# Analysis

of status on use of potentially harmful substances and application of sustainable procurement practices in healthcare sector of the Republic of Moldova

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Sustainable Health in Procurement Project – SHiPP

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# Executive summary

The present report is developed in the framework of the Sustainable Health in Procurement Project (SHiPP), supported by the Swedish International Development Cooperation Agency (Sida). In implementing this, UNDP is working with the Health Care Without Harm (HCWH), a U.S. based international NGO with huge experience in the sector. Project countries include Argentina, Brazil, China, India, Moldova, South Africa, Tanzania, Ukraine, Vietnam and Zambia. The project's objective is to promote sustainability in the health sector supply chain to improve human health and reduce greenhouse gases, resource depletion, and chemical pollution. It addresses the intersection between health, human rights and the environment to promote procurement practices that consider environmental and social impacts, to aggregate demand for sustainable manufacturing and waste management and to move the supply chain towards greater sustainability.

The report describes the results of analysis of status on use of potentially harmful substances and application of sustainable procurement practices in healthcare sector in the Republic of Moldova. The results are indicative of the likely use of hazardous and high concern chemicals in the healthcare sector, context of their use, and in case of the generation of hazardous waste, their treatment mode.

## METHODOLOGY OF STUDY

The goal of the assessment was to obtain indicative data on use of hazardous chemicals in medical facilities and to evaluate the current sustainable procurement practices applied within the healthcare sector. The assessment was based on application of structured checklist for healthcare facilities on use of potentially hazardous chemicals and interview based questionnaire for centralized procurements public authorities on application of sustainable procurement practices. Both questionnaire and checklists were combined with introductory meetings and visits to interviewers in order to explain the objectives of the assessment and some overall expectations from the checklist and questionnaire. To each of the participants was assured anonymity.

Key national institutions were limited to 2 centralized authorities: *Center for Centralized Health Procurement* and *Medicines and Medical Devices Agency*

Sampling of the healthcare institutions to which the questionnaire was applied included three healthcare facilities, 2 public and 1 private.

## THE QUESTIONNAIRE ON SUSTAINABLE PROCUREMENT PRACTICE

Sustainability in healthcare is sometimes marginalized, as it is seen as field that cannot be subject to a quantitative assessment. However, there are ways to verify sustainable practices and policies, such as requesting certification of environment management systems or environment protection standards, asking suppliers about their sustainability programs or documented product improvements, including considering life cycle approach.

The interviewed state entity responsible for the centralized procurement in the healthcare sector the Center for Centralized Health Procurement was asked about the knowledge and level of application of sustainable procurement practices while purchasing goods, works or services, including use of sustainability criteria in tender documents.

The questionnaire was aimed at providing an initial screening on the understanding and application of sustainability practices and criteria necessary to set a starting point for further action.

## THE CHECKLIST

The use of chemicals is widespread in healthcare and includes chemicals such as cleaning agents, disinfecting and sterilizing agents, laboratory chemicals, medical gases, anesthetic agents, cytotoxic drugs and pharmaceutical substances. The checklist included set of questions that allow to track the degree of use of such harmful substances within the healthcare facilities and to see the potential exposure of healthcare workers manipulating various chemicals of concern. The potentially hazardous chemicals mentioned in the checklist do not represent all chemicals that can be found today in a healthcare facility, but they are the ones that generate most concerns and could be a starting point for launching initiatives to replace and buy less hazardous alternatives.

## WHAT DO THE RESULTS SAY?

The development of the healthcare sector shows a gradual increase of use of various chemicals and products, some of them having highly hazardous properties. According to received information, the healthcare facilities in the Republic of Moldova are using hazardous chemicals in their daily work for different purposes: cleaning, disinfection, sterilization, pathological anatomy, laboratory, as well as in measuring devices or other types of equipment. Some of this chemicals and devices can be replaced by safer alternatives, while others have to be used under special conditions and precautionary measures.

The healthcare facilities are aware about the presence and use of hazardous chemicals, that safety data sheets are available and requested from the suppliers, also the personal protection equipment is used when manipulating with the chemicals within the institutions.

There are some hazardous chemicals, whose negative impact is less known by respondents. They can be found in products used daily in healthcare sector for service provision, but also in such items as furniture, construction materials or hospital buildings, such as PVC, bisphenol A, DEHP or flame inhibitors.

**Healthcare waste management legal framework in Moldova** complies with EU standards, however enforcements actions are still necessary. All the procedures related waste treatment and final disposal are described within

the Sanitary Regulation on Medical Waste Management no 696/2018. Many healthcare facilities treat **infectious waste** by themselves or handle these services to specialized authorized companies.

As regards to the sustainable procurement practices in the healthcare sector, the r**ecent creation of the CAPCS center** has **good incentives to achieve the expected outcomes of the process**, and namely of an increased efficiency of the procurement of the medicines, consumables and other supplies and increased transparency and accountability of the medicines procurement. The beneficiaries of the system - the healthcare facilities- noted that are overall satisfied with the centralized procurement system and in some cases the specific requirements are taken into account.

So far, the principles of **sustainable procurement** in the healthcare sector in the Republic of Moldova are not fully implemented and, respectively, their application in this regard is not well established. The procurement decisions are still based on price-only criteria and less on product life-cycle impacts - from sourcing to manufacturing, product delivery and end-of-life management.

The **procurements made by the private healthcare facility** are independent and not related to the Center for Centralized Health Procurement, which allows such institutions to make individual choices as regards their procurements.

The **private donations** received in a form of equipment, furniture or other products/ materials by the hospitals aren't separately recorded or reported under the centralized procurement within the healthcare. Yet, the lack of such information within the centralized procurement authorities can lead to not including the consumables or spare parts for medical devises functioning within the annual procurement lists, thus leading to impossibility to use them by their beneficiaries.

## LOOKING AHEAD

Given the results of the assessment, a number of recommendations have been made that are geared towards:

- Developing collaborative approaches among stakeholders involved in healthcare procurement to tackle issues such as life cycle approach and use of the best price-quality ration as Most Economically Advantageous Tender (MEAT);
- Developing additional consistent and transparent practices to ensure the sound procedures on procurement and monitoring of healthcare products;
- Investigating the market on chemicals of concern's available alternatives and piloting of the replacement practices within healthcare institutions *(for example substitution of disinfectant glutaraldehyde with safer alternative (for instance peracetic acid), substitution of the PVC containing medical consumables within the neonatal intensive care units (NICUs), maternity departments, and pediatrics);*

- Engaging partnership on receiving the clinical/ carer's and patient's association input in the procurements;
- Training of healthcare staff on safety data sheets and personal protection measures regarding use and manipulation of the chemicals of high concern;
- Raising awareness and creating partnerships to share best practice, training /knowledge & capacity building.
- Including within the tender specification documents the provisions related to energy consumption requirements and the avoidance of restricted / prohibited chemicals and other compounds (such as HMs, POPs, flame retardants, etc) within the purchased items (according to provisions of Law nr 277/2018 on Chemicals and Regulation on WEEE nr. 212/2017 (Annex 6).

## PERIOD OF STUDY

The present study was conducted during August – October 2019. The results and findings of the present analysis will be presented to selected national stakeholder at the National Workshop planned in November 2019.


## ACKNOWLEDGEMENT

The report was developed by a team of 3 national experts with Dr. Tatiana TUGUI (National Team Leader), Tatiana Echim (Data Analysis Expert) and Natalia Efros (Technical Expert) with support of UNDP Moldova Climate Change, Environment and Energy Cluster Lead and Effective Governance Programme Analyst. The authors of the report would like to acknowledge the support provided by the staff of visited healthcare facilities and administration of Center for Centralized Health Procurement and Medicines and Medical Devices Agency.

# Glossary

| | |
|---|---|
| **AMDM** | Medicines and Medical Devices Agency |
| **BFA** | Bisphenol A |
| **CAPCS** | Center for Centralized Public Procurement in Healthcare |
| **CAS** | Chemical Abstracts Service |
| **DEEE** | Waste Electrical and Electronic Equipment |
| **DEHP** | Bis(2-ethylhexyl) phthalate |
| **EMAS** | The EU Eco-Management and Audit Scheme |
| **GA** | Glutaraldehyde |
| **GHS** | Globally Harmonized System of Classification and Labelling of Chemicals |
| **FTS** | Technical security paper |
| **OMC** | World Trade Organization |
| **OMS** | World Health Organization |
| **SHiPP** | Sustainable Health in Procurement Project |
| **PE** | Endocrine disruptors |
| **PNUD** | United Nations Development Programme |
| **POPs** | Persistent organic pollutant |
| **PVC** | Polyvinyl chloride |

# Chapter 1

## Sustainable procurement practices in the healthcare sector

# 1.1. Definitions, legal and institutional framework

## DEFINITIONS

According to *Marrakech Task Force on Sustainable Public Procurement* - **Sustainable Procurement** is a process whereby organizations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the organization, but also to society and the economy, whilst **minimizing damage to the environment**."

Public procurement in the Republic of Moldova has a *relatively short history,* considering that the first public procurement law dates back to 1997. In June 2016, Republic of Moldova ratified the Agreement on Government Procurement of the World Trade Organization (WTO GPA), and this, along with the EU-Moldova Association Agreement involves taking all measures to promote trade liberalization and the development of public procurement in accordance with the best international practice.

Referring to the definition, it shall be mentioned that the framework **Law on public procurements no. 131 of 03/07/2015** has a distinct Article no 23, which denotes standards of environmental protection and in case of sustainable procurement implementation; they must refer to quality assurance systems based on the relevant European standards series, and environmental management standards.

Box 1

### Law on public procurements of the Republic of Moldova no 131 of 03/07/2015

**Article 23. Environmental management standards** [1]

*(1) If the contracting authority requests submission of certain certificates, issued by independent bodies, attesting the fa t that the economic operator complies with certain environmental protection standards, then it has to relate to:*

*a) either to the Community Eco-Management and Audit Scheme (EMAS);*

*b) or to the environmental management standards based on the series of European or international applicable standards in the field, certified by bodies compliant with the Community law or the European or international standards concerning certification*

*(2) In accordance with the principle of mutual recognition, the contracting authority has the obligation to accept the equivalent certificates issued by the bodies established in states of the European Union. If the economic operator does not hold an environmental certificate as requested by the contracting authority, the latter has the obligation to accept any other proof or evidence submitted by the respective economic operator, to the extent the evidence submitted confirms that an appropriate environmental protection level is ensured.*

*Additional provisions related to sustainable procurement has the **Art. 37 Rules regarding the description of goods, works and services** para. (15) of Public Procurement Law No 131 of 03/07/2015*

*(15) The contracting authority has the right to impose in the award documentation, to the extent such are compatible with the Community law, special terms of performing the contract aimed at obtaining certain social or environmental protection effects and the promotion of sustainable development.*

## NATIONAL LEGAL FRAMEWORK

National legal framework in the Republic of Moldova and practices referring to sustainable procurement have evolved considerably over the years as the principles of transparency, competition, non-discrimination benefits the state budget by saving public money. The public procurement legislation, being in line with the acquis of the European Union and the good international practices, ensures the contracting authorities the possibility to include sustainable criteria at all stages of the public procurement procedure, including in the clauses of the procurement contract.

