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Health care waste management practice in Nepal

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ABSTRACT

The management of health care waste has become an urgent need to safeguard the public health from adverse effects caused due to improper management of healthcare waste. Healthcare waste management continues to present an array of challenges for developing countries, including Nepal. As the demand for healthcare facilities increases, there is also an increase in waste generation from these facilities. This situation requires an organized system of healthcare waste management to curb both public and occupational health risks. The aim of this paper is to explore the current situation of health care waste management practices in Nepal and its possible impacts on human health as well as recommend the best practices.

Keywords: health impact; legislation; risk and non-risk health care waste; waste management practice.

INTRODUCTION

The World Health Organization (WHO) defines healthcare waste as all wastes generated by healthcare establishments, research facilities and laboratories.[1] This definition also includes waste that originates from "minor" or "scattered" sources, such as wastes produced in homes, where there is patient care (dialysis, insulin injections, etc.). With the steady increase in the number of health care institutions in Nepal, the amount of health care waste, (HCW) generated is also increasing.[1-3] In addition to increasing quantity, the composition of HCW is also rapidly changing, affecting its sound management. The improper management of HCWs generated in health care facilities can adversely affect the health of health care providers, patients, waste handlers and individual members of the community.[2] It also has adverse impacts on the environment. Hospital Waste Management is part of hospital hygiene and maintenance activities.[2] This involves management of a range of activities, which are mainly engineering functions, such as collection, transportation, operation/ treatment of processing systems, and disposal of waste.[2] However, initial segregation and storage activities are the direct responsibility of nursing personnel in the hospital. If the infectious components get mixed with the general non-infectious waste, the entire mass becomes potentially infectious.[2-3] This study focuses on the following four headings as need, status, impact and legislation regarding the health care waste management in Nepal.

1.1 Need of Health Care Waste Management:

Health care institutions in the recent times have increased tremendously in number and capacity with increasing number of hospital beds. There are eight central, five regional, ten zonal, 65 district hospitals, and 209 primary heath care centers, 676 health posts and 3129 sub health posts under government health services that are continuously providing preventive and curative health services to the people.[4] In addition, 184 private hospitals with more than 25 bed capacities are providing health services. Actual data of below 25 bedded hospitals, polyclinics, clinics are not included in government reporting system.[4] Most of the private hospitals on business ground are concentrated in the urban areas but the health services in rural communities are inadequate to fulfill the demand of health care services.[3-4] There is an increasing load of medical waste generation with the increase in health care institutions,

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especially owing to the increased use of disposable materials, lack of onsite separation practices, proper disposing system, and least attention on scientific medical waste management practice by HCIs.[3-4]

1.2 Current Status of Health Care waste:

Only limited information is available on health care waste management practices in Nepal. ENPHO (2001) has reported an average health care waste generation of 1.7 kg/person/day and 0.48 kg/person/day of Health care risk waste (HCRW) at an average bed occupancy rate of around 65%.[5] Out of 24 HCIs studied, information on amount of waste generation is available only from 3 HCIs (Patan Hospital, National Kidney Center and Koshi Zonal Hospital). Patan has reported an average 594.0 kg waste production per day of which 377 (63.5%) is general, 165 (27.8%) is hazardous and 52 (8.8%) is sharps. Similarly, National Kidney Center has reported 28 kg waste generated per day out of which 14 (50%) is general, 5 (17%) is hazardous and 9 (33%) is sharp waste and in average 441.14 kg waste is generated from Koshi Zonal Hospital that includes 302 (68.4%) general, 125 (28.4%) hazardous and 14 (3.1%) sharp waste. The hospital has bed occupancy rate 60.7±20.8 percent.[6] Waste segregation and collection are the most important process during the process of HCWM that minimizes the volume of waste as well as separates nature of medical waste generated from HCIs. Health care institution can simply segregate waste on the basis of nature of waste as prescribed on health care waste management guideline but few of hospitals have adapted the process.[6-7] Most of HCIs, governmental or non-governmental have not done systematic segregation of waste at the place of generation. The system in which the level of color coding or labeling of waste containers bags has been adopted strictly followed by the color coding system issued by national guideline of health care waste management which is not in practical in almost all hospitals.[5-7] In some cases, infectious waste has been mixed with municipal waste. Waste have been collected in larger bins loaded on a trolley in most of large HCIs, but in most cases, the waste have been transported by the sweepers (cleaners) to the central storage facility, either in plastic bags or in the waste collection bucket[6-7] A research has also shown about 33.3% (n=24) HCIs use transportation trolley and the rest HCIs have transferred the waste manually using buckets. In most of HCIs locations of the temporary storage are not satisfactory and are close to the municipal waste storage or near water bodies or premises of hospital.[6] The temporary storage location, storage containers and storage management have a direct impact on the resulting environmental and health risks at the hospital, which must be well sanitized and secured for access only to authorized personnel.[5-7] Though, very few hospitals of Nepal have used containers as guided by guidelines of Nepal government. The training protocol and education mechanism in most of the hospitals have not been functioned though it has committed to apply legislation.[6] In conclusion, there is not proper scientific mechanism applied by most of the health care institutions of Nepal for disposing medical wastes.

