Movement and Management of Hazardous Waste within the South Pacific Region

[8] Stockholm Convention on Persistent Organic Pollutants

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(i) Sound decision-making

Decision-making should be based on scientific information and risk analysis from national, regional and international sources and should promote the optimization of resources.

(ii) Precautionary approach

Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

(iii) Adherence to regional and international conventions

Pacific Island countries should abide by their obligations to regional and international conventions to which they are a Party.

(iv) Adoption of the user pays approach

The costs associated with pollution will be borne by those who cause it.

(v) Transparency

All regional health care waste management activities should be conducted in an open and transparent manner and Pacific Islanders should have access to information regarding health care waste management where this does not infringe on the rights of individuals or private businesses.

(vi) Public Participation

Health care waste management considers the interests and concerns of all interested and affected when decisions are being made.

Implementation timeframe

This regional health care waste strategy will be implemented over a three year period (2013–2015).

Pacific thematic priorities

To achieve the stated goals, five priority thematic areas are identified. These thematic areas cover:

i. Safeguarding public health;
ii. Assessment and planning;
iii. Financing for action;
iv. National capacity development; and
v. Coordinated, environmentally sound, health care waste management.

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Safeguarding public health

The issues

Health care waste can contain a large number of hazardous substances including blood products and other potential toxic materials such as pharmaceuticals (Appendix 1), and as a consequence, their disposal needs to be carefully controlled.

What we want to achieve

Pacific island communities are informed and aware of the relative risks posed by health care waste. Up-to-date National Occupational Health and Safety (OH&S) guidelines are enforced to minimise the risk to workers in contact with health care wastes.

How we will achieve the targets

1. Undertake national awareness campaigns to provide accurate information concerning the relative health risks posed by health care waste to Pacific island health care waste managers and workers.

2. Implement and enforce minimum OH&S standards for personal protective equipment (PPE) for all workers involved in handling health care waste (Appendix 2).

3. Implement regular standardised regional or national training for workers involved in handling and processing health care waste.

Assessment and planning

The issues

The extent of the health care waste problem in the Pacific has not been comprehensively documented, but the limited information available indicates that health care wastes are not managed appropriately in most Pacific island communities, placing community health and the local environment at risk. The lack of information on the quantities of national health care waste produced annually, or on the extent of health care waste stockpiles (such as expired pharmaceuticals) also currently hinders effective planning. As a consequence, many Pacific countries have no current systematic management of this waste stream.

What we want to achieve

A comprehensive understanding of the status of health care waste management in the Pacific region, and of the annual quantity of health care waste produced. This information will inform and be included in the development of appropriate national management frameworks and policies. These national policies will improve country management of health care waste and minimize future environmental risks to Pacific island communities.

How we will achieve the targets

4. Complete an inventory of the quantity and status of national health care waste stockpiles based on a regionally adopted assessment method.

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5. Complete an inventory of the annual generation rates of health care waste in Pacific island countries based on a regionally adopted assessment method.

6. Complete a national inventory of transportation, treatment, and disposal infrastructure used for health care waste.

7. Establish a regional database to house collected health care waste information and data.

8. Establish and operate an appropriate national framework that improves country management of health care waste and promotes shared health care waste management responsibility by all stakeholders (template in Appendix 3).

Financing for action

The issues

Management of health care wastes requires a skilled labour force and is time consuming and costly. National budgets are often inadequate to manage health care wastes.

What we want to achieve

Sufficient funding secured annually for the management and disposal of health care wastes in the Pacific region to prevent them becoming, or continuing to be a significant country waste issue.

How we will achieve these targets

9. National governments adopt and enforce appropriate financial measures to finance annual health care waste management and disposal.

Country capacity development

The issues

National integrated management of health care waste requires a trained workforce with a range of skills and experience.

What we want to achieve

Skilled and experienced Pacific islanders actively engaged in all facets of health care waste management.

How we will achieve these targets

10. Maintain a core team of personnel with experience and expertise in the management of health care waste at the National level.

Coordinated, environmentally sound health care waste management

The issues

Environmentally sound management of health care waste encompasses prevention, reduction, collection, storage and disposal of the waste. Many Pacific island countries lack

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appropriate standards on equipment imports and charitable donations which could help to manage and reduce the proliferation of health care waste and the percentage of medical equipment that contains hazardous materials. Once health care wastes are generated, there are a range of potential options for its disposal; however, there is a lack of objective evaluation of each option in Pacific island countries and territories.