1 https://www.legis.md/cautare/getResults?doc_id=121243&lang=ro#

Key **legal framework acts** that promote sustainable procurement and address health and environmental standards:

- Law on the state budget (annually)
- Law on public procurements nr. 131 of 03/07/2015
- Law on environmental protection nr. 1515 of 16.06.1993
- Law on health protection nr. 411 of 28.03.1995
- Law on energy efficiency nr. 142 of 02.07.2010
- Labour Code nr. 154 of 28.03.2003
- Law on preventing and combating corruption No. 90 of 25.04.2008

Besides these framework documents, the regulatory acts adopted by the Government of the Republic of Moldova during the last period denote lead to establish strong framework for sustainable public procurement. The documents to be additionally pointed out under the legal framework include:

- **Government Decision no. 1128 of 10.10.2016** on the establishment of the Center for Centralized Health Procurement.
- **Government Decision no. 160 of 21.02.2018 approving the Program for the promotion of the "green" economy in the Republic of Moldova for the years 2018-2020** and of the Action Plan for its implementation. Among the specific objectives of the Programme is ensuring, by 2020, that at least 15% of all public procurement will meet sustainable procurement criteria.
- **Government Decision no. 668 of 27.05.2016** approving the Regulation on public procurement using the negotiated procedure, mentions among the award criteria the environment features, however this criterion is not mandatory, but an additional one.
- **Government Decision no. 669 of 27.05.2016** for the approval of the Regulation on public works contracts – Section 3. Elaboration and content of the award documentation, mentions among the qualification requirements the environment protection standards.
- **Government Decision no. 665 of 27.05.2016** for the approval of the Regulation on Low-Value Public Procurement
- **Government Decision no. 987 of 10.10.2018** approving the Regulation on procurement of goods and services through the request for proposal (RFP) process
- **Government Decision no. 1420 of 28.12.2016** approving the Regulation on the List of Qualified Economic Operators
- **Government Decision no. 705 of 11.07.2018** approving the Technical Concept of the Information System Automated "State Register of Public Procurement" (MTender)
- **Ordinance no 173 of 05.10.2018** of the Ministry of Finance regarding the approval of the Standard documentation for the public procurement of goods. In the Instruction for bidders, among the principles for contract award there is environment protection.

## INSTITUTIONAL FRAMEWORK FOR HEALTHCARE PROCUREMENT

At **institutional level, the National Agency for Public Procurement** (formed through Government Decision no. 1217 of December 31, 1997 regarding the National Agency for Public Procurement) is a specialized authority, under subordination of the Ministry of Finance, and has a fundamental role of conceptual development and implementation of public procurement policies, including those related to sustainable public procurement. The implementation of sustainable public procurement is an action expressly established in the Agency's Action Plan, which reflects the commitment of state institutions in this regard.

At the level of the **procurement in the healthcare sector** there are 2 major entities responsible at the national level, having a separate mandate and roles. Both agencies report to the Ministry of Health, social Protection and Labour and the Ministry of Finance:

### CENTER FOR CENTRALIZED HEALTH PROCUREMENT http://capcs.md/

Newly created state institution - **Center for Centralized Health Procurement** is a central purchasing authority (created under the Law on Public Procurement

no. 131 of 03.07.2015) that plans and undertakes the procedures for public procurement of:

- medicines, other medical products,
- medical devices,
- specialized medical transport,
- maintenance services of medical devices and information systems included in the Medical Register,
- treatment services and disposal of medical waste

The center awards public procurement contracts, and evaluates and supervises the execution of public procurement contracts. It activates on behalf of the state budget, the budgets of the administrative-territorial units, the financial means of the public institutions, the means of the funds of the state, health insurance and external loans related to direct or guaranteed state debts.

The mission of the Center is to:

1) **plan the procedures for public procurement;**
2) **carry out the procedures for public procurement;**
3) **ensure efficiency;**
4) **coordinate public procurement processes for system needs;**
5) **supervise and monitor of the execution of the public procurement contracts.**

**MEDICINES AND MEDICAL DEVICES AGENCY**
https://amdm.gov.md/

The **Medicines and Medical Devices Agency** is created according to Government Decision no. 617 of 28 June 2005 "On the recovery of pharmaceuticals situation in Republic of Moldova" by reorganizing the National Institute of Pharmacy, the Pharmaceutical Inspection and Pharmaceuticals Department of the Ministry of Health. The Agency aims to achieve the basic state policy in the field of medicines and pharmaceutical activity.

The main activities:

- authorization (expertise, approval and registration) of medicines;
- authorizing the import of unregistered drugs for registration purposes
- quality control and supervision of medicines;
- supervision and control over pharmaceutical activity,
- applying the market surveillance procedures according to the provisions established by the legislation in the field of medical devices;
- promoting and monitoring the rational use of medicines;
- application and development of the pharmacovigilance system;
- authorizes the supervision of the clinical trials and approves their results "
- monitoring the process of supplying and equipping with medical devices, especially of public medical-sanitary institutions;
- implementation and development of information technologies in the pharmaceutical field;
- creation and administration of the National Catalog of producer prices for medicines, according to Law no. 71-XV of March 22, 2007 regarding registers;
- the support of information management of medical institutions and supervisory authorities in the field of medical devices;
- ensuring the implementation of quality and safety standards;
- market monitoring of medicines and medical devices present on the market, including their quality;
- contributing to the harmonization of legislation in the field of medicine, pharmaceutical activity and medical devices with the Community acquis;
- holding the State Nomenclature of authorized drugs in the Republic of Moldova;
- creation and maintenance of the State Register of medical devices, according to Law no. 71-XV of March 22, 2007 regarding registers;
- providing consultative assistance in the fields of activity;
- licensing of the pharmaceutical activity
- other functions provided by the legislation.

## 1.2. Sustainable procurement implementation within the healthcare center

Adopting a green or environmentally sustainable purchasing policy in health sector means defining environmental criteria related to all stages of life cycle of products and supplies acquired by a healthcare facility. This implies taking into account the extraction of raw material, its manufacture, distribution, use and final disposal. There are various online databases developed by NGOs and governments to recognize which are the safest ecological products and substances available [2],[3].

Through the adoption of a green/sustainable purchasing policy, the healthcare facilities engage to purchase products or contract services that meet the same quality and safety standards, but which, in turn, have a lower impact on human health and the environment. In general, environmental friendly products are less toxic and polluting, make more efficient use of energy, are safer and healthier for patients and staff, have a higher content of recycled materials, less packaging and do not contain fragrances or allergens.

Improving the efficiency, effectiveness, equity and responsiveness of supply chains and procurement processes for pharmaceuticals, vaccines and other health products, which make up a large share of total health expenditure in within the country has **important implications for health system performance and population health.**

**Decentralized governance of health services** provides greater autonomy in planning, management and decision making as a response to the primary healthcare approach. Yet is less applicable within the multiple strategic context of healthcare development.

**Centralized procurement/tendering** can achieve cost savings across multiple contexts, including improved purchasing power. The centralized procurement level is playing an essential role in the tendering of the essential sets of pharmaceuticals and procurement, warehousing and distribution of devices and selected commodities. The *centralized procurement* is also viewed as one of the tools for implementation of sustainable procurements as a way of increasing the efficiency of public procurements, primarily by providing savings when purchasing products in bulk, including reducing costs in logistics and administrative provisions, while more qualified experts manage a procurement processes.

Using analysis performed prior the creation of the Center for Centralized Health Procurement the following **advantages and attractiveness particularities** were revealed:


**Figure 1. Benefits of the centralized purchase system**

2 https://www.epa.gov/saferchoice#56

3 http://www.epa.gov/dfe/saferingredients.htm

The current activity of the CAPCS Center is based on the **following principles**:

a) efficient use of public money and minimizing the risks of the contracting authorities;
b) transparency of public procurement;
c) ensuring competition and combating anti-competitive practices in the field of public procurement;
d) environmental protection and promotion of sustainable development through public procurement;
e) maintaining public order, good morals and public safety, protecting health, protecting human life, flora and fauna;
f) liberalization and expansion of international trade;
g) free movement of goods, freedom of establishment and provision of services;
h) equal treatment, impartiality, non-discrimination in relation to all the bidders and economic operators;
I) proportionality;
j) mutual recognition;
k) taking responsibility for public procurement procedures.

## 1.3. Results of the analysis of sustainable procurement enforcement within the healthcare sector

| ISSUE | RESULTS OF ANALYSIS | PROPOSED MEASURES |
|---|---|---|
| **1. Embedding sustainability into healthcare purchasing process** | | |
| Centralised health procurement for the essential pharmaceuticals, devices and certain services (transportation, waste management, etc) is at place | The questionnaire conducted by national experts revealed, that **recent creation of the CAPCS center** has **good incentives to achieve the expected outcomes**, and namely of an<br>i) increased efficiency of the procurement of the medicines, consumables and other supplies;<br>ii) increased transparency and accountability of the medicines procurement (lists of tenders and results are regularly published and updated at www.capcs.md web page). | Bring new green initiatives into the CAPCS activity planning<br><br>Adopting the list of priority chemicals of concern |
| **Register of accredited economic operators** | The Center does not have a distinct **Register of accredited economic operators**, but, in the PURCHASE DATA SHEET (FDA), under the heading Criteria and qualification requirements, it requests the Pharmaceutical Activity License. | |
| **Knowledge and capacities on sustainable procurement** | Measure isn't included in CAPCS action plan for 2019 | To organize the additional **training program on sustainable procurement in the healthcare sector** for CAPCS and medical institution staff, responsible for the procurement. |

| ISSUE | RESULTS OF ANALYSIS | PROPOSED MEASURES |
|---|---|---|
| 1. **Application of the environmental / sustainable contractual clauses** | | |
| Considering of the EMAS (EU) ISO standards (14001) as a part of the third-party certificate | Not applied yet | To complement the CAPCS program for monitoring the execution of contracts (developed according to the provisions of Government Decision no. 1128 of 10.10.2016) with technical specifications specific to **sustainable public procurement,** such as:<br>- eco-labels, energy efficiency requirements, European green procurement criteria<br>- environmental management systems: EMAS (EU) and ISO 14001 |
| Environmental Criteria application, such as savings on water and/ energy use | Not revealed | The purchasing policy shall incorporate the criteria that will determine the environmental characteristics of the goods and services acquired by the healthcare sector. |
| EcoLabel | Not revealed | |
| Application of the life cycle approach (*taking into account all costs - from the purchase, to the maintenance and disposal of the good*) in the technical specifications of the tender documents | The following provisions aren't currently included in the technical specification documents:<br>- **transportation** (product delivery in the appropriate quantity, deliveries to be performed outside the peak traffic hours);<br>- **Supplier take back system** requirement for packaging (recycles); there is a double advantage of centralising packaging prior to reuse or recycling and encouraging the supplier to cut down on any unnecessary packaging<br>- **disposal** – not included as a mandatory requirement | |
| Using Smart Driven procurement principles for medical devices | The international approach reveals the distinct approach with reference to procurement of medical devices. The approach looks at the following key principles: i) to incorporate quality and cost of care delivery; ii) to involve stakeholders and develop partnerships; iii) to foster consistent and transparent practices to ensure sound procedures; iv) to maintain competition. With reference to current medical devises procurement it can be mentioned, that these principles are applied partially. | More actions shall be taken in order to involve bigger number of stakeholders into the consultation process and to ensure that centralized procurement practices do not reduce the participation of SMEs. |

| ISSUE | RESULTS OF ANALYSIS | PROPOSED MEASURES |
|---|---|---|
| Adaptation of the technical specification for the specific medical devices based on particular request from medical institutions | In addition, **Generic specifications** are developed for the purchase of standard type devices. Such as an ECG device. The investigation with this type of device is the same for any medical institution regardless of profile.<br><br>The generic specification cannot be modified. If there is an individual need, so it is not a device with standard functions, then the **medical institution can submit an individual technical specification that will meet their requirements**. Also, the argument for the necessity of this device will be annexed. | More flexibility shall be given to procurement of more environmentally sound solutions. |
| Waste electric and electronic medical equipment | No end of life provision regarding taking back waste of medical equipment / devices | Inclusion within the tender document the supplier obligation regarding Extended producer's responsibility for **waste medical electronic devices** (in compliance with WEEE Regulation nr. 212/2017) |

# Chapter 2

## Chemicals in healthcare facilities

Healthcare facilities commonly use dozens of chemicals that can be hazardous to both the environment and health of workers and the community. Some of these compounds have been related to produce effects such as cancer, congenital malformations and asthma, among others. They alter the indoor air quality of hospitals and in many cases, once used, they become hazardous waste that, if not properly managed, have a high environmental impact.

