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Assessment of Waste Management in Health Care Facilities in Sudan

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Abstract

Background: Environmental health services (EHS) in healthcare facilities (HCFs) - such as sanitation, water, HCW management, hygiene, hand washing, food control, vector control and air quality if properly managed will prevent the transmission of contamination from person-to-person and person-to-environment, vice versa.

Healthcare waste should not cause any adverse impacts on human health or the environment. Medical waste management is complex and success is in large part dependent on changing the habits of hospital staff in this regard, waste reduction and proper segregation is essential. By properly sorting and reducing waste, hospitals not only avoid disposal costs and environmental hazards; they are often able to recycle a large proportion of their non-medical waste, reducing the amount of raw materials, energy and processing needed to replace the products they use. On the other hand, when hazardous medical and non-medical waste are mixed together, hospitals end up paying additional charges to dispose of increased volumes of medical waste, which can amount to many times the cost of disposing of non-medical waste.

Objective: The objective of this study is to assess the national situation of environmental health services in health care facilities in Sudan.

Methods: Descriptive cross-sectional study implemented, using survey to analysis the situation of HCW in five hospitals in Khartoum state and at Gazira, North Dafour, South dafrour and North Kordfan. the national documents for environmental health services in health care facilities reviewed at center and state level.

Results: Policy for environmental health services in health care facilities issued at central level, specific laws and legislations including environmental health law 2009, federal Ministry of Health; Hazardous waste regulation issued 2014; nuclear energy law 2005; environmental protection law, 2001; public health law2008; labor law and Khartoum SMOH, health care-waste regulation in 2005 were available. Beside that National Environmental Health Strategic Plan 2014 to 2019 was developed. On the other hand, the surveys show that 39% of workers know the hazardous of health care waste and 98% of nurses know the importance of not recover the needle, 7.5% of workers stated that they infected with infectious hepatitis and in some hospital 98% of workers immune against infectious hepatitis. The ratio of hospital per 100,000 population is 1.3 and ratio of beds per 100.000 population is 81.5.

Human resources (public health officers) in the health facilities are limited in large hospitals, since the last of 2013 the states started to employee public health officers to deal with EH activities inside the hospitals. In some state the EH unit exist in large and teaching hospitals and public health officers is responsible for the unit but need to build the capacity. According to the unstable situation of economic and political the turner offer of staff is very high.

Conclusion: Although the policy, strategy, different law and regulation developed but there is no follow up mechanism established, more over the environmental health services in health care facilities is very poor and the risk for staff, patients and community is high and need clear and urgent interventions to eliminate or reduce the risk.

Keywords: *Environmental Management System (EMS); Healthcare Facilities (HCFs); Environmental Health Services (EHS)*

Introduction

An environmental management system (EMS) is a formal approach in countries with strict environmental laws to manage an organization's impact on the environment. Hospitals and health centers of any size should derive a benefit from introducing and implementing an EMS. These benefits include cost reductions through reduced energy consumption, reduced quantities of waste, increased recycling, and minimized negative impacts on the environment from waste handling and treatment, and an improved public image.

An EMS framework encompasses the environmental aspects of waste management, including reduction, reuse and recycling. It also has considerable relevance to environmentally preferable purchasing. This is because a health-care facility usually has a choice in the purchase of products or services. It is becoming increasingly common to require suppliers to have an EMS in place as a condition of awarding contracts. An EMS should be an integral part of an organization's approach to good management. It is used to develop and implement its environmental policy and to manage its continuing environmental impacts.

Key elements of an EMS should include the following:

1. Process or mechanism for screening project plans and proposals for potential environmental risks; for example, using screening tools, checklists and expert review.
2. Development and use of environmental management plans that clearly define which environmental mitigation measures should be taken, by whom, and at which point in the project's implementation; monitoring and reporting activities to verify that relevant environmental management actions are being taken and that they are generating the intended results; evaluation of the overall environmental performance of projects and activities to inform organizational learning and future environmental mitigation actions.

Health-care associated infections contribute to morbidity and mortality, and to a loss of health sector and household resources worldwide. Five to thirty per cent of patients develop one or more infections during a stay in hospital a significant proportion of which could be avoided. In crises or precarious situations, the number of infections worsens. In some circumstances, people may choose not to seek care because the nearest facilities are not functioning or because treatment is uncertain due to shortages of water, electricity or supplies. Unsafe health-care settings contribute to a significant proportion of some diseases. Legionellosis is a well-established risk associated with health-care facilities, with an average proportion of health-care associated infections close to 10%. Sharps waste, although produced in small quantities, is highly infectious.