What we want to achieve

Economically sustainable and environmentally sensitive disposal of health care wastes within the Pacific region.

How we will achieve the targets

11. Undertake national awareness campaigns to provide accurate information concerning the relative risks posed by health care wastes to Pacific Island environments.

12. Undertake national public awareness campaigns to provide accurate information on practices that medical facilities can adopt to prevent, reduce, and better manage health care waste at a local scale.

13. Adopt a national health care waste management framework to guide disposal, following assessment and consolidation of relevant environmentally sound disposal options and public preferences (Appendices 4 and 5).

14. Implement health care waste collection, storage and transportation protocols in compliance with provisions concerning the transport of dangerous goods and hazardous waste including relevant regional and international conventions (Appendix 6).

15. Complete an annual public reporting of national health care waste management to document the status of national health care waste programmes.

16. Develop national monitoring regimes based on a regional model using key performance indicators.

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Pacific Regional Health Care Waste Strategy Action Plan (2013–2015)

Strategy Objectives	Action	Intended Outcome	Lead Agency	Time frame	Assumption
Public health safeguarded	1. Undertake national health care waste awareness campaigns 2. Implement and enforce minimum OH&S standards for personal protective equipment for all workers involved in handling health care waste. 3. Implement regular standardised regional or national training for workers involved in handling and processing health care waste.	Pacific island communities are informed and aware of the relative risks posed by health care waste Risks from health care wastes are minimised to workers and the community	National Health Departments, OHS/Labour Department	2013-2014	National health care waste management a Member priority
A comprehensive understanding of the status of health care waste management	4. Complete an inventory of the quantity and status of national health care waste stockpiles 5. Complete an inventory of the annual generation rates of health care wastes 6. Complete a national inventory of transportation, treatment, and disposal infrastructure used for health care waste. 7. Establish a regional database to house collected health care waste information and data. 8. Establish and operate an appropriate national health care waste management framework	A comprehensive understanding of the status of health care waste management in the Pacific region A comprehensive understanding of the annual quantity of health care waste produced National policies developed to improve country management of health care waste	National Health Departments, SPREP	2013-2014	Seed funding available
Sufficient funding secured annually for the management and disposal of health care wastes	9. National governments adopt and enforce appropriate financial measures to finance annual health care waste management and disposal.	Funding secured for health care waste inventory, management and stockpile removal Prioritised health care waste stockpile removal completed	National Health Departments, SPREP	2013-2015	Funding available National Health Departments have available resources Pacific health care waste management a SPREP priority

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Strategy Objectives	Action	Intended Outcome	Lead Agency	Time frame	Assumption
Skilled and experienced Pacific islanders actively engaged in all facets of health care waste management	10. Maintain a core team of personnel with experience and expertise in the management of health care waste at the National level.	Skilled and experienced Pacific islanders actively engaged in all facets of health care waste management	National Health Departments	2013-2015	Funding available National Health Departments have available resources
Economically sustainable and environmentally sensitive disposal of health care wastes	11. Implement health care waste collection, storage and transportation protocols 12. Complete an annual public reporting of national health care waste management to document the status of national health care waste programmes 13. Develop national monitoring regimes based on a regional model using key performance indicators	Economically sustainable and environmentally sensitive disposal of health care wastes within the Pacific region.	National Health Departments	2013–2015	Funding available Appropriate health care waste disposal options agreed

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Appendix 1

Components of health care waste and their associated health hazard

Health care wastes are potentially hazardous wastes that are generated by public and private health care institutions, and consist of, or are contaminated by, potentially infectious substances (e.g. blood), human tissue, and/or potentially hazardous chemical substances (e.g. pharmaceuticals).

General wastes are non-hazardous solid wastes generated by the health care sector which can be disposed of safely through the normal solid domestic or municipal waste disposal system. These wastes are disposed of to sanitary landfill. Some types of general waste may be recycled such as plastics, glass, metal, paper and cardboard.