The effects of some of these chemicals on the health of people and the environment are known and there have been undertaken efforts to eliminate or at least minimize their use. Examples are mercury, PVC (polyvinylchloride), DEHP (di (2-ethylhexyl) phthalate) present in medical devices; or ethylene oxide used as a gas for cold sterilization. Others are less known and are found in products used daily in health care, in furniture and buildings of hospitals. This is the case of bisphenol A or brominated flame retardants.

In recent years, in the Republic of Moldova, legislation was put in place to manage and regulate use of hazardous chemicals, as well as to force hazardous waste generators to identify and treat them through authorized operators[4],[5],[6],[7],[8]. The country has ratified the majority of the ILO conventions related to the international labour standards. Still pending process of ratification of the ILO Convention no 170 Chemicals Convention from 1990 that relates to the safety on use of the chemicals at work.

To improve the health of patients and workers, it is necessary to eliminate or minimize the maximum exposure to these hazardous chemicals through its replacement with safer alternatives. The health sector must lead a path towards true care and prevention, where the compounds and substances that contribute to the onset of diseases are avoided.

The experience in various countries demonstrates that healthcare facilities can, through their purchasing power, generate the necessary demand to boost the manufacture of safer and, in turn, effective and quality products.

## 2.1. Overview of hazardous chemicals present in healthcare facilities

There is a wide variety of substances and chemical compounds used or present in products and materials of hospitals and healthcare facilities. Below the information on some chemicals of most concern and their impact on health is provided, as well the state of their use in the interviewed healthcare facilities.

The red text signifies the use of hazardous chemicals, which can be replaced by an alternative or which have to be used under special conditions, while the green text signifies the use of less hazardous chemicals and good practices within the interviewed healthcare facilities. The boxes are used to present the available alternatives, recommendations for safer use or replacement

4 Law on chemicals no 277 of 29.11.2018, https://www.legis.md/cautare/getResults?doc_id=112668&lang=ro

5 Law on waste no. 209 of 29.07. 2016, https://www.legis.md/cautare/getResults?doc_id=118272&lang=ro#

6 Government Decision No 501/2018 on approval de Instruction for waste records keeping and reporting of information on the waste management, https://www.legis.md/cautare/getResults?doc_id=108614&lang=ro

7 Government Decision No 696/2018 on approval the Sanitary Regulation on management of the medical waste, https://www.legis.md/cautare/getResults?doc_id=108829&lang=ro

8 Government Decision No 99/2018 on approval the List of waste, https://www.legis.md/cautare/getResults?doc_id=102107&lang=ro

## 2.1.1. DISINFECTION AND STERILIZATION

Sterilization is the complete elimination or destruction of all forms of microbial life (including fungi and bacterial spores) and disinfection is the process that eliminates most microorganisms on objects, with the exception of bacterial endospores.

All materials must be thoroughly cleaned before disinfection. The heat-resistant elements must be sterilized in an autoclave, which has the advantage of producing rapid temperature rise in short sterilization times and leaves no residual toxic residues. *Whenever possible, purchases should prioritize autoclavable material.*

However, many more complex devices, such as endoscopes, cannot be processed by autoclave, but chemical disinfectants must be used. In most cases, there is no single valid method for processing biomedical elements, and they differ in the mode of use, economic cost, danger and applicability according to the materials and equipment used in the establishment.

For liquid chemical disinfection, various substances such as glutaraldehyde, orthophthaldehyde and peracetic acid are used, among others. Ethylene oxide is a widely used gas for chemical sterilization.

### a) Glutaraldehyde

Glutaraldehyde is a high-level disinfectant, which is mainly used in the material intended for endoscopies (colonoscopes, bronchoscopes) and other non-heat resistant devices or materials. It is an irritating and also sensitizing product. In short-term exposures and even at low concentrations, it causes irritation of the mucous membranes and especially of the upper respiratory tract and has been associated with a series of occupational diseases.

In National Register of Biodistructive Products the following producers of glutaraldehyde are registered VIROBAC, AS Estonia "Chemi-Pharm", MAXIL SEPT S S.C. "ROMCHIM" S.R.L., Romania, Aldesin Ultra Scientific and Production Company "Chenix" SRL, Russia.

***Glutaraldehyde was indicated as being used by one of the interviewed hospitals for high-level disinfection of endoscopes, laparoscopes and cytoscopes. Glutaraldehyde is included in the National register of biodistructive products, held by the Ministry of Health, Labor and Social Protection[9], contains registered biocidal products allowed to be placed at national market.***

Box 2

#### Reasons to replace glutaraldehyde

When glutaraldehyde was introduced to the market in the early 1960s, it was good news. It replaced the highly toxic, irritating and carcinogenic formaldehyde. However, shortly thereafter, reports began to be published on the existence of serious health effects caused by exposure to glutaraldehyde. Today, more than 40 years later, there are safer alternatives that offer disinfection with lower risks for health and environmental workers. Reasons to eliminate glutaraldehyde:

1. *Glutaraldehyde is a potent occupational skin irritant and sensitizer.*
2. *Exposure to glutaraldehyde in hospitals is a recognized cause of occupational asthma in many industrialized countries.*
3. *Some research indicates that exposure to glutaraldehyde (GA) has been associated with chemical sensitization effects. This condition results in intolerance, not only to GA, a sensitizer, but also to other classes of chemical substances.*
4. *Patients, family members and hospital staff may be unnecessarily exposed to GA vapors in clinics and clinical areas where GA containers are open or there are poor ventilation and / or personal protection systems.*


9 http://ansp.md/index.php/registrul-national-al-produselor-biodistructive/

5. *There are alternatives to GA that maintain infection control standards and do not cause unnecessary wear or damage to sensitive medical instruments.*
6. *Alternatives to GA are available. They are safer, both for workers and for the environment.*
7. *It is important to take precautionary measures and get ahead of the rules. Currently, a limit of 0.05ppm is suggested as the maximum exposure limit due to evidence of sensitization of the device13.*
8. *The alternatives are cheaper in the long term. This is so if the direct costs of ventilation systems, the construction of closed areas for safe use, monitoring systems, the necessary training in their use and contingency management are taken into account. Replacing the GA also saves indirect costs, associated with treating cases of dermatitis, asthma and work time lost due to these and other occupational diseases.*
9. *A plan to eliminate GA is consistent with one of the main approaches to public health - prevention. It makes sense to eliminate highly toxic and sensitizing substances from the hospital environment, when viable, sustainable and effective alternatives are available.*
10. *GA has already been successfully eliminated or significantly reduced, in many hospitals. They are the testimony of the benefits of change.*

## b) Ethylene oxide

A widely used method is chemical sterilization by *ethylene oxide* (ETO), a gas that should be used only under strict safety measures that minimize the exposure of personnel. It is highly toxic and declared carcinogenic (IARC Group 1b). It is used in thermolabile materials (heat sensitive) and devices that cannot be submerged in liquids. The materials sterilized by ETO should be aerated to allow gas desorption in an aeration chamber before being used, varying the time according to the material. This gas accumulates in the materials, so strict safety measures must also be taken with regard to the control of how many times an input is re-sterilized to avoid exposing patients to levels greater than those allowed.

## c) Triclosan

**Triclosan** is an antimicrobial agent that has been used for more than 40 years as an antiseptic, disinfectant or preservative in clinical settings, in various consumer products including cosmetics, plastic materials, toys, etc. Biocidal products that contain triclosan as the main antimicrobial are usually complex formulations due to the lack of solubility of this bisphenol. There are concerns that the widespread use of a low concentration of triclosan in various applications might lead to or select for bacterial resistance to antibiotics.[11] In EU Triclosan (EC No 222-182-2, CAS No 3380-34-5) is not approved as an active substance for use in biocidal products for product-type 1, since 27 January 2016[12].

Triclosan as active substance was found in 2 products recorded in the register and both are hand gels (EuroDerm; EuroHand Gel S.C., Eurototal Comp S.R.L.). The CAPCS center confirmed that no procurement of triclosan was made by institution.

It should be noted that, during the visits conducted to the participating medical institutions the questions related to disinfectants, primarily focused on frequently used routine disinfectants e.g. for hands, skin, surfaces, healthcare equipment, instruments, or laundry.

The main questions and received feedback are presented in the table below:

10 https://ec.europa.eu/health/scientific_committees/opinions_layman/triclosan/en/l-3/1-biocides.htm

11 https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32016D0110&from=EN11

| ISSUE | RESULT OF QUESTIONNAIRE / ANALYSIS | PROPOSED MEASURE |
|---|---|---|
| **Safety Data Sheets on disinfectants** | | |
| At which extend the Safety Data Sheets on disinfectants exist at all containers (or just at initially entered bigger containers received from supplier); | The SDS in many cases are in English / other languages , yet not always the translation into Romanian on the container is available. It is often the case if the disinfectant from original container (could be of several litres) is being transferred into the smaller ones for daily use. The meaning of the pictograms of hazards is as well less known by the respondents. | At the health hazards chapter the medical workers are trained to safely manipulate with the disinfectants, at the same time the knowledge of environmental impact is insufficient. |
| Language of SDS available on the containers | | |
| Meaning and knowledge on pictograms among the medical staff | | |
| Training need on GHS | | |


**Image 1. Photo documentary of disinfectants from visits for hospitals**

Ethylene oxide was indicated as being used by one of the interviewed hospitals for sterilization.

The chemical is included in the Annex III of the Rotterdam Convention, being prohibited for the category of use as pesticide. Republic of Moldova has provided its interim response to ban its import as pesticide. It will also be included in the Annex 1 of the draft PIC Regulation as pesticide.

All three healthcare facilities indicated the use of steam autoclaving, and two indicated dry autoclaving for sterilization purposes.

Triclosan was not indicated to be used by none of the interviewed healthcare facilities.

Box 3

### Available alternatives

An alternative for glutaraldehyde is ***paracetic acid***[12]. It is a mixture of acetic acid and hydrogen peroxide in aqueous solution, which is also a high level disinfectant. It is biodegradable and is not corrosive or toxic to the environment. However, this solution is irritating, so that precautions have to be taken. It was previously included in the National register of biodistructive products, however the last registration expired in 2015.