1.3 Health Impact of Health Care Waste:

Risk due to improper health care waste management on human health and surrounding environment is immeasurable.[8] World health organization has estimated 21 million people are suffered from hepatitis B, two million from hepatitis C and at least 260,000 from HIV infection with contaminated syringes.[9] In March 2009, 240 people in Indian state of Gujarat contracted hepatitis B with previously used syringes those were later discovered to have been acquired through the black market trade of unregulated health care waste.[10-12] The practice of uncovered health care waste risk implies an obvious risk for spreading infection via easily exposed numerous animals and scavengers. Till now in most of health institutions, incinerators like small brick kilns are used that do not meet the common international standards which operates at low temperatures and have low stack height.[12] It emits most dangerous chemicals like dioxin and furans, and causes impairment of the immune, nerve, endocrine and reproductive system in human body.[9] Most of the general infectious waste generated at health care facilities has dumped untreated at the river bank together with other types of wastes.[13] The organic part of the waste will flow down either to the ground water or to surface water. As the waste is dumped so close to the river, there is a risk that the infectious waste gets mixed into the river when the water level rises, hence spreading infectious agents in the river stream.[13] This eventually can contaminate the drinking water system of nearby inhabitants. In addition, scavengers (including street children) picking recyclable materials from the uncovered waste at the dumpsite may carry millions of pathogens with them and vulnerable to various diseases.[12-14] They can also transmit infectious diseases to other individuals as well. There are no sanitary landfills sits in Nepal with any protection mechanism of ground water. Occupational health is still a neglected area for healthcare workers. In fact, six out of ten most populous countries (China, India, Brazil, Pakistan, Bangladesh and Nigeria) are found to be facing HCWM burdens with an approximately 50% or more of the current global population at an environmental, occupational and public health risk.[12,14]

1.4 Current Legislation for addressing Health Care Waste Management:

In Nepal, there were no specific national policies on the waste management till 1996. The important measures related to solid waste were considered in Eighth, Ninth

and Tenth Plan of Nepal Government.[15] According to the Eighth Plan causes for air, water, and land related pollution was supposed to be investigated through on-the spot observation and management mitigation plans. In this regard emphasis was laid on adopting technology required for minimizing waste.[15] However, pollution control program launched during this period included limited assessment studies of existing situations in the areas of solid waste along with other sectors; air, water, noise etc. Utilization of appropriate technology still needs to be developed in the areas of solid waste including health care waste. Management work plans to control pollution caused by solid waste needs to be implemented. The solid waste aspect has also been mentioned in the Ninth Plan. The Tenth Plan has emphasized upon the Public Private Partnership for Solid Waste Management and implementation of Pollution Pay Principle. However, these policies are silent regarding health care waste management. The three year Interim Plan of Nepal Government (2064/65- 2066/67) has clearly mentioned the programs for Health Care Waste Management. It states that necessary programs for the proper disposal of health care waste management will be conducted. Following legal documents are addressing the provision for better management of municipal, industrial and health care waste in Nepal, and it is presented here in hierarchy order.[16]