Categories of health care waste (WHO)

Category	Description	Examples
INFECTIOUS WASTE	Waste suspected to contain pathogens.	Laboratory cultures, waste from isolation wards, tissues (swabs), materials or equipment that have been in contact with infected persons, excreta.
PATHOLOGICAL WASTE	Human tissue and organs.	Body parts, blood, and other body fluids, and fetuses.
SHARPS	Sharp waste.	Needles, infusion sets, scalpels, blades, knives, bro-ken glass, and broken plastic.
PHARMACEUTICAL WASTE	Waste containing pharmaceuticals.	Pharmaceuticals that have expired or that are no longer needed, and bottles or boxes contaminated by or containing pharmaceuticals.
GENOTOXIC WASTE	Waste containing substances with genotoxic properties.	Waste containing cytotoxic drugs often used in cancer therapy, and waste containing genotoxic chemicals. Genotoxic waste is highly dangerous and may contain mutagenic, teratogenic, or carcinogenic properties.
CHEMICAL WASTE	Waste containing chemical substances.	Laboratory reagents, photographic chemicals, and disinfectants that are expired or no longer needed, solvents. Health care facility chemical waste may be similar to conventional hazardous industrial waste in that they may be toxic, corrosive, flammable, and reactive. Some chemicals typically used at health care facilities include formaldehyde, photographic chemicals, solvents, and other chemicals.
WASTE WITH HIGH CONCENTRATIONS OF HEAVY METALS	Consumables and replacement equipment.	These materials can be highly toxic such as is the case with waste with high concentrations of mercury including batteries, broken thermometers, blood pressure gauges, etc.
PRESSURIZED CONTAINERS	Gas cylinders, gas cartridges, aerosol cans.	Many different types of gas are used in health care. These gases are often stored in pressurized containers such as cylinders, cartridges, and aerosol cans. The containers themselves must be handled carefully since they may explode if incinerated or accidentally punctured during handling.
RADIOACTIVE WASTE	Waste containing radioactive sub-stances.	Unused liquids from radiotherapy and laboratory research, contaminated glassware, packages or absorbent paper. Urine or excreta from patients treated, or tested with unsealed radionuclides, and sealed radionuclide sources.

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Appendix 2

Personnel Protective Equipment (PPE) and training for health care waste workers

Health care wastes can be potentially dangerous to anyone that comes in contact with them, and it is essential that workers are trained and equipped to deal with the waste that they manage. To protect workers, health care facilities need to invest in training and education for workers, and in the purchase of personal protective gear and clothing for clinical and non-clinical staff that are likely to come into contact with potentially infectious or hazardous materials. Additionally, workers should receive at least basic immunizations against tetanus and hepatitis. Specifically:

1. Workers involved in health care waste management should be provided with training and information about handling health care wastes as well as about its safe disposal. This training should include simple and easy-to-understand information that describes what health care wastes are, what the hazards are, and how to handle, package, store and dispose of the waste safely.

2. Workers handling health care waste should be provided with, and required to wear[9]:
   - Protective footwear for protection from heat and sharps and hazardous materials
   - Gloves to protect hands from heat and sharps and hazardous materials
   - Protective respirators to protect incinerator operators against air-borne particulates (dust, fiber, fumes, mist, soot, and smoke)
   - Coveralls and eye and face protection
   - High visibility vest for workers in the vicinity of vehicular traffic or fork-lifts
   - Sunscreen and hats and other sun-protection as necessary

3. Medical waste containers should be handled correctly at all time to ensure that[10]:
   - Bags of hazardous healthcare waste and of general waste are not mixed at anytime. If hazardous waste is accidentally placed with general waste, the entire quantity of waste must be treated as hazardous.
   - Waste storage bags and containers should be, and remain effectively sealed and manually handled as little as possible.
   - Medical waste bags should not be held against the body nor should collection staff attempt to carry too many bags at a time.
   - Sharps have been known to pierce the sides and bottom of polypropylene containers. These containers should be picked up and carried by the handle provided.
   - Protective clothing should be worn during all waste handling operations (see above).

[9] PATH (2010). *The Incinerator Guidebook: A practical guide for selecting, purchasing, installing, operating, and maintaining small-scale incinerators in low-resource settings.*

[10] Leong, M. (2010). *Infection Prevention and Control Guidelines*. SPC, Noumea. New Caledonia. 102pp.

Appendix 3

Recommendations for elements of a model national health care waste policy

Policy vision

Integrated management of health care waste to minimize potential environmental and public health impacts.

Purpose

To establish and operate an appropriate management framework that improves country management of health care waste and promotes shared health care waste management responsibility by all stakeholders.