***Plasma gas sterilization*** is a less toxic option for thermosensitive material. An aqueous solution of hydrogen peroxide is injected into a chamber that vaporizes and diffuses throughout the available space. It decomposes in water vapours and oxygen as the final product, so it does not generate hazardous waste or toxic gases. These devices do not have the same processing capacity as ethylene oxide because they have smaller chambers but, in turn, sterilize in much shorter cycles, which generate the possibility of reusing equipment or materials on the same day.

***Liquid paracetic acid sterilization*** is a sterilization system compatible with the thermosensitive material (previously cleaned) that can be fully immersed in peracetic acid at a temperature below 56 ° C. It allows 'in situ' sterilization of thermosensitive material that cannot be processed due to lack of time in a usual sterilization method, for example, rigid endoscopes, trocars, clamps, separators, fiberglass cables and flexible endoscopes. The material is placed in the specific trays and, once processed, is transported aseptically in the same container to the place of use. The material sterilized by this system cannot be stored since, when not using packaging, it must be used after sterilization.

## 2.1.2. CLEANING

The use of some chemicals in hospitals adversely affects indoor air quality and has been linked to increases in the incidence of asthma and respiratory diseases[13],[14]. Exposure and contact with chemicals used in cleaning can also cause eye irritation, nose and throat, rashes, dizziness, headaches, nausea and chemical sensitivity. Patients are particularly vulnerable to threats of indoor air quality, as many of them have a compromised respiratory, neurological or immune system and / or are more sensitive to chemicals.

***From the proposed chemicals of most concern, the interviewed healthcare facilities indicated the use for cleaning purposes of sodium hypochlorite (included in the Register), quaternary ammonium.***

12 At present, not included in the National Register of biodistructive products. The last registration expired in 2015, http://ansp.md/index.php/registrul-national-al-produselor-biodistructive/

13 *Occupational Exposures and Asthma among Nursing Professionals.* http://www.ncbi.nlm.nih.gov/pubmed/19164328

14 Occupational risk factors among and asthma among health care professionals http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1899286/

Box **4**

### General recommendations on safety use of cleaners

The use of *safer cleaning* products and *less toxic disinfection methods,* as well as the adoption of a *fragrance-free policy* are part of the implementation of an environmentally sustainable and safe cleaning program for health personnel, which improves indoor air quality and significantly reduces impacts on people's health and the environment.

- For each product in use, evaluate whether there is a substitute that reduces the impact on health and the environment by comparing it with those used for the same function.
- Look for cleaning products that meet green chemistry criteria established by third parties.
- Replace the use of floor cloth with microfiber cloths and mops. Microfiber retains particulate matter (dust) and reduces the use of chemicals. Use buckets with a juicer to prevent dirt from being re-deposited in the mop, thus reducing redistribution of dirt during cleaning.
- Use a cleaning chemical dosing system.
- Limit the use of disinfectants. Its excessive use has become a problem for human health, also contributing to the development of antibiotic resistant bacteria. Its use must be handled carefully, identifying the areas that should be disinfected from those that should only be cleaned.
- Use appropriate safety equipment.
- The cleaners must be kept in the original container, with its label and the manufacturer's instructions.
- Do not store cleaners in public access areas and consult the manufacturer's instructions for storage.

## 2.1.3. LABORATORY AND PATHOLOGICAL ANATOMY

Hospital laboratories use a huge variety of chemical substances, including solvents, dyes and reagents, which varies depending on the technology available, the complexity of the hospital and professional practices. Pathological anatomy areas use a smaller variety of substances, but no less dangerous. The problems derived from improper handling within the services, as well as their inappropriate treatment once they become waste make these areas one of the outstanding accounts of the health sector, both due to environmental pollution and chronic exposure of workers to substances that in many cases can be mutagenic, sensitizing or even carcinogenic. The particularity of these areas is that there are few hazardous chemicals for which there are safer alternatives in today's market. Therefore, knowing them, identifying them and giving them safe internal and external management should be a priority.

### a) Xylol

Xylol or xylene is a solvent derived from petroleum or coal tar, used in the vast majority of pathology laboratories for sample processing. It is used in different stages of this processing, thanks to its degreasing and dehydrating power.

It is a central nervous system depressant and can cause dermatitis, headaches, tenderness and fatigue. It is irritating to the eyes and skin, in short exposures. Chronic exposure can cause central nervous system depression, anemia, dry skin, dermatitis, bleeding in the mucous membranes and other effects.

Chronic exposure to inhalation of xylol vapors is a risk in the absence of appropriate safety measures, such as permanent ventilation of the areas where it is used and work under hoods. It is also important to be careful to have only the amount of xylol needed to work in the work area and not accumulate the waste or the new input needed to work for many months.

***Xylol was indicated as being used by one of the interviewed hospitals in pathological anatomy.***

## b) Formaldehyde (40% formol)

Formaldehyde is used in the preservation and processing of samples. It is an irreplaceable substance at present for laboratories and areas of pathological anatomy. Its carcinogenic potential (IARC Group 1) forces you to take the greatest possible precautions in your daily use, which are not always observed in hospitals. It is highly volatile at room temperature, so it is necessary to have active ventilation systems in the processing and sample storage areas that, together with airtight storage systems, ensure compliance with occupational exposure limits established.

**Formaldehyde** ***was indicated as being used by two of the interviewed healthcare facilities, one indicated its use in pathological anatomy.***

Box **5**

### Recommendations for safe use of formaldehyde

It is recommended to have written procedural rules and to have a contingency plan in case of an accident, as well as to train the exposed personnel about their danger and demand the periodic monitoring of the formaldehyde environmental concentration in the pathological anatomy areas and where they are stored. samples. Liquid waste shall not be accumulated in the same place where work is done, or thrown into the sewer system.

## c) Other

**Dyes solutions**: there are several classes, used to make visible particular types of bacteria or cellular structures. Among the most used, are Eosin, May Grünwald solution, Giemsa solution and others such as Methylene Blue. Its danger is not uniform, so the Safety Data Sheets of all of them must be available. They should not be thrown into the sewage system, but accumulate in drums and hire an operator authorized for withdrawal and treatment.

**Potassium cyanide**: it has been replaced in many laboratories by technological updating in hematological counters; the new equipment uses other less dangerous reagents, so in most hospitals it has already been replaced.

**Ethidium bromide**: it is used in molecular biology laboratories to detect, mark and visualize DNA and RNA sequences. It is a mutagenic substance, so it must be replaced by safer alternatives whenever possible, and be handled under strict safety measures. There are safer substitutes in the market. This substance is part of the agarose gel electrophoresis process, where Acrylamide is also used, a substance suspected of being carcinogenic in humans and included in Group 2a of IARC[15].

***Two of interviewed healthcare facilities indicated the use of solutions (May Grünwald, Giemsa, potassium cyanide, ethidium bromide) in the laboratory or pathological anatomy.***

15 IARC Monographs Volume 60. http://monographs.iarc.fr/ENG/Monographs/vol60/volume60.pdf

## 2.1.4. DEVELOPING LIQUIDS

Developing liquids are two products that are used in the development of radiographic plates, which can be manual or automatic. The manual development is a practice still in force, although in decline. This practice exposes personnel and patients continuously to the vapors generated by both the developer and the fixative, contaminating the internal air and often also the water courses.

The composition of both products may vary depending on the manual or automatic development, and the type of automatic processor. These liquids, once their use is exhausted, are transformed into hazardous waste, which must be removed from the establishment by a carrier and operator authorized for this category and taken to treatment for the recovery of residual silver and the elimination of its hazard characteristics.

It is possible to avoid the use of these compounds by fully digitizing the diagnostic imaging services.

***The interviewed healthcare facilities indicated the use of digital radiology services. The advance in the digitalization of images has allowed to lower the costs of the equipment. The analogue radiology supplies, such as radiographic plates, development fluids have higher disposal costs, which are avoided by applying the digital services.***

## 2.1.5. ANESTHETIC GASES

Inhalation anesthetic agents are very volatile chemical agents and central nervous system depressants, which are used to increase the pain sensitivity threshold and eliminate waking state. Whichever gas patients get, they breathe it in — but only about 5% is actually metabolized. The rest is exhaled. And to make sure the gas doesn't knock out anyone else in the operating room, it's sucked into a ventilation system.

So, health workers (delivery room, surgery, recovery rooms) may be exposed to anesthetic gases that are released or escaped during medical procedures. The most commonly used gases include nitrous oxide, halothane, isoflurane, desflurane and sevoflurane. They are a problem due to their danger and the risks that chronic exposure in the operating rooms generates for the health of workers.

The risks from occupational exposure to inhalation anesthetic agents depend greatly on the presence and use of appropriate ventilation systems that produce a sufficient number of renovations, with a minimum of 10 air exchanges per hour in the operating room[16], as well as the monitoring of correct operation and loss control at anesthesia tables. If there are no exposure control systems for staff and patients, all those who work daily in the operating room are considered to be exposed: anesthesiologists and surgeons, health personnel, nurses, surgical instruments, dentists, delivery room staff and all facility service where anesthetic gases are applied. Acute effects of high concentrations include dizziness, vertigo, nausea, fatigue, headache, irritability or depression[17]. Chronic effects on the health of exposed personnel have shown in several investigations an increase in the rates of spontaneous abortions, kidney and liver diseases. The associated pathologies are very diverse, since the chemical agents used are also diverse.

Some researches show that volatile anaesthetic agents account for 5% of a typical hospital's carbon footprint. Per hour of anaesthesia, the agent desflurane is 60 times worse than Sevoflurane. Whilst these two gases work in the same way and have minor differences, switching from Desflurane to Sevoflurane has cut carbon ($CO_2e$) emissions of one hospital from volatile agents by 4.5% (from 5%) to 0.5%[18].

Desflurane is 20 times as powerful in trapping heat in Earth's atmosphere as sevoflurane. It also lasts for 14 years in the atmosphere, whereas sevoflurane breaks down in just one year[19].