4.1 Interim Constitution of Nepal, (2063) 2007 (with amendment):

It has prioritized the human rights and protection of environment. Article 16 (1) of the Interim Constitution assert that every person shall have the right to live in a healthy environment. Similarly, Article 35 (5) asserts that "The State shall give priority to the prevention of adverse impacts in the environment from physical development activities by increasing the awareness of the general public about environmental cleanliness as well as to the protection of the environment and special safeguard of the rare wildlife. The state shall make arrangements for the protection of sustainable uses and the equitable distribution of benefits derived from the flora/fauna and biological diversity".[17]

4.2 Environment Protection Act, 2053 (1997) and Environment Protection Rules, 2054 (1997) & Amendments (1999, 2007, 2009 and 2010): The Environment Protection Act, 1997 Environmental Protection Act 1997, and Environmental Protection Rules have made provisions on pollution control, Initial Environmental Examination (IEE), Environmental Impact Assessment (EIA), conservation of national heritage etc. Section 7 of Act refers to pollution control, which states "A person shall not cause pollution or allow pollution to be caused in a manner which is likely to have significant adverse impact on the environment or harm human life or public health or shall not emits, discharge sound, heat, radioactive from any machine, industrial enterprises or any other place above the prescribed standard." The law has also listed chemicals, drug related industries as polluting industries, and requires that such industries should obtain pollution control certificates from the Ministry of Population and Environment (Now Ministry of Environment, Science and Technology). The Chapter 3 of Regulation has provided various provisions under rules 15 to 29 for preventing and controlling pollution. These provisions include Stopping emission and discharging solid waste against the standards (rule 15), and to install and maintain properly the equipment or treatment plants (rule 16).[18]

4.3 Industrial Enterprise Act, 2049 (1992): Enterprise relating to hospital, nursing home and X-ray has been defined as service industry. GoN may issue directives to any industry in the matters relating to the pollution of environment and it shall be the duty of the concerned industry to follow such directives. As provided in industrial policy, this Act provides that industrial license provides that license or registration certificate shall contain provisions regarding concessions, exceptions, facilities that will be given to enterprise and prescribed conditions to be fulfilled by them. Section 13 also provides that the industrial promotion board establishment under the Act can direct the industries to make arrangements for controlling environmental pollution. The Act is required if it is related with defense, public health and environment. Section 11 clearly gives priority to industry based on waste products and industry manufacturing pollution control devices. Similarly, section 25 (2) empowers GON to punish those who don't comply with the conditions mentioned in the license or registration certificate.[19]

4.4 Local Self Governance Act, 2055 (1999) and Local Self Governance Regulation, 2056 (1999)

It is the authority local government for the conservation of local natural resources, conflict management and monitoring of project activities. The municipality has the authority to prepare development plans and establishes basic community infrastructures including public health. The local government can regulate constructions according to the plans and has also the authority for the management of public convenience, means of transportation, parking system of vehicles, pollution control, waste management and eminence of public road plantation and to protect areas for drinking water, flood controls and natural and cultural heritage sites.[20]

4.5 Solid Waste Management Act, 2068 (2011)

This Act outlines the duties of local government to take action to control haphazard waste generation, disposal or collection and has provisions for various punitive

measures against those engaged in activities detrimental to the intentions of the Act. As per the Section 9, rule 38, (Ta and Tha) and rule 39 (8), haphazard generation, discard or collection of hazardous waste from industrial state or health care institutions will be considered as guilt and has the provision by the local government to penalize the fine of Rs 50, 000 to 100, 000 for the first time and the penalty will be double for the repetition and will be recommended to concerned bodies for revoking the permission. Also the Section-10, rule 43 (1, 2) states that the respective authority should make sure that the healthcare institutions has the proper provision for waste management prior issuing the permission from its establishment and operation and can also enforce necessary standards to be followed by healthcare institutions.[21]

4.6 The Labor Act, 2048 (1991):

The Labor Act 1991, which is administrated by the Ministry of Labor, is the main regulation regulating the working environment. Chapter 5 of this Act deals with occupational health and safety. Section 27 of Chapter 5 requires the management to make certain arrangements such as the removal of waste accumulated during production process and prevention of accumulation of dust, fume, vapor, and other impure materials, which would adversely affect health of workers. Section 28 and 29 require management to provide protective clothing and devices to workers handling chemical substances another hazardous and explosives substances. In order to prevent accidents, section 30 of the Act requires the proprietor to make arrangements for fire safety equipment and emergency equipment while section 31 requires the placement of sturdy fences around hazardous machines and equipment operated by energy.[22]