Policy goals

This health care waste management policy has the following goals:

- To minimize the unnecessary, untimely, and uncontrolled generation of health care waste
- To minimize the adverse effects of health care waste on the environment and people of the Pacific region
- To ensure the systematic replacement of health care equipment containing unnecessarily hazardous materials
- To minimize duplication of effort and maximize coordination of health care waste management activities
- To build capacity of stakeholders to promote effective health care waste management
- To ensure policy objectives are being met

Scope

This policy covers all health care waste consistent with the classification of hazardous waste under the Waigani and Basel Conventions.

Background

[To be completed, using information from previous sections of the regional strategy.]

Policy principles

The objectives of this Policy Framework are compatible with the objective of sustainable development. Regional health care waste should be managed in accordance with the following policy principles:

Transparency

All regional health care waste management activities should be conducted in an open and transparent manner and Pacific islanders should have access to information regarding waste management where this does not infringe on the rights of individuals or private businesses.

Sound decision-making

Decision-making should be based on scientific information and risk analysis from national, regional and international sources and should promote the optimization of resources.

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Precautionary approach

Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Adherence to regional/international conventions

Pacific island countries should abide by their obligations to regional and international conventions to which they are a Party.

Public participation

Health care waste management should take into account the interests and concerns of all interested and affected persons when decisions are being made.

Health care waste management policy strategies

Objective	**To minimize the unnecessary, untimely, and uncontrolled generation of Health care waste**
Policies	To achieve this objective, National Governments should: i. Promote and enforce responsible health care waste management in all hospitals and clinics.

Objective	**To minimize the adverse effects of health care waste on the environment and people of the Pacific Region**
Policies	To achieve this objective, National Governments should: ii. Require the establishment and application of appropriate standards, guidelines, and safeguards for the handling, collection, transportation, storage and disposal of health care wastes which ensures environmental and public health protection.

Objective	**To minimize duplication of effort and maximize coordination of health care waste management activities to ensure effective implementation of the Policy.**
Policies	To achieve this objective, National Governments should: iii. Ensure that health care waste management concerns are appropriately addressed in existing waste management legislation, regulations, strategies, action plans and programmes; iv. Support the inclusion of health care waste management into appropriate existing governance structures such as taskforces or committees; v. Ensure that health care waste management is appropriately addressed in current or future waste management planning.

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Objective	To build the capacity of stakeholders to promote effective health care waste management
Policies	To achieve this objective, National Governments should: vi. Create opportunities to develop people's understanding, skills and general capacity and to engage with them concerning environmentally sound health care waste management, including the potential impacts and consequences of poor management; and vii. Support the processes to build institutional capacity concerning health care waste management.

Objective	To ensure that the health care waste management policy objectives are being met
Policies	To achieve this objective, National Governments should: viii. Determine a national definition of health care wastes using Basel and Waigani convention guidelines. ix. Support the development of a national register of health care wastes (which could be integrated into systems for other hazardous waste); x. Require regular reporting and auditing of data and information relating to health care waste management activities from the persons; agencies, institutions, groups, or businesses involved; xi. Develop an appropriate monitoring and evaluation framework to ensure midterm review of the policy; and xii. Report annually on collection, storage and disposal of health care wastes.

Roles and responsibilities

In order to guarantee effective implementation of this policy, Regional responsibilities for health care waste management should be as follows:

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- Develop a strategy and action plan for health care waste management in the Pacific region which details the time-frame, baseline, targets, outputs and outcomes of regional health care waste management
- Take the lead in securing regional funding for health care waste management
- Provide technical support in relation to in-country health care waste management

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- Provide technical support for developing policy, regulation, standards, guidelines and quality assurance concerning national infection control.

National governments

- Take the lead in collecting and reporting national health care waste data
- Take the lead in the development of national occupational health and safety guidelines for health care waste management
- Take the lead in enforcement of relevant workplace health and safety legislation
- Take the lead in health care waste collection and removal
- Take the lead in provision of health care waste management training

Development of a national health care waste policy will require completion of a series of steps outlined in the following Table.