16 Borganelli GN, Primosch RE, Henry RJ. Operatory ventilation and scavenger evacuation rate influence on ambient nitrous oxide levels. J Dent Res 1993; 72 (9): 1275-1278

17 http://www.ccohs.ca/oshanswers/chemicals/waste_anesthetic.html

18 https://noharm-europe.org/articles/blog/europe/we-need-talk-about-des

19 https://www.npr.org/sections/health-shots/2019/05/06/716415598/effects-of-surgery-on-a-warming-planet-can-anesthesia-go-green

***The interviewed healthcare facilities indicated that they use sevoflurane as aesthetic gas, as well as $CO_2$, $O_2$, $N_2$. Use of sevoflurane is already a good practice applied by the healthcare facilities, which can contribute to reduction of their carbon footprint.***

Box **6**

### Recommended measures to control exposure

To control the exposure of health personnel to anesthetic gases, some measures can be taken:

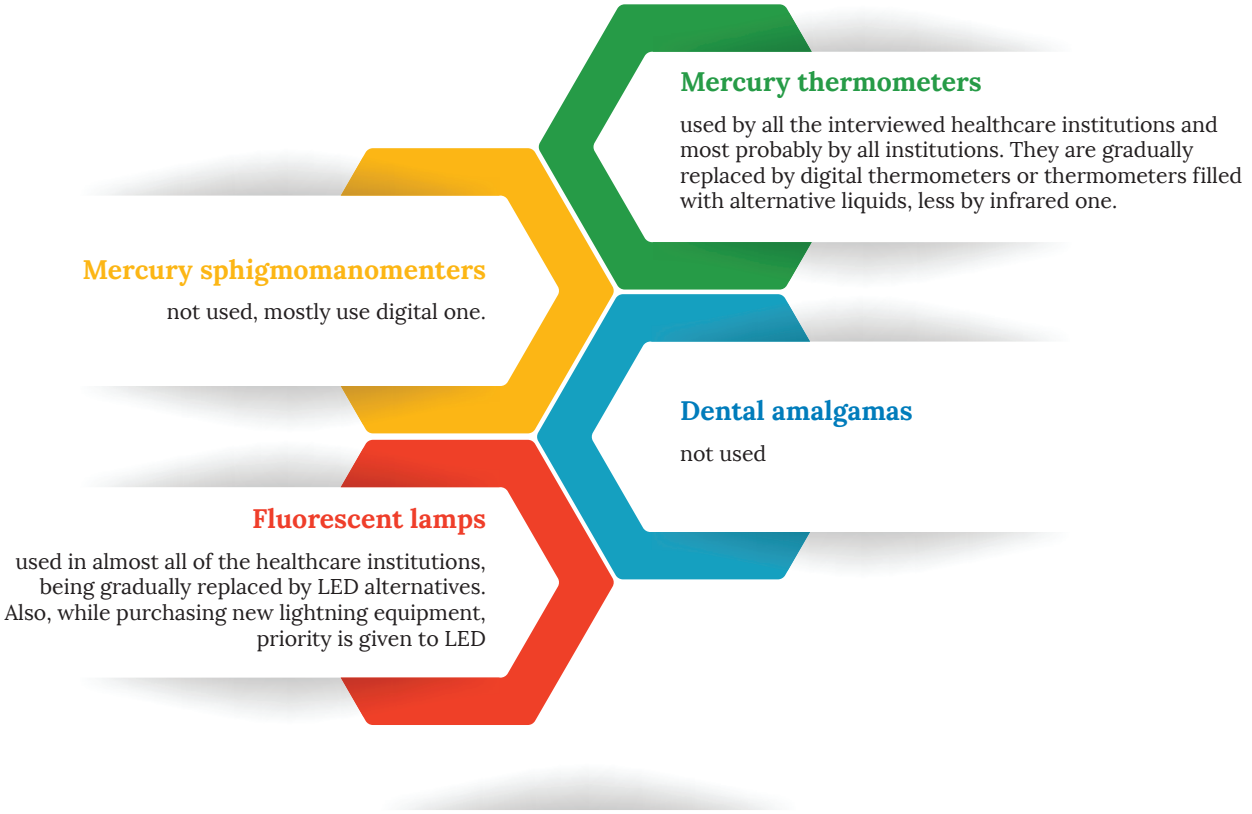
- Have a ventilation system to eliminate the gases that escape from the patient's circuit (making sure there is no table, car or chair object that blocks ventilation in the operating room),
- Proper design of equipment and masks large enough to capture the gases exhaled through the patient's mouth,
- Implementation of preventive maintenance programs,
- Inspection of the cleaning system of waste anesthetic gases and anesthesia systems.

## 2.2. Chemicals present in products used in the healthcare facilities

### 2.2.1. MERCURY

Mercury is a heavy metal that is found in nature in various chemical forms. It is the only metal that in its elemental form is liquid at room temperature. It is a dense, odorless, white-silver liquid. It is used in thermometers to measure body temperature, sphygmomanometers (to measure blood pressure), dental amalgams, fluorescent lamps, batteries, pesticides and paints, among others. Mercury containing thermometers and sphygmomanometers can enter the environment because these devices break easily. If these wastes are not collected and disposed of safely, they pollute the air, water and soil.

Various alternatives are currently available to eliminate the use of medical devices with mercury, such as digital and infrared thermometers and aneroid or digital sphygmomanometers.




### Regulation at national level

- To date, Moldova has undertaken important efforts to facilitate the Minamata Convention implementation, such as conducting mercury release inventories from main sources, adopted the new Waste Law nr 209 from 29 July 2016, that specifically incorporates the Article 58 regarding mercury waste, adopted WEEE regulation nr 212 from 07 March 2018, that introduces EPR principle for the major EEE products, conducted consultations with the national stakeholders on mercury management perspectives on the country.
- According to the Chemicals Law no. 277/2018, the use of mercury in measuring devices and in dental amalgam fillings is prohibited (Art. 17).
- As regards the centralized acquisition of thermometers by the healthcare facilities, they should follow the generic specifications available on the website of the Center for Centralized Health Procurement. the specifications provide for mercury free thermometers and sphygmomanometers.

**Figure 2. Use of mercury as substance by the healthcare facilities and national regulations related to mercury**

## 2.2.2. BISPHENOL A

Bisphenol A (BPA) is an industrial chemical that is primarily used to produce polycarbonate, a clear rigid plastic that is used in a wide variety of everyday consumer products, such as bottles (bottles), reusable water bottles, metal food containers, plastic cutlery and others.

In addition, BPA is used in the production of epoxy resin, which covers the inside of metal food and beverage containers, which is used as a protective film to prevent the migration of metal from the containers. The BPA is also used in thermal paper and self-copying paper.

In health care it is used in tubing, blood oxygenator, dialyzers, intravenous administration set, syringes, catheters, humidifiers, hemodialysis membrane, etc. Several studies have shown that BPA is an endocrine disruptor (ED)[20], toxic, persistent and bioaccumulative. Animal studies demonstrated an increase in

20 Vandenberg et al., 2007, Human exposure to bisphenol A (BPA) Reprod Toxicol 24: 139–177

breast and prostate cancer, decreased sperm count, early sexual maturation in females, increased obesity and type 2 diabetes[21].

The European Union[22] have laws to restrict the use of polycarbonate in bottles.

Several studies have shown that BPA is an endocrine disruptor (ED), capable of interfering with the action of estrogen and estradiol hormone. Studies link high and low levels of BPA exposure with an increase in the rate of cancer development, reproductive disorders (low sperm count, hormonal changes, enlargement of the prostate gland, precocious puberty), neurological and behavioral disorders, cardiovascular diseases, obesity and diabetes[23].

The scientific community has considered migration from medical supplies as an important source of exposure to BPA in humans. BPA has been found in a variety of human tissues and fluids such as placenta, breast milk, urine, blood, and saliva. Once in the body, it is believed that most of the BPA is rapidly transformed in the liver and intestines, from "free BPA" active molecule) to "conjugated BPA" (not active and less likely to have health effects), then removed by urine. However, the transformation of BPA is not completely efficient, and various biomonitoring studies have shown that the general human population is exposed to BPA, including significant internal exposure to free BPA in the body. Moreover, free BPA can be deposited in body fat and slowly released into the bloodstream. A recent study has al so suggested that MBP, a metabolite of BPA, may interfere with estrogens more strongly than BPA.

***The responses from the checklist are different, one of them mentioned that it is not aware if the mentioned medical devices (bottles, polysulfone membranes in hemodialysis, hemodialysis machines) contain bisphenol A. Bottles for newborn are not provided by the public healthcare institutions, except of the private one, which provides glass and plastic bottles, which might contain bisphenol A.***

**Image 2. Ordinary baby feeding bottle that can contain BPA and a BPA free bottle**

21 www.ehhi.org/reports/plastics/bpa_health_effects.shtml

22 Commission Directive 2011/8/EU of 28 January 2011 amending Directive 2002/72/EC as regards the restriction of use of Bisphenol A in plastic infant feeding bottles Text with EEA relevance https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:026:0011:0014:EN:PDF

23 Hugo et al., 2008, Bisphenol A at environmentally relevant doses inhibits adiponectin release from human adipose tissue explants and adipocytes. Environ Health Persp 116: 1642-1647.

Kortenkamp et al., 2010, Combined exposures to anti-androgenic chemicals: steps towards cumulative risk assessment. Int J Androl 33: 463-474.

Li et al., 2010, Relationship between urine bisphenol-A (bisphenol A) level and declining male sexual function. J Androl 31: 500-506

Vandenberg et al., 2007, Human exposure to bisphenol A (BPA) Reprod Toxicol 24: 139–177 Vandenberg et al., 2007, Human exposure to bisphenol A (BPA) Reprod Toxicol 24: 139–177

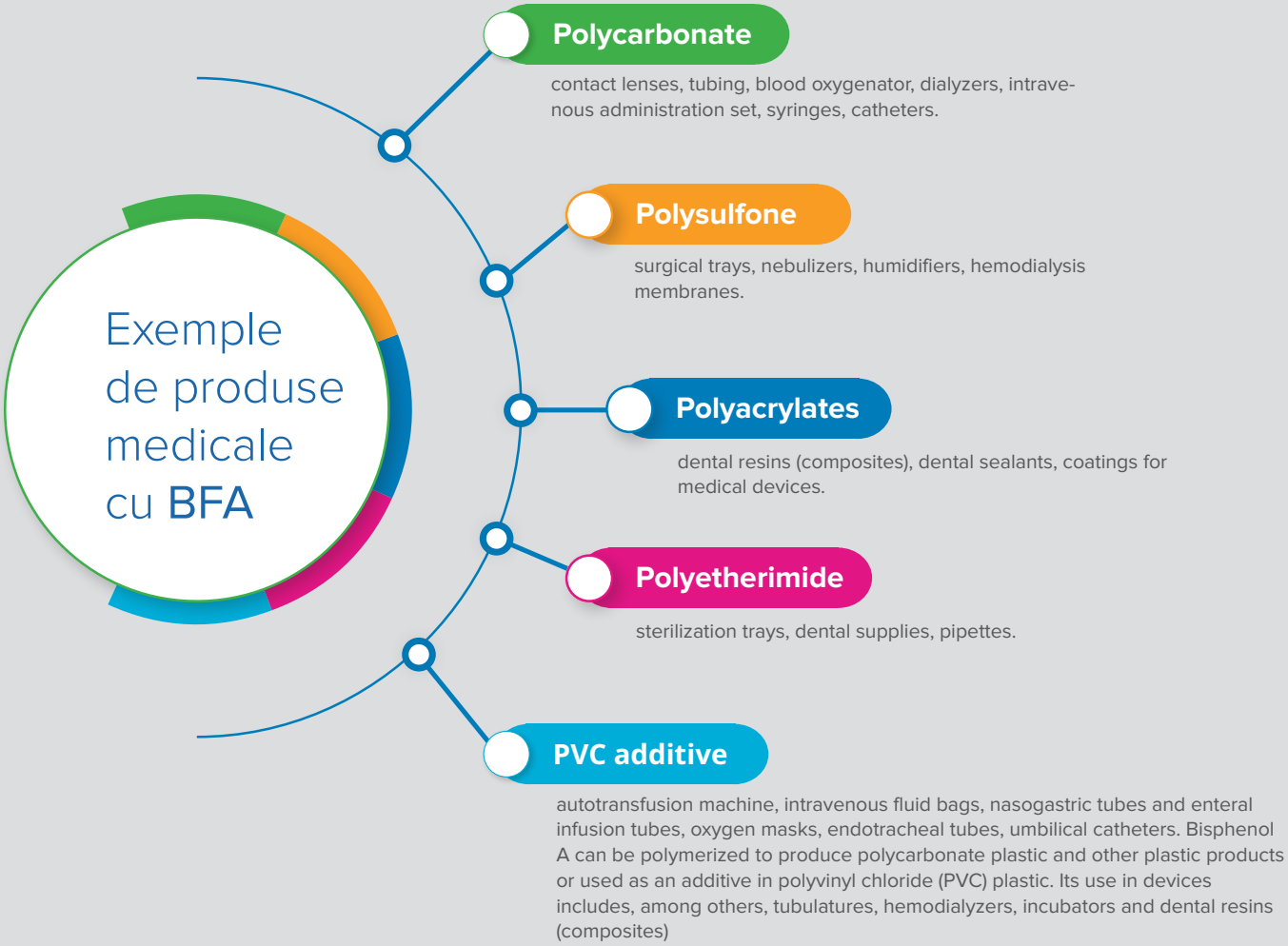



**Figure 3. Examples of medical supplies with BPA**

### 2.2.3. PVC AND DEHP

Polyvinylchloride (PVC) is the most commonly used plastic in medical devices such as intravenous solution bags and tubing. It is also used in gloves, enteral feeding products, intravenous infusion sets, bladder and vascular catheters, among others. PVC or "vinyl" is a synthetic product that is made by polymerizing the vinyl chloride monomer. During manufacturing and when PVC is incinerated, dioxins, a true human carcinogen, are generated.