Health-care settings include hospitals, health centers, clinics, health posts, dental surgeries, general practitioner settings and home-based care. Interventions to improve environmental health in health-care settings are intended to reduce the transmission of infections (in healthcare settings) and therefore directly reduce the disease burden. They are also targeted at high risk populations (for example, immune compromised patients).

Health-care settings are environments with a high prevalence of infectious disease agents. Patients, staff, careers and neighbours of the health-care setting face unacceptable risks of infection if environmental health is inadequate. The health-care setting might even become the epicenter of outbreaks of certain diseases, such as typhus or diarrhea [1-3].

Background information on national health care system

Since the early recovery of the patient and health of clinical staff directly depends on infection prevention practices used in health care institutions, waste management is one of the essential components of good infection prevention practices. It is essential that health care waste is collected, stored and disposed in a proper and scientific manner. General hygiene is a prerequisite for good medical waste management in health care institutions. It is also vital that the whole health care institutions be kept clean and on a satisfactory state of hygiene. With the steady increase in the number of health care institutions in Sudan, the amount of medical wastes generated is also increasing. But due to the lack of Health Care Institutions proper waste management, lack of budget allocated for waste disposal, in adequate technology for waste treatment, cadres of EH not available in some health facilities most of the wastes from health care institutions are being disposed haphazardly, which is causing environmental and public health problem. Health map in Sudan showed that (14%) of the population, or approximately five million citizens have no basic health care and is not available in the range of 5 km, with a difference between the states, where this ratio raises up to 50% in Central Darfur. The map also showed that 24% of all units operating care currently, offering a minimum of basic health care packages and weakened in the states of North Kordofan and White Nile.

Objective and Scope

The objective of this study is to assess the national situation of environmental health services in health care facilities in Sudan.

Methodology

Descriptive cross-sectional study implemented, using survey to analysis the situation of HCW in five hospitals in Khartoum state and at Gazira, North Dafour, South dafrour and North Kordfan. The national documents for environmental health services in health care facilities reviewed at center and state level.

Results

Governance on EH healthcare facilities

Policy

Sudan was developed a policy for health care waste and endorsed, the policy document outlines the rational for the legislation, plus national goals and the key steps essential to the achievement of these goals. It contained the following:

- Descriptions of the health and safety risks resulting from mismanagement of health care waste.
- Reasons for sound and safe health care waste management practices in health-care establishments.
- Listing of approved methods of treatment and disposal for each waste category (safety box, other health care waste and general waste).
- Warning against unsafe practices, such as disposing of hazardous waste in municipal landfills.
- Management responsibilities within and outside health-care establishments.
- Assessment of the costs of health care waste management.
- Key steps of health care waste management: minimization, separation, identification, handling, treatment, and final disposal of waste; technical specifications for the implementation of each step should be described in separate technical guidelines.
- Record-keeping and documentation; Training requirements.

Legal framework Laws and legislation; the health care wastes addressed in:

- Environmental health law 2009 which is specialized law, the law determines the required standards for the management of health-care waste and the licensed devices and equipment used and the treatment required.
- Federal Ministry of Health, Hazardous waste regulation issued 2014.
- Nuclear energy law 2005.
- Environmental protection law 2001.
- Public health law 2008.
- Labour law.
- Khartoum MOH, health care-waste regulation issued in 2005.

Strategy and plan of action of EH in healthcare waste

Sudan recognizes environmental health as one of the priority sectors that contribute to the well-being of the nation and, therefore, remains committed to providing quality health services to all its citizens. Recognizing that a healthy population is critical to improve production and productivity, Sudan will continue investing in the environmental health sector, in order to ensure sustainability of the nation's human capital base, required for sustainable economic growth. According to that, Sudan developed National Environmental Health Strategic Plan 2014 to 2019, the Strategic plan aim to support health facilities in Sudan to minimize human exposure to risks generated from their environmental problem.