Activity	Number of Weeks													
	1	2	3	4	5	6	7	8	9	10	11	12	13	..16
Circulation of draft regional health care waste strategy														
Complete draft national health care waste policy incorporating information from Regional Strategy														
Conduct stakeholder consultation workshops on draft policy														
Refine draft policy further based on workshop outcomes														
Final draft national health care waste policy completed														
Incorporate health care waste management policy outcomes into national waste management strategy														

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Appendix 4

Health care waste management essentials

The basic steps that result in successful health care waste management require the consideration and implementation of a number of separate, but interlinked issues:

1. Waste classification

Health care waste can be comprised of infectious or bio-hazardous waste, waste that is hazardous because of its chemical toxicity, radioactive waste, and non-hazardous general (domestic-type) waste. A system of classification should clearly delineate the different types of waste.

1. Waste segregation

Waste segregation entails the separation of the different types of waste (see above) at the point of generation, according to the system of handling, treatment and disposal. This involves an investment in training, signage and containers and results in waste being sorted into appropriate secure containers which determine treatment and disposal. In particular, if safe and effective segregation of sharps occurs, most of the hazards inherent in potentially infectious waste generated in health care can be managed safely.

2. Waste minimisation

Waste minimization involves an analysis of what materials are purchased for use at a medical facility and identifying what packaging or specific items can be eliminated. In other cases it involves a careful analysis of disposable products which could be replaced by reusable ones. Waste minimization includes inventory control to minimize expired materials, and environmentally preferable purchasing to ensure that environmentally sound products are purchases where ever possible. Waste minimization also involves recovery, recycling, reuse, and composting in health facilities. Since infectious and hazardous chemical wastes account for only about 15% of the total waste generated by health facilities, a program of segregation and recycling can dramatically reduce the amount of waste that requires special treatment.

3. Substitution

Particularly hazardous materials that create a specific risk to workers and the community can often be substituted by less hazardous materials. A good example is the replacement of mercury thermometers with infrared alternatives. Procurement of products that do not contain polyvinyl chloride (PVC) is also particularly important if medical wastes are incinerated.

4. Secure handling

To protect health care workers, facilities need to train workers, and purchase personal protective gear and clothing for clinical and non-clinical staff that are likely to come into contact with potentially infectious or hazardous materials. Workers should also receive at least basic immunizations against tetanus or hepatitis. Once waste has been generated and collected, it needs to be transported correctly for final disposal. This should ensure contact with workers and the public is minimized. Other best environmental practices include collection of waste in color-coded containers, and the correct use of labeling.

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Appendix 5: Health care waste treatment and disposal options

Treatment method	Considerations	Environmental considerations	Management considerations	Socio-economic considerations
Landfill burial	Waste is buried in specially designated "cells", covered with soil and compacted.	High potential for localised environmental and health impacts	Necessary for the landfill to be well run and maintained and secure	
Low temperature incineration	Open pit or unassisted burning	Low temperature burn creates dioxin and furans		Low cost
Mid temperature incineration	Waste combusted below 800^{o}C	Low temperature burn creates dioxin and furans. Ash disposed of in landfill.	Requires trained and skilled operator. 5-10 year life span	$10,000
High temperature incineration	Waste combusted in chamber incinerator at temperature in excess of 1000^{o}C for a minimum of 2 seconds	Minimises the formation of dioxin and furans from congeners contained in the waste. Ash disposed of in landfill.	Requires trained and skilled operator. 5-10 year life span	$50,000
Chemical disinfection	Chemical added to waste material	Toxic bi-products may be produced. Liquid effluent created that need to be disposed of Use of chlorine can create dioxins	Sterilization efficacy need to be continuously monitored. Waste shredding will reduce volume by 60-90% that goes to landfill	Not used in developing countries $30,000 to $450,000
Steam based disinfection (Autoclave)	Waste introduced and sterilized in a pressure vessel with steam at 121^{o}C.	Sharps are not destroyed. Unsuitable for treatment of some hospital wastes such as body parts.	Sterilization efficacy need to be continuously monitored. Sterilised waste needs subsequent grinding/shredding required prior to disposal of waste to landfill. Required connection to sanitary sewer 20 kg/hr to 3000 kg/hr	$30,000 to 900,000
Rotating autoclave	Waste introduced into a cylindrical pressure vessel with an internal rotating drum lined with sharp vanes. Pressurised steam (150^{o}C) sterilizes the waste which is also broken up by drum rotation.		Sterilization efficacy need to be continuously monitored. Waste needs subsequent grinding. Disposal of ground sterilised waste to landfill 90 kg/hr to 2000 kg/hr	$380,000 to 900,000
Steam treatment with continuous internal maceration	Waste is steam sterilized at 138°C and ground up. Cold water is injected and the slurry is passed through a liquid separator to filter out the waste.		Waste solids are captured in disposable bags and landfilled. 68 kg/hr	$36,000-900,000
Small-scale microwave treatment	Waste is exposed to microwave energy which generates heat (95-100^{o}C) inside the chamber. Waste shredded and then disposed of to landfill.	Water quality impacts from effluent Potential soil contamination at landfill	3 kg/hr to 400 kg/hr	$600,000