4.7 National Urban Sanitation Policy, 2064 (2007): The main objective of this policy is to promote the healthy, livable, safe, and economically vibrant urban environment though planned provision of infrastructure services, facilities and amenities that ensure the quality of life and environment at urban setting.[23]

4.8 Second Long Term Health Plan, 2054-74 (1997-2017): The Ministry of Health and population, Government of Nepal, developed 20-years Second Log-Term Health Plan (SLTHP) from 2054 to 2074 (1997-2017). The aim of the SLTHP is to guide health sector development in the improvement of the health for the population, particularly those, whose healthcare needs are not often met. The SLTHP addresses disparities in healthcare, assuring gender sensitivity and equitable community access to quality healthcare services. The SLTHP envisions a healthcare system with equitable access and quality services in both rural and urban areas. The system would encompass the concepts of sustainability, full community participation, decentralization, gender sensitivity, effective and efficient management, and private and NGO participation.[24]

4.9 Health Care Waste Management Guidelines, 2065/6 (2008/9)-DoHS: Health Care Waste Management Guideline, 2065 (with amendment 2066) has defined and designated Health Care Waste (HCW) into two major categories; general waste and hazardous waste. The general waste has been further sub-grouped into organic and the inorganic waste. Similarly, the hazardous waste has been sub-divided as, combustible; sharps; and non-combustible wastes. The Guideline has directed provisions for Waste minimization, waste segregation and collection, waste storage and transportation/ handling, waste treatment and disposal, and public awareness on HCW as the initial and prime steps for the Health Care Waste Management. Provision of formation of Waste management and Occupational Health and safety committee: At least seven members committee in chairman of hospital management head. Furthermore, the Guideline has also differentiated the responsibility of waste producers (Health Institutions), local bodies, and the national level institutions in managing the health care wastes.[25]

4.10 National Environmental Impact Assessment Guidelines, 2050 (1993): National EIA Guidelines were developed after a series of meetings and intensive workshops conducted by the National Planning Commission in collaboration with IUCN. The guidelines approved and gazette by the Government of Nepal assist several mechanisms for identification of projects requiring EIA, processes selecting alternatives, and mitigation measures including monitoring and evaluation. The guideline provides important reference such as a checklist of environmental parameters, as well as numerous diagrams, tables and flow charts. The basic intent is to provide mechanism to optimize development benefits without degrading environmental quality and natural resources, and to integrate environmental considerations within the project planning cycle.[26]

4.11 Urban Environmental Management Guidelines, 2067 (2011): Section 6 (Kha, Ga, Gha and Nga) state that hazardous waste generated from hospital activities must be categorized or classified and managed as per the provision stated by National Health Care Waste Management Guideline (MoHP/GoN), within its premises under the supervision of concerned agencies. For this, institutions must specify the responsible departments or designated body for the management of hazardous health care waste as well as trainings must be provided to the human resource involved in waste management. If unable to do so, should request municipality for its management and the institution must bear the cost of management. Section 17 (Ka, Kha, and Ga) states that construction materials produced from Environment Friendly Technology must be promoted during the

construction of residential, commercial, and industrial infrastructures. Similarly, building must be designated in such a way that proper utilization of natural resources like solar and wind energy can be done and such natural resources based energy technology must be promoted. Also, have the provision of compulsion of implementation of building code for the safety and sustainability of constructed building.[27]

4.12 Waste Management Orientation Booklet for Health Workers, 2006: This booklet contains the subject matters of health care waste, its types and impacts on environment and health, health care waste management, infection control, adoption of protection measures during the health care waste management, responsibility of health care waste management, health impact of mercury and management of spilled mercury.[28]

4.13.1 Basal Convention on the Control of Trans-boundary Movements of Hazardous Waste, 1989: It has mandatory provisions that all the parties should accept the principle that the only legitimate trans-boundary shipments of hazardous waste or exports from countries that lack the facilities and or expertise to dispose safely of certain wastes to other countries. The importing countries should have both facilities and expertise; Exported wastes should be labeled according to the UN recommended standards[29]