State	Health center			Basic units	Health	Total
	Urban	Rural	NGOS	Work	Looked	
Northern	3	40	0	179	58	283
R. Nile	31	169	18	123	20	371
Red Sea	21	65	28	135	30	277
Gadarif	28	57	0	237	13	335
Kassala	48	94	3	165	40	350
Khartoum	161	76	229	131	-	602
Gazerra	64	377	1	442	36	880
Sennar	32	91	1	254	0	378
W. Nile	12	139	0	189	109	449
B. Nile	32	35	1	71	1	140
N. Kordfan	76	165	0	332	30	608
S. Kordofan	0	83	-	120	0	203
Kordofan	0	0	-	101	31	132
N. Darfour	0	122	-	89	14	103
S. Darfour	41	60	-	230	0	313
W Darfour	21	39	-	57	19	136
C. Darfour	-	-	-	-	0	-
E. Darfour	8	40	29	30	25	132
Sudan	593	1612	313	2885	427	5692

Table 1: *Show the PHC (annual statistical report 2019).*

State	No. of Pop.	No. of Hospitals	No. of Beds	Hospital per 100.000	Beds per 100.000
Northern	945733	34	1815	3.6	191.9
R. Nile	1413700	40	2468	2.8	174.6
Red Sea	1790897	27	1238	1.5	69.1
Gadarif	1792199	43	1893	2	89
Kassala	2126707	30	1513	0.4	21.3
Khartoum	7108128	54	7168	0.8	100.8
Gazerra	4689976	97	5317	2.1	113.4
Sennar	1677963	34	1807	2.1	113.4
W. Nile	2245187	31	2005	1.4	89.7
B. Nile	1132028	18	913	1.6	80.7
N. Kordfan	2698834	37	1717	1.4	63.6
S. Kordofan	1167855	14	769	1.2	65.2
W. Kordfan	1691698	19	1038	1.1	61.4
N. Darfour	2760226	21	999	0.8	36.2
W. Darfour	995019	9	543	0.9	54/6
S. Darfour	3657603	20	1227	0.5	33.5
C. Darfour	739154	-	-	-	-
E. Darfour	1568062	6	325	0.4	20.7
Sudan	40197974		28489	1.2	78.8

Table 2: *Below show the ratio of hospital per 100.000 and beds per 100.000.*

Source: Annual Health Statistical Report 2019.

Health units development 2015 -2019

	2015	2016	2017	2018	2019
Grand total	470	505	468	523	524
No. of beds	30074	30308	30212	30179	32745
No. of health center	26511	2424	2462	2627	2518
No. of basic health units	3511	3425	2562	3072	3312
No. of blood banks	173	192	243	176	268
No. of X ray units	166	1761	151	164	181

Table 3

Hospital and beds per 100.000

	2015	2016	2017	2018	2019
Beds per 100.000	78.2	76.5	74.1	71.9	81.5
Hospital per 100.000	1.2	1.3	1.1	1.2	1.3

Beds per 100.000	81,5
Hospital per 100.000	1.3

Table 4: *Source: Annual health statistical report 2019.*

Responsible Body	Role and Responsibilities
Federal Ministry of Health (FMoH)	• Development of guidelines and manuals (Water quality and safety. sanitation and hygiene promotion) • Development, develop and update laws and legislations • Establishment of water surveillance system in all states • Capacity building (personnel, laboratories, equipment's) • develop plans and supervising the implementation • Conduct monitoring and evaluating • Conduct Supervisory visits to states • Participate in workshops, forum, and seminars • Coordination with other related sectors.
Ministry of Water resources and electricity (MoWR &E)	• Development and endorsement of national WASH policy with partners. • Development of standard and guideline for water supply, waste water system • Coordinate WASH sector.
	• Mobilization of resource from different donors • Development of national strategic plan • Participate at regional and international forum jointly with FMoH • Lead the monitoring and evaluation of sector strategic plan progress • Provision of water supply to community, school and health facilities.

Ministry of Education	• Jointly with Ministry of Water resources to implement the provision of WASH service in all school. • Conduct regular hygiene promotion at all school • Ensure the inclusion of WASH service in all newly constructed schools. • Ensure the collection of school WASH indictors through EMIS
Ministry of Finance	Allocation of adequate financial resources (fund) to conduct the activities of water, sanitation and hygiene promotion.
NGOs and Private Sector	• Provision of water supply to community, school and health facilities. • Promotion of sanitation and hygiene

Table 5: *Illustrate the responsible bodies in environmental health area and their role and responsibilities.*