PVC is a rigid material that requires the addition of a plasticizer to make it flexible, malleable and elastic. Esters of phthalic acid are used to modify the mechanical properties of PVC. There are about 25 different types of phthalate esters, but DEHP (di (2-ethylhexyl) phthalate) is the most commonly used plasticizer in medical products. Most sanitary PVC supplies contain between 20 and 40% of their weight in DEHP; in some, it reaches 80%. The DEHP is released during the use of the product and can migrate directly to the patient's body from the PVC medical devices. Currently, medical associations and government agencies in various countries admit that there are risks, especially for the most vulnerable patients, and propose replacing products containing PVC and DEHP with safer alternatives.

DEHP is an endocrine disruptor (chemical substance capable of altering hormonal balance) and animal studies demonstrate its toxic effect on the male reproductive system. In addition, it is listed as toxic for reproduction and substances of very high concern in European Community legislation on chemicals (REACH). There is concern about the contribution of DEHP in the genesis of hepatotoxicity frequently observed in children receiving total parenteral nutrition

(TPN). In the European Union, when NPT bags were replaced by PVC-free and DEHP-free, the incidence of liver problems (cholestasis) was significantly reduced. A report from the Center for the Evaluation of Human Reproduction Risks of the US National Toxicology Program Regarding the potential effects associated with DEHP, he considered that there are serious concerns that certain intensive medical treatments in boys may result in exposure to DEHP levels that affect the development of the male reproductive system.

***The responses from the checklist revealed the fact that the healthcare facilities are not aware about the presence of DEHP in the consumables used by them. Some consumables that were presented by the healthcare facilities did not contain information on the content of DEHP. It might be assumed that they contain DEHP, as there were no other labels.***

## Box 7

### Examples of DEHP free devices

There is a wide variety of DEHP-free devices available in the market.

**Bags:** PVC-free bags are made of ethylene vinyl acetate (EVA), polyethylene or multilayer polypropylene, are cost effective and technically competitive. Intravenous infusion bags and other PVC-free bags are available in the market. The only exception is the blood bags.

**Tubing:** PVC free tubing is silicone and is available for most medical services.
Gloves: the alternative is those containing nitrile.

### Towards a PVC-free health care

To avoid unnecessary burdens on the health of premature babies, the Vienna Hospital Association began reducing medical devices with PVC in the 1990s and has since implemented a PVC-free policy for its neonatal intensive care units. The criterion covers invasive medical supplies, as well as products that come into contact with the skin of premature babies. In the Neonatal Unit of the Children's Hospital of Glanzig, the elimination of PVC began in 2000 and the content of invasive PVC medical products was reduced from 343 kg and 14.6% by weight in 2001, to 178 kg and 7, 6% by weight in 2010. The estimated price increase was only 9 to 15%[24].

HCWH Europe's Safer medical device database - an open-access database intended to help procurers make informed decisions and purchase medical devices free from phthalates and PVC.9

The database contains over 150 products that are PVC-free or where phthalates have[25] not been intentionally added.

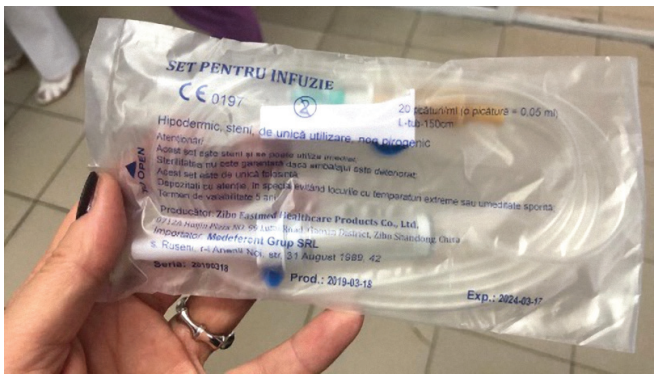



**Image 3. Photo documentary pictures with the PVC containing products taken during visits to medical facilities**

24 Lischka et al., 2011, Substituting phthalates in plastic medical devices: the Austrian experience-PVC-free neonatal intensive care unit of Children's Hospital Glanzing in Vienna. J Environ Sci Eng 5: 1162-1166

25 http://www.safermedicaldevices.org/

## 2.2.4. LATEX

In recent years, latex allergy has become important in health personnel due to the increased use of gloves.

Prevalence studies in health workers indicate that between 6-17% have developed a latex allergy[26]. Latex is also present in probes, elastic bandages, syringe plungers, condoms, etc.

The absorption of latex proteins through the skin is considered the main route of sensitization, responsible for contact dermatitis, whose symptoms include dry, irritated and itchy skin, most often on the hands. It can also cause angioedema (inflammation below the surface of the skin with or without redness), rhinoconjunctivitis (inflammation of the nasal mucosa and eyelid) or bronchial asthma and severe conditions such as anaphylaxis.

Box 8

### Recommendations for use of gloves

- Provide nitrile gloves for employees with allergies.
- Investigate symptoms of allergy and asthma in exposed workers (doctors, nurses, kitchen and cleaning staff).
- Provide gloves with reduced protein and talc to non-allergy sufferers.
- Provide training to workers on latex allergies.
- Have in the institution management guides, operating room cleaning protocols and places of assistance and have latex-free elements to treat allergic patients.
- If you are allergic, avoid touching, using or being near products that contain latex.

***The healthcare facilities indicated the use of latex and PVC gloves, while none of them indicated occurrence of any adverse effects among the personnel (like asthma or allergy)***

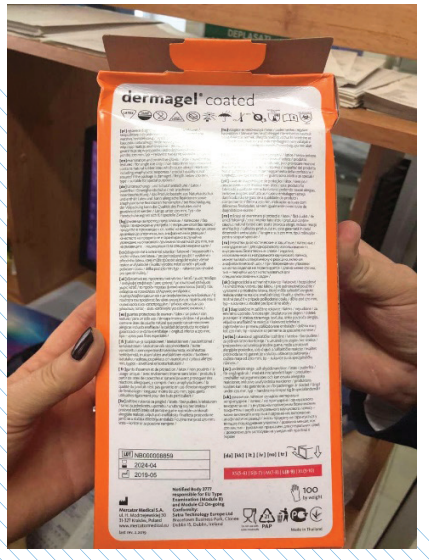



**Image 4. Photo documentary pictures with the latex containing gloves taken during visits to medical facilities**

26 US Department of Health and Human Services. Centers for Disease Control and Prevention. Alert. Preventing allergic reaction to natural rubber latex in the workplace. June, 1997; NIOSH publication, pp 97-135

## 2.2.5. FLAME RETARDANTS

To a wide variety of products made of synthetic material, a group of chemical substances called flame retardants is added to inhibit the ignition and spread of fire. Currently, there are more than 175 different flame retardants available in the world market, which are added to a wide variety of flammable materials such as upholstery foam, insulation, mattresses and pillows, textile products (carpets, upholstery fabrics, curtains), electronics (computers, televisions) and other construction materials.

The flame retardants most used for their low cost and high effectiveness are those that contain bromine, called brominated flame retardants (BFRs). Today, there are more than 75 different types of BFRS that are used in a wide variety of products. Some of the main polybrominated biphenyls (PBB), polybrominated biphenyl ethers (PBDE), tetrabromobisphenol A (TBBPA) and hexabromocyclododecane (HBCD)[27].

BFRs do not degrade easily and have been found to increase their concentration along the food chain. In the past 30 years, levels in humans have doubled approximately every 5 years[28]. They behave like endocrine disruptors (they alter the hormonal balance) and are related to disorders of the immune system, cancer, neurodevelopmental disorders and the behavior and alteration of the thyroid gland.

In health facilities, they can be found in mattresses, pillows, quilts, curtains, carpets, computers and screens, televisions, printers, roof membranes, etc.

***The responses from the checklist revealed the fact that the healthcare facilities assumed the presence of flame-retardants in the mattresses, pillows and other textile products, as their presence was not clearly indicated in the accompanied documentation. One institution noted that it is not aware about this substance.***

Box 9

### Recommendations for reduction of exposure to flame retardants

To reduce exposure to flame retardants, health facilities can implement a purchasing policy that includes:

1) Choose products that comply with flame retardant properties without the addition of flame retardants, if available.
2) Contact the supplier to request information on the chemical composition of the product and choose those that contain flame retardants that have proven to have the least impact on health and safety. Request product labeling.

27 http://www.atsdr.cdc.gov/toxprofiles/tp68.pdf

28 Hites RA. Polybrominated diphenyl ethers in the environment and in people: A meta-analysis of concentrations. Environmental Science & Technology 2004; 38(4): 945-956

| Hexabromocyclododecane | Decabromodiphenyl ether | Hexabromodiphenyl ether and heptabromodiphenyl ether, Tetrabromodiphenyl ether and pentabromodi-phenyl ether | Hexabromobiphenyl |
|---|---|---|---|
| **New industrial chemical under Stockholm Convention** | **New industrial chemical under Stockholm Convention** | **New industrial chemical under Stockholm Convention** | **New industrial chemical under Stockholm Convention** |
| **to be included in the Annex 6 to the Law on waste 209/2016** | **to be indlused in the Annex 6 of the LAe on Waste 209/2016** | **included in the Annex 6 to the Law on waste 209/2016** | **included in the Annex 6 to the Law on waste 209/2016** |
| Exemption for use in:<br>• expanded polystyrene and extruded polysty-rene in buildings | Exemptions:<br>• Parts for use in vehi-cles<br>• Aircraft and spare parts for those aircraft<br>Textile products that require anti-flamma-ble characteristics, excluding clothing and toys<br>• Additives in plastic housings and parts used for heating home appliances, irons, fans, immersion heaters that contain or are in direct contact with electrical parts or are required to comply with fire retar-dancy standards, at concentrations lower than 10 per cent by weight of the part<br>• Polyurethane foam for building insulation | Exemptions:<br>• articles and prepa-rations showing concentrations of hex-abromodiphenyl ether below 0.1% by weight, produced (partly or wholly) on the basis of recycled materials or waste materials prepared for reuse<br>• EEE, according to the requirements referred to in Article 53(3) | prohibitted with no exemtpions |

**Figure 4. Legal provisions regulating flame retardants at national level (approved and draft)**

# Chapter 3

# Waste management practices in the healthcare facilities

## 3.1. Medical waste classification

### DEFINITION AND CLASSIFICATION

According to the provisions of the framework Law on Waste nr. 209/2016 and more particularly the Regulation on medical waste treatment nr. 696/2018, the medical waste are wastes resulting from the medical activity , classified in types according to sub-category 1801 of the Waste List approved by Government Decision no.99 of January 30, 2018. The present classification shall be at force starting with reporting for 2018.