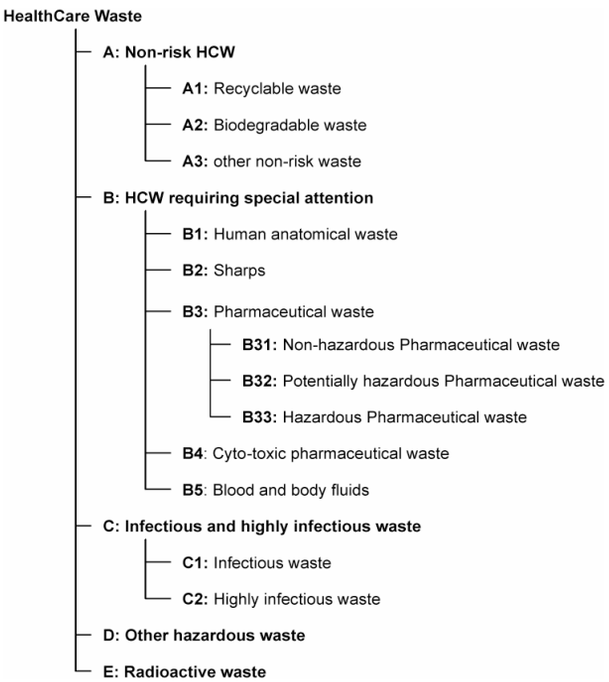
4.13.2 Stockholm Convention on Persistent Organic Pollutants (POPs), 2001: The overall objective of the Strategic Approach is to achieve the sound management of chemicals throughout their life-cycle so that, by 2020, chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment.[30]

4.13.3 Strategic approach to International Chemicals Management (SAICM): The overall objective of the strategic approach is to achieve the sound management of chemicals through their life-cycle so that, by 2020, chemicals are used and produced in ways that lead to minimization of significant adverse effects on human health and the environment and ensure chemical uses that pose an unreasonable and otherwise unmanageable risk to human health and the environment risk assessment and taking into account the costs and benefits as well as the availability of safer substitutes and their efficacy, are no longer produce or used for such uses. In addition risks from unintended release of chemicals that pose an unreasonable and otherwise unmanageable risk to human health and environment based on a science based risk assessment and taking into account the cost and benefits are minimized.[31]

It is thus concluded that biomedical waste management in Nepal is being a crucial issue in health and environment. The generated health care waste from HCIs is challenging to physical- chemical, biological and socio-economic and cultural environment, even creating health impact on both direct and indirect route. There has not been adopted well improved health care waste management practice in many healthcare facilities of Nepal, though few of HCIs are initiating and applying to promote and ensure safe and best practices. Legislation on waste management in Nepal has already promulgated; though, the actual implementation situation remains far from satisfactory. Therefore, health care institution must be implemented the standard waste management procedures guided by national legislation of health care waste. In addition, health care waste management person as well as general public must be aware about the health impact of weak health care waste management practice.

WAY FORWARDS

Waste management has become a big issue nowadays. It is not only limited to the health care institutions but also challenging to the policy makers. It is mainly due to lack of legal framework implementation at health care institutions.[1,25] Problem can be easily solved in each health care institution if all these institutions follow national waste management policy. Therefore, each health care institution must be established "Waste Management and Occupational Health and Safety Committee", and implement the standard waste management the procedures guided by national guideline of health care waste.



Hospital waste management committee must represent at least all departments and work should be performed under chairperson who must be Hospital Superintendent or hospital staff assigned by hospital management committee.[1,25] The waste management committee

shall be responsible for the preparation, monitoring, periodic review, revision or updating if necessary, and implementation of the waste management plan. In order to meet the standard requirements, the committee shall meet regularly to review situation and action plan, develop hospital management policy/guidelines, involve in regular monitoring and supervision, identify problems and develop action plan to solve problems and allocate resources for waste management. Health care waste can be classified accordingly.[1]

General waste: It includes all non risk waste that has not been infected like general office waste, packaging or left over food. They are similar to normal household or municipal waste and can be managed by the municipal waste services. Examples of such wastes (Eg: Paper, cardboard, kitchen waste, metal containers etc).[1,25]

1.2 Hazardous waste: It includes: gaseous, liquid and solid chemicals, waste with high contents of heavy metals such as batteries, pressurized containers, etc (Eg: Used cotton, gauze, soiled bandage, blood bags, human and animal tissues, body parts etc).[1,25]