Appendix 6

Best practice health care waste incineration

High temperature medical waste incineration is a common option adopted by Pacific island countries to dispose of medical waste. Incomplete incineration or the incineration of unsuitable materials releases pollutants into the air, and produces ash residue. Incinerated materials containing chlorine can generate dioxins and furans, which are human carcinogens and have been associated with a range of adverse health effects. Incineration of heavy metals or materials with high metal content (in particular lead, mercury and cadmium) can lead to the spread of toxic metals in the environment.

For incinerators to be operated safely, and in a manner that minimizes any potential environmental risks, a number of basic steps need to be followed[11]:

- Only incinerators that operate at over 850-1100^{0}C and fitted with special gas-cleaning equipment (to enable compliance with the international emission standards for dioxins and furans) should be used;
- Waste segregation and waste minimization practices should be used to restrict incineration to appropriate infectious wastes only;
- Clear operational guidelines for incinerator operation should be available; and
- Materials containing chlorine such as polyvinyl chloride products (e.g. some blood bags, IV bags, IV tubes, etc.); or heavy metals such as mercury (e.g. broken thermometers) should never be incinerated.

Ash examination and quality[12]

Inspection of the incinerator ash is one tool the operator has for evaluating incinerator performance. The operator should look for fine gray ash. White or gray ash indicates that a low percentage of carbon remains in the ash. Black ash indicates higher carbon percentages remaining. Although carbon remaining in the ash indicates that available fuel has not been used and combustion has not been complete, the fact that carbon remains in the ash is not in itself an environmental concern or an indicator that the ash is not sterile. Ash containing large pieces of unburned material (other than materials which are not combustible, such as cans) shows that incinerator performance is poor.

[11] WHO (2012) http://www.who.int/mediacentre/factsheets/fs281/en/index.html

[12] Batterman, S. (2004). *Findings on an Assessment of Small-scale Incinerators for Health care Waste*. World Health Organization, Geneva.

Appendix 7

The policy context for health care waste management in the Pacific

(a) International framework

Basel Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal (the Basel Convention) is an international treaty that was designed to reduce the movements of hazardous waste between nations, and includes a specific Ban Amendment (1995), designed, when entered into force, to prevent transfer of hazardous waste from developed to less developed countries. The Convention is also intended to minimize the generation of hazardous waste, to ensure their environmentally sound management as closely as possible to the source of generation, and to develop a regulatory system to assist countries in restricting unwanted imports of hazardous waste. Clinical wastes are listed as hazardous waste under Annex I of the Basel Convention, as are waste pharmaceuticals, drugs and medicines. Additionally, any waste determined to be hazardous under domestic law (by Parties of import, export, or transit) are also considered to be hazardous waste under the Basel Convention.[13] Ten Pacific countries are parties to the Basel Convention.

Stockholm Convention

The Stockholm Convention is a global treaty to protect human health and the environment from persistent organic pollutants (POPs). POPs are chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of living organisms and are toxic to humans and wildlife. POPs circulate globally and can cause damage wherever they travel. In implementing the Convention, Governments will take measures to eliminate or reduce the release of POPs into the environment. Over 150 countries signed the Convention and it entered into force, on 17 May 2004. The Stockholm Convention focuses on eliminating or reducing releases of 12 POPs, the so-called "Dirty Dozen", including dioxins and furans. The convention recognizes that a special effort may sometimes be needed to phase out certain chemicals for certain uses and seeks to ensure that this effort is made. Nine additional POPs were added to the Convention in 2010.

World Health Organisation[14]

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

[13] Basel Secretariat (2011). Article 1 of the Basel Convention.

[14] WHO (2004).Safe health care waste management. *http://www.healthcarewaste.org/country-level/introduction/*

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- reducing the exposure to toxic pollutants associated with the combustion process through the promotion of appropriate practices for high temperature incineration.