**Table 1.** ***Classification of healthcare waste according to the Government Decision no 99/2018 on approval the list of waste***

| 18 | WASTES FROM HUMAN OR ANIMAL HEALTH CARE AND/OR RELATED RESEARCH |
|---|---|
| 18 01 | wastes from natal care, diagnosis, treatment or prevention of disease in humans |
| 18 01 01 | sharps (except 18 01 03) |
| 18 01 02 | body parts and organs including blood bags and blood preserves (except 18 01 03) |
| 18 01 03* | wastes whose collection and disposal is subject to special requirements in order to prevent infection |
| 18 01 04 | wastes whose collection and disposal is not subject to special requirements in order to prevent infection (for example dressings, plaster casts, linen, disposable clothing, diapers) |
| 18 01 06* | chemicals consisting of or containing dangerous substances |
| 18 01 07 | chemicals other than those mentioned in 18 01 06 |
| 18 01 08* | cytotoxic and cytostatic medicines |
| 18 01 09 | medicines other than those mentioned in 18 01 08 |
| 18 01 10* | amalgam waste from dental care |

There are various types of medical waste generated by healthcare sector.

- **Infectious waste:** waste contaminated with blood and other bodily fluids (e.g. from discarded diagnostic samples), cultures and stocks of infectious agents from laboratory work (e.g. waste from autopsies and infected animals from laboratories), or waste from patients with infections (e.g. swabs, bandages and disposable medical devices);
- **Pathological waste:** human tissues, organs or fluids, body parts and contaminated animal carcasses;
- **Sharps waste:** syringes, needles, disposable scalpels and blades, etc.;
- **Chemical waste:** for example, solvents and reagents used for laboratory preparations, disinfectants, sterilant and heavy metals contained in medical devices (e.g. mercury in broken thermometers) and batteries;
- **Pharmaceutical waste:** expired, unused and contaminated drugs and vaccines;
- **Cyctotoxic waste:** waste containing substances with genotoxic properties (i.e. highly hazardous substances that are, mutagenic, teratogenic or carcinogenic), such as cytotoxic drugs used in cancer treatment and their metabolites;

- **Radioactive waste:** such as products contaminated by radionuclides including radioactive diagnostic material or radiotherapeutic materials; and
- **Non-hazardous or general waste:** waste that does not pose any particular biological, chemical, radioactive or physical hazard.

The major sources of **health-care waste** are both public and private entities as follows:

- hospitals and other health facilities
- laboratories and research centres
- mortuary and autopsy centres
- blood banks and collection services
- nursing homes

## 3.2. Healthcare waste generation rates

The health care system in the Republic of Moldova consists of the complex of various institutions providing healthcare services (hospitals and primary healthcare facilities), laboratory and research institutions.

According to recent data, there are 87 hospitals consisting of 35 district, 10 municipal, 16 MoH national, 16 private, and 10 specialty institutions and having a total of 18138 beds in total, of which 68% are in Chisinau. Primary care facilities consist of 24 family medicine centres, 251 local health centres; 626 doctor's offices and 335 local health offices.

Table 2 summarizes the 2016 waste generation data available for the sector including non-hazardous waste generally managed by the MSW system. Based on this, an estimated 1,620 t of hazardous HCW that requires separate dedicated management.

**Table 2.** ***Overall waste generation from the Healthcare sector (t/year)***[29]

| Types of waste | 2015 | 2016 |
|---|---|---|
| Non-hazardous waste | 34139.8 | 34509.4 |
| Hazardous waste | 1023.5 | 1123.4 |
| Infectious waste | 787.4 | 891.5 |
| Anatomopathological waste | 30.7 | 33.7 |
| Cutter-punching waste | 201.5 | 204.9 |
| Pharmaceutical waste | 17.3 | 13.8 |
| Chemical wastes | 7.9 | 8.1 |
| Radioactive waste | 2.1 | 2.0 |

29 Excerpt on report on implementation of National Waste Management Strategy (approved by GD248/2013, https://www.legis.md/cautare/getResults?doc_id=114412&lang=ro#)

## 3.3. Healthcare waste treatment and disposal

**The Sanitary Regulation on management of the medical waste (GD 696 of 11.07.2018)** sets the regulates the mode of separate collection by types, packaging, labeling, temporary storage, transportation within the manufacturing institutions, treatment, delivery, disposal and recording of waste resulting from medical activity.

More specifically the **treatment and final disposal methods**.

The treatment of medical waste is formulated under the regulation as follows:

The processes and methods used to treat and eliminate waste resulting from medical activity must not endanger public health and the environment and must meet the following requirements:

1) there is no danger to water, air, soil, fauna or vegetation;
2) it does not have a negative impact on the health of the population in the neighboring residential areas;
3) does not produce noise pollution and unpleasant odor;
4) does not affect landscapes or protected areas.

Article 102 defines, that *When choosing the treatment method, the type of waste, the environmental and safety factors, the technological capacities and the provisions of Law no.209 of July 29, 2016 on waste and this Sanitary Regulation are taken into account. (see more details in Annex 3).*

Based on the existing data, the Table 3 provides the distribution of management methods applied to medical wastes in the Republic of Moldova

**Table 3.** ***HCW Hazardous Waste Treatment and Disposal by Method (t/year)***[30]

| Treatment and disposal method | 2015 | 2016 |
|---|---|---|
| Autoclaving | 586.2 | 599.3 |
| Disinfection | 517.6 | 581.4 |
| Incineration | 176.9 | 160.1 |
| Outsourcing (typically land disposal) | 125.5 | 185.3 |
| Burial in cemeteries | 29.6 | 26.3 |
| Composting (associated with animal waste disposal) | 63.0 | 59.6 |
| **Total** | **1,498.8** | **1,612.0** |

According to this information, healthcare waste management methods involves 345 t is to be subject to sub-standard incineration (160 t/year) or open landfill burning (185.3 t/year) primarily off site by contracted service providers, while the majority (1,140 t) is treated at source largely with outdated non-combustion techniques.

In terms of on-site practices 68% on healthcare institutions reported that they operated separate collection networks for infectious waste and their processing prior to disposal.

Overall, only 50% of 2,640 reporting health care facilities had formal waste management plans in place with significant variation between public (28%) and private (78%) facilities.

30 Excerpt on report on implementation of National Waste Management Strategy (approved by GD248/2013, https://www.legis.md/cautare/getResults?doc_id=114412&lang=ro#)

## 3.4. Expired medicines. Cystostics

A separate point of conducted study was management of expired medicines.

The meeting held with the representatives of the Medicines and Medical Devices Agency (25.10.2019) revealed that the main treatment method for expired medicines is their encapsulation (Governmental Decision 696/2018, point 114). The expired pharmaceuticals are collected in a centralized way by the biggest medicine warehouses, being received from the hospitals or pharmacies.

Incineration is the second alternative for waste treatment being considered by the Agency. Along with the adoption of the amendment to the Art. 17 of the Law on waste 209/2016[31], which allows incineration and provides for adoption of the secondary legislation regulating incineration, this method will be applied.

***Expired medicines from healthcare facilities***

From interviews conducted with healthcare facilities and confirmed by CAPCS the new centralized system for healthcare procurements provides efficient system of purchasing, distribution and use of pharmaceuticals, that overall minimizes the possibility of expiration of those.

Yet, there are also cases of medicines donations and deliveries of medications and vaccines by part of national or state programs over which the hospital has no control. In this case, some of donated quantities are overestimated.

***Expired medicines from population***

So far, there is no collection infrastructure for collecting expired pharmaceuticals and waste medical equipment from population. However, the Medicines and Medical Devices Agency noted that it intends to establish a collection network among pharmacies. It has also identified a storehouse and shall initiate the procedure for authorization of the collection process and of the storehouse.

## 3.5. Costs for healthcare waste management

Data on actual annual budget expenditures investment on health care waste management is limited. The available data is only under the public healthcare system. The generation rate varies depending on the range of services provided by the healthcare institution, number of beds and level of equipping.

An approximate estimation was done in one of the visited medical institution, and denotes, at average costs for the municipal waste disposal is of approximately 80 MDL/$m^3$ (USD$4.7/$m^3$). The hazardous waste management *(treatment of the cutting and stinging and infectious waste)* is being mainly externalized, the average cost for this treatment is of 12-15MDL/kg (USD$0.8/kg).

## 3.6. Results of the assessment using checklist

One of the objectives of the checklist was to assess the healthcare waste management practices, in particular the application of the Sanitary regulation on medical waste treatment no 696/2018 and the treatment operation applied.

Overall, the interviewed healthcare institutions are complying with the provisions of the mentioned regulation, of which the following can be mentioned:

- have adopted a waste management plan;
- keep records of generated waste, according to the GD 9/2019 and 501/2018;
- the medical devices waste are collected separately;
- there are available dedicated spaces for temporary storage of waste within facilities.

One of the interviewed facilities noted that they do not possess waste treatment capacities and the infectious waste, and the waste is handed over to an authorized company. Another two facilities noted that they have their own treatment capacities: one is using autoclaving and another – chemical treatment. After the treatment operation is applied, the waste is disposed along with the municipal one.

31 http://www.legis.md/cautare/getResults?doc_id=117948&lang=ro

# Chapter 4

## Externalization of the services by healthcare sector involving chemicals of concern

## 4.1. Hazardous waste management

According to the provisions of the Sanitary regulation on medical waste treatment nr. 696/2018, **treatment of hazardous waste can be outsourced**, by handing over, on the basis of the service contract, to the authorized economic operators in accordance with art. 25 of Law no. 209 of July 29, 2016 regarding waste by the authorities empowered by art. 24 of the aforementioned law for the treatment of waste resulting from the medical activity on types of waste, except for the infectious waste identified with the code 18 01 03 * in the annex to this Health Regulation, produced in the microbiological laboratories and / or from patients with highly communicable diseases, which requires treatment at the source of generation.

In all territories, there are reported provided conditions for separation at source of the waste resulting from the medical activity by categories and the temporary storage in specially designated spaces. The healthcare facilities also reported the availability of consumables for segregation of waste by categories (yellow and black bags, eco-boxes, etc.).

Outsourcing of waste treatment services, including infectious and sharps, were reported by 32 territories (86.5%), while the method of treating infectious waste by immersion in chlorine solutions and their incineration in open air or improvised installations persist in healthcare facilities from rural areas.

Based on authorization on waste management, currently there are several companies, that specifically address the healthcare waste stream.