1.2.1 Pressurized container: It consists of full or emptied containers or aerosol cans with pressurized liquids, gas or powdered materials. Examples of such wastes (Eg: Pressurized cylinder, cartridge, aerosol canes).[1,25]

1.2.2 Chemical waste: It consists of discarded chemicals that are generated during disinfecting procedures or cleaning processes. Not all of them are hazardous but some have toxic, corrosive, flammable, reactive, and explosive, shock sensitive, cyto- or genotoxic properties.[1,25]

1.2.3 Human anatomical waste: It comprises non-infectious human body parts, organs and tissues and blood bags. Examples of such wastes: tissue waste, removed organs, amputated body parts, placentas, etc.[1,25]

1.3 Sharps: It includes all objects and materials that are closely linked with health-care activities and pose a potential risk of injury and infection due to their puncture or cut property. Examples of such wastes (Eg: needles, syringe, blades, broken glass, infusion sets, saws, knives).[1,25]

1.4.1 Infectious waste: It includes all biomedical and health-care waste known or clinically assessed by a medical practitioner or veterinary surgeon to have the potential of transmitting infectious agents to humans or animals. Examples of such wastes: Blood from patients contaminated with HIV, viral hepatitis, brucellosis, Q fever. Feces from patients infected with typhoid fever, enteritis, cholera. Respiratory tract secretions from patients infected with TB, anthrax, rabies, poliomyelitis.[1,25]

1.4.2 Highly infectious waste: It includes all microbiological cultures in which a multiplication of pathogens of any kind has occurred. Examples of such wastes: Sputum cultures of TB laboratories, contaminated blood clots and glassware material generated in the medical analysis laboratories, high concentrated microbiological cultures carried out in medical analysis laboratories. Examples of such wastes: Dressing material, swabs, syringes without needle, infusion equipment without spike, bandages.[1,25]

1.5 Radioactive health-care waste: Radioactive waste includes liquids, gases and solids contaminated with radionuclide are whose ionizing radiations have genotoxic effects. The ionizing radiations of interest in medicine include X and γ-rays as well as α- and ß-particles. Examples of such wastes: Radioactive waste includes solid, liquid and gaseous waste contaminated with radionuclide generated from in vitro analysis of body tissue and fluid, in vivo body organ imaging and tumor localization, and investigative and therapeutic procedures.[1,25]

1.6 Pharmaceutical: Pharmaceutical wastes are divided into three classes as Non-hazardous pharmaceutical waste, potentially hazardous pharmaceutical waste and Hazardous pharmaceutical waste. (Eg: Unused, expired, spilt, contaminated drugs, vaccines, sera etc). [1,25]

For scientific management of health care waste, hospital waste management committee should be aware about the nature of waste generated from hospital. So that to ensure that the committee does not face problem in the segregation and collection processes of waste management. It shall be segregated into various containers, as like green for bio-degradable, blue for non-bio-degradable, red for sharp, yellow for hazardous and grey for non autoclavable hazardous waste.[1, 25] It can be minimized by reducing, reuse, recycling as well as selling to municipality after disinfection of waste through the process of autoclaving and sterilization. For waste storage and transportation/handling, waste shall be lifted daily, and trolley with wheels shall be used for collection and transportation. [1,25] Separate services way should be provided for transportation of waste and hazardous waste shall be transported in closed vehicle. A central storage facility should be developed with tiled wall and floor and proper drainage should be made so that there is no water logging or contamination.[1,25] Daily records shall be maintained for the hazardous waste about the quantity and place where the waste has been transported. Sharp waste must be identified and destroyed by using needle destroyer at wards or the source where they are generated.[1,25] The person involved in the collection, storage and transportation of hazardous waste should be provided with personal protective equipments and training about nature of health care waste and it health impact. Hazardous waste must be disinfected before disposal through autoclave; if it cannot be treated by other means it can be buried in a safe pit at least 2 meter deep after chemical disinfection, same method can be applied for infectious waste also.[25] For hazardous waste water treatment, reed bed waste water treatment plant with capacities of

15 m3 per day should be used where the waste water is biologically treated and then discharged into public sewerage.[25]

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