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 and long-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.
- 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.

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(b) Regional Framework

Noumea Convention

The Convention for the Protection of Natural Resources and Environment of the South Pacific Region (the Noumea Convention) and its Protocols obliges Parties to endeavour to take all appropriate measures to prevent, reduce and control pollution from any source and to ensure sound environmental management and development of natural resources, using the best practicable means at their disposal and in accordance with their capabilities. Ten Pacific countries are Party to the Noumea Convention.

Waigani Convention

The Waigani Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Waste and to Control the Trans-boundary Movement and Management of Hazardous Waste within the South Pacific Region (the Waigani Convention) is similar to the Basel Convention, with the exception that the Waigani Convention does include radioactive waste, and applies only to the Pacific islands region. The Region's obligations under the Waigani Convention are similar to that under the Basel Convention. There are currently thirteen Pacific Region countries who are signatories to the Waigani Convention. As a Party to the Waigani Convention, these countries are obliged to (among other things):

- ban the importation of hazardous and radioactive waste from outside the convention area;
- prohibit shipment to and from non-Parties, unless there is a special agreement;
- take measures to reduce the generation of hazardous waste at source taking into account social, technological, and economic needs;
- as far as possible, develop adequate treatment and disposal facilities for hazardous waste; and
- follow established procedures for the trans-boundary movement of hazardous waste to other Parties for environmentally sound disposal.

Pacific Regional Solid Waste Management Strategy 2010–2015

The Pacific Regional Solid Waste Management Strategy 2010–2015 has a vision of "*A healthy and a socially, economically and environmentally sustainable Pacific for future generations*" through the adoption of cost-effective and self-sustaining solid waste management systems by Pacific Island Countries and Territories. The original strategy was formulated in 2005 and revised in 2009 to focus on integrated waste management (refuse, reduce, reuse, and recycling) with an emphasis on appropriate waste collection and disposal to achieve this goal. The strategy has also been simplified to include 9 key priority areas for solid waste management in the Pacific which include sustainable financing; adoption of integrated solid waste management including recycling; improved legislation; awareness, communication and education; capacity building; environmental monitoring; and improved medical waste management.

Pacific Public Health Surveillance Network: Infection Prevention and Control Guidelines

The membership of the Pacific regional Infection Control Network (PICNet), have produced guidelines for the prevention and control of infections in healthcare settings, with a particular focus on the needs of SPC's member states. These guidelines are based on the Fiji Ministry of Health infection control manual for health facilities. The overall objective of the guidelines is to provide healthcare administrators and HCWs with a framework to prevent

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and control the transmission of infectious pathogens within, from, or to the healthcare setting, to patients, health care workers and the community alike. The guidelines cover infection control programme management; infection control practices to prevent and control the transmission of infectious pathogens through the use of standard and transmission-based precautions; environmental management practices to prevent and control transmission on infectious pathogens; and protection of health care workers from infectious pathogens.

Summary of health care waste related conventions and protocols

Country	*Stockholm Convention*	*Basel Convention*	*Waigani Convention*	*Noumea Convention*	*Waste Management Strategy or Plan*	*National health care waste Policy or Strategy*
Australia	*Y*	*Y*	*Y*	*Y*		*Y*
Cook Islands	*Y*	*Y*	*Y*	*Y*	*Draft*	
FSM	*Y*	*Y*	*Y*	*Y*	*Draft*	
Fiji	*Y*		*Y*	*Y*	*Y*	*Y*
Kiribati	*Y*	*Y*	*Y*		*Draft*	
Marshall Is	*Y*	*Y*		*Y*	*Draft*	
Nauru	*Y*	*Y*		*Y*	*Draft*	
New Zealand	*Y*	*Y*	*Y*	*Y*		*Y*
Niue	*Y*		*Y*		*Draft*	
Palau	*Y*	*Y*	*Not ratified*		*Y*	
PNG	*Y*	*Y*	*Y*	*Y*	*Draft*	
Samoa	*Y*	*Y*	*Y*	*Y*	*Draft*	*Draft*
Solomon Is	*Y*	*Y*	*Y*	*Y*	*Y*	
Tonga	*Y*	*Y*	*Y*		*Y*	
Tuvalu	*Y*		*Y*		*Draft*	
Vanuatu	*Y*		*Y*		*Y*	

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