List of policy documents with reference to WASH in health care facilities 2019

Name of policy document, publication year	WASH-in HCF related content of the document	Responsible Stakeholder
National IPC Manual 2021	Hospital hygiene, broad guidelines on water safety including parameters of decontaminants, water pressure, temperature, color, odor, pH, water treatment methods and dialysis Requirements. Waste Management procedures guidelines including separation collection, storage, treatment and disposal	National IPC manual
Sudan SDG6 Plan 2019	Guiding principles intention to achieve universal basic WASH services in all health institutions by 2030, including budget commitments for construction of new facilities as well as O&M services. Costed plan for the provision of water supply to health facilities and description of main interventions for WASH in HCFs between now and 2030.	MIWR, FMoH, UNICEF
Sudan Drinking Water Safety Strategic Framework 2017	Scale-up for access to safe drinking water across Sudan. Awareness raising measures to highlight the importance of hygiene and safe water in health facilities through local community programs	MIWRI, FMoH
Water Supply and E. sanitation Policy 2010	Guiding principles for provision of WASH to School, Health and Religious Premises Strategies for WASH promotion in School, Health Facilities and Religious premises.	MIWRI, FMoH
Water Supply and Environmental Sanitation Policy 2010	Light framework in a plan to strengthen water supply to health facilities. Strategic plan to coordinate with MOH activities to improve sanitation and hygiene in the health sector.	MIWRI
Regulation of Hazardous Health Waste 2014	Licensing requirements and obligations for private operators in the collection, treatment and disposal of medical waste from health care facilities	FMOH
National Sanitation Hygiene Strategic Framework 2016	Overview of institutional responsibilities for sanitation and hygiene across Sudan including health facilities. Strategic objectives to ensure effective environmental health and behaviors in all health facilities across Sudan and effective management of hazardous waste. Brief situational description of sanitation and hygiene and WASH systems in health facilities	FMOH
Technical Guidelines for the Construction and Management of Rural Health Institutional Latrine 2009	Technical guidelines on the construction of rural pit and pour-flush latrines. No specification for the need	MIWRI, UNICEF, FMOH

National Roadmap for Making Sudan ODF	Identification of number of health facilities without suitable latrine facilities	UNICEF, MIWR FMOH
Revised Waste Management Guide 2021 (not currently endorsed)	Guidelines on the segregation, collection, treatment and disposal of hazardous medical waste	FMOH
Environmental Health Act 2009	Definitions of roles and duties of localities towards environmental health and laws. Protection of water sources and laws against polluting of water sources	FMOH
Public Health Act 2008	Legal framework for the protection of public health. Provides powers of the administration to regulate a control food and water supply and infectious waste management	MIWR, HCENR, FMOH

Table 6

WASH in health facility report 2022

Latest estimates of WASH "Basic Services" access in health care facilities						
Health Care Context	**Urban**	**Rural**	**Hospital**	**Non Hospital**	**Public**	**Private**
Basic Water supply	54%	11%	43%	23%	22%	53%
Basic Sanitation	9%	5%	12%	1%	4%	16%
Basic Hand hygiene	29%	10%	28%	15%	12%	44%
Basic Waste Management	8%	< 1%	6%	3%	2%	9%
Basic Environmental Cleaning	3%	< 1%	2%	1%	1%	4%

Table 7

Conclusion and Recommendations

Although the policy, strategy different law and regulation developed but there is no follow up mechanism, more over the environmental health services in health care facilities is very poor and the risk for staff, patients and community is high and need clear and urgent interventions to eliminate or reduce the risk. There for we suggest the following recommendations:

1. Develop of environmental health guidelines for training of trainer is very important to build the capacity of environmental health staff.
2. Raise fund to finance the environmental health from the Ministry of Finance.
3. All Ministry of Health at state should allocate fund for environmental health in their Plan of action.
4. Strengthen the commitment of decision makers at all level towards environmental health.
5. Mobilize and monitor all levels of administration to enforcement of environmental regulations for environmental health activities in health facilities.
6. Raise the concern of environmental health team in monitoring, auditing the implementation of environmental health system in health facilities to the responsible department in federal ministry of health to solve it.
7. Ensure efficient utilization and support of the resources for implementation of environmental health services in health care facilities.
8. Raise awareness of the staff to avoid nosocomial infections, physical injuries and to follow safe working practices.
9. Establish legislative frameworks for implementation of the environmental health services in health facilities at all levels [4-16].

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