**Table 4.** ***Authorized companies that address the healthcare waste*** [32]

| Company name | Authorization | Validity |
|---|---|---|
| S.R.L. „UISPAC”<br>str. N. Milescul Spătarul, nr. 75<br>mun. Chișinău,<br>tel. 068-160-030<br>022-35-01-76 | Authorization no. 064/2015 on collection, transport and treatment though autoclaving of waste from medical activities. | 27 October 2015<br>27 October 2020 |
| S.R.L. „Ecostat”<br>**Şos**. Munceşti, nr. 607<br>mun. Chișinău,<br>tel. 079-520-116 | Authorization no. 071/2016 collection, transport and treatment by autoclaving (sterilization) of medical waste. | 27 May 2016<br>27 May 2021 |
| Production Cooperative<br>„Entuziast”<br>str. Florilor, nr. 1,<br>mun. Chișinău,<br>tel. 069-986-117,<br>022-24-34-05 | Authorization no. 058/2015 on the collection and recovery of waste and scrap from the processing of precious metals. | 29 January 2015<br>29 January 2020 |
| S.R.L. „TRISUMG”<br>str. Sanatoriului, nr. 2/67,<br>mun. Cahul,<br>tel. 0299-4-17-77 | Authorization no. 061/2015 regarding the processing of rubber and plastic waste by the pyrolysis method. | 04 June 2015<br>04 June 2020 |
| S.R.L. „SĂNĂTATEA”<br>str. 31 August nr. 62,<br>mun. Străşeni/<br>str. Mihai Viteazul, nr. 257<br>mun. Străşeni<br>tel. 0237-4-33-89,<br>069115440 | Authorization no. 08/2018 regarding the collection, transport and temporary storage of ferrous and non-ferrous metal scrap and waste. | 25 June 2018<br>25 June 2023 |

32 List of authorized companies are published and regularly update by the Environmental Agency www.mediu.gov.md

## 4.2. Laundry within healthcare facilities

Laundry in a health-care facility may include bed sheets and blankets, towels, personal clothing, patient apparel, uniforms, scrub suits, gowns, and drapes for surgical procedures. Although contaminated textiles and fabrics in health-care facilities can be a source of substantial numbers of pathogenic microorganisms, reports of healthcare associated diseases linked to contaminated fabrics are so few in number that the overall risk of disease transmission during the laundry process likely is negligible. Use of current control measures should be continued to minimize the contribution of contaminated laundry to the incidence of healthcare associated infections.

The most common definition of the contaminated laundry as "laundry which has been soiled with blood or other potentially infectious materials or may contain sharps."

The purpose of the laundry portion of the standard is to protect the worker from exposure to potentially infectious materials during collection, handling, and sorting of contaminated textiles through the use of personal protective equipment, proper work practices, containment, labelling, hazard communication, and ergonomics.

### EPIDEMIOLOGY

According to OSHA study[33], the heaviest bacterial load is found on the sleeves and the pockets of these garments; the organisms most frequently isolated were *Staphylococcus aureus*, diphtheroids, and *Acinetobacter* spp. Presumably, the sleeves of the coat may make contact with a patient and potentially serve to transfer environmentally stable microorganisms among patients.

### IN-HOUSE LAUNDRY SERVICES

Laundry services for health-care facilities are provided either in-house or by contracting off-site commercial laundries

Some of interviewed healthcare facilities poses their own laundry premises, other externalize them. When externalizing the services, that is the current practice applied recently by the majority of the healthcare facilities, the contract is awarded to the laundry company, specialized in medical items laundry, that respects the set of minimum criteria for mechanical, thermal and chemical treatment, such as temperature, bleaching and ironing specifications.

Box **10**

#### Rules for setting of the laundry facility inside of a healthcare institution

The laundry facility in a health-care setting should be designed for efficiency in providing hygienically clean textiles, fabrics, and apparel for patients and staff. A laundry facility is usually partitioned into **two separate areas** – a "dirty" area for receiving and handling the soiled laundry and a "clean" area for processing the washed items.[34] To minimize the potential for recontaminating cleaned laundry with aerosolized contaminated lint, areas receiving contaminated textiles should be at negative air pressure relative to the clean areas.

**Laundry areas should have handwashing facilities readily available to workers.**

Laundry workers should wear appropriate personal protective equipment (e.g., gloves and protective garments) while sorting soiled fabrics and textiles. Laundry equipment should be used and maintained according to the manufacturer's instructions to prevent microbial contamination of the system. Damp textiles should not be left in machines overnight.

33 Loh W, Ng VV, Holton J. Bacterial flora on the white coats of medical students. J Hosp Infect 2000;45:65–8

34 Greene VW. Microbiological contamination control in hospitals: part 6 — roles of central service and the laundry. Hospitals JAHA 1970;44:98–103.

## COLLECTING, TRANSPORTING, AND SORTING CONTAMINATED TEXTILES AND FABRICS

The laundry process starts with the removal of used or contaminated textiles, fabrics, and/or clothing from the areas where such contamination occurred, including but not limited to patients' rooms, surgical/operating areas, and laboratories. Sorting or rinsing contaminated laundry at the location where contamination occurred is not allowed.

**Contaminated textiles and fabrics** are placed into bags or other appropriate containment in this location; these bags are then securely tied or otherwise closed to prevent leakage. Single bags of sufficient tensile strength are adequate for containing laundry, but leak-resistant containment is needed if the laundry is wet and capable of soaking through a cloth bag. Bags containing contaminated laundry must be clearly identified with labels, color-coding, or other methods so that health-care workers handle these items safely, regardless of whether the laundry is transported within the facility or destined for transport to an off-site laundry service. Contaminated textiles and fabrics in bags can be transported by cart.

Health-care facilities should determine the point in the laundry process at which textiles and fabrics should be sorted**. Sorting** after washing minimizes the exposure of laundry workers to infective material in soiled fabrics, reduces airborne microbial contamination in the laundry area, and helps to prevent potential percutaneous injuries to personnel. Sorting laundry before washing protects both the machinery and fabrics from hard objects (e.g., needles, syringes, and patients' property) and reduces the potential for recontamination of clean textiles.

## PARAMETERS OF THE LAUNDRY PROCESS

Fabrics, textiles, and clothing used in health-care settings are disinfected during laundering and generally rendered free of vegetative pathogens (i.e., hygienically clean), but they are not sterile. Laundering cycles consist of flush, main wash, bleaching, rinsing, and souring.

Box **11**

### Parameters of the laundry process

The antimicrobial action of the laundering process results from a combination of mechanical, thermal, and chemical factors. Dilution and agitation in water remove substantial quantities of microorganisms. Soaps and detergents function to suspend soils and also exhibit some microbiocidal properties. Hot water provides an effective means of destroying microorganisms. A temperature of at least (71°C) for a minimum of 25 minutes is commonly recommended for hot-water washing. Water of this temperature can be provided by steam jet or separate booster heater. The use of chlorine bleach assures an extra margin of safety. Chlorine bleach becomes activated at water temperatures of (57.2°C–62.7°C. The last of the series of rinse cycles is the addition of a mild acid (i.e., sour) to neutralize any alkalinity in the water supply, soap, or detergent. The rapid shift in pH from approximately 12 to 5 is an effective means to inactivate some microorganisms. Effective removal of residual alkali from fabrics is an important measure in reducing the risk for skin reactions among patients.

Laundry workers should wear appropriate personal protective equipment (e.g., gloves and protective garments) while sorting soiled fabrics and textiles. Laundry equipment should be used and maintained according to the manufacturer's instructions to prevent microbial contamination of the system. Damp textiles should not be left in machines overnight.

Cleaned wet textiles, fabrics, and clothing are then dried, pressed as needed, and prepared (e.g., folded and packaged) for distribution back to the facility. Clean linens provided by an off-site laundry must be packaged prior to transport to prevent inadvertent contamination from dust and dirt during loading, delivery, and unloading. Functional packaging of laundry can be achieved in several ways, including

a. placing clean linen in a hamper lined with a previously unused liner, which is then closed or covered
b. placing clean linen in a properly cleaned cart and covering the cart with disposable material or a properly cleaned reusable textile material that can be secured to the cart; and
c. wrapping individual bundles of clean textiles in plastic or other suitable material and sealing or taping the bundles.

### SPECIAL LAUNDRY SITUATIONS

Some textile items (e.g., surgical drapes and reusable gowns) must be sterilized before use and therefore require steam autoclaving after laundering.

### SURGICAL GOWNS, DRAPES, AND DISPOSABLE FABRICS

Many interviewed hospitals mentioned the preferable use of disposable fabrics instead of reusable.

## 4.3. Integrated Pest Management

Pesticides[35] are toxic substances created to kill or repel pests. The use of pesticides in health facilities exposes patients, workers and visits to these toxic chemicals through inhalation, ingestion or absorption. They are used in various areas, the most common being waiting rooms, corridors, offices, kitchen, patient rooms, as well as use in gardens. Older people, chemically sensitive individuals, pregnant women, newborn and children are especially vulnerable to their toxic effects.

Chronic exposure to low doses of some pesticides can cause adverse effects, such as problems in the central nervous system, developmental delay, cancer, impaired immune and endocrine systems. The effect on human health of exposure to pesticides depends on a number of factors, such as the type of pesticide and its toxicity, the amount or dose of exposure, the duration, the time of exposure and the route by which it occurred. Epidemiological studies have described the statistical relationships between prenatal and children's exposure to pesticides at low doses and increased pregnancy loss and congenital malformations.

Since the first synthetic pesticides were introduced in the early '40s, their overall consumption has grown remarkably. Once released into the environment, they can contaminate rivers, groundwater, air, land and food.

***The interviewed healthcare facilities indicated that the pest control is conducted periodically by specialized companies, which use of chemicals approved by the Ministry of Health, Social Protection and Labour. In addition, the IPM methods are applied, where appropriate, however they are not used as the basic method.***

Box **12**

### Integrated Pest Management

The method for pest control, called Integrated Pest Management (IPM), eliminates or greatly reduces the use of these dangerous pesticides. MIP is a proposal that focuses on the prevention and management of the pest problem (both inside and outside of health facilities) through less toxic methods, such as better sanitation, maintenance of structures, mechanical and biological controls and cultural practices. The IPM is focused on preventing the problem of pests by reducing or eliminating food, water or habitat sources, blocking the entry of pests into buildings and keeping plants and soil in healthy conditions. Chemical pesticides are used as the last alternative and preference is given to the least toxic to fulfill this function. On the rare occasions when a pesticide is used, staff, patients and the public should be widely notified.

35 According to the Law on chemicals 277/2018, the pesticides are divided in two groups:
- pesticides utilized as phytosanitary products (PPP);
- other pesticides, as biocide products and disinfectants, insecticides and parasiticide

# Chapter 5

## HealthCare waste management reporting

According to Law on Waste nr. 209/2016, articles 32 and 33 specify the waste evidence and reporting. The same provisions regarding the obligatory reporting on generation of the medical waste is included under the Sanitary Regulation on Medical Waste Management nr. 696/2018. The reporting shall be done online, on yearly basis by introduction of the data within the Waste Management Automatic Information System (WM AIS, in Romanian it is *Sistemul informațional automatizat Managementul deşeurilor* – SIA MD)

WMIAS - represents the totality of software and hardware products intended for information collection, storage and processing in order to create the information resource on waste named the 'Waste Management' Register. It includes the events related to the economic life cycle, the documents accompanying this cycle, including the import and export of waste, waste producers and certified business entities, as well as the automation of the business-processes of subjects involved in the waste chain and the submission of waste chain information to the public authorities, individuals and legal entities through the departmental portal.

The formats and templates for the Waste reporting are set in Instruction on the recording and reporting of waste data and information and their management (Gov. Decision nr. 501 from 29.05.2018). According to the Decision the data will be reported annually until 30th April of the following year. The responsibility for the quality of data is put on a subjects reported data. The reports are coming out from data recorded by responsible subjects, which are obliged to keep the chronological (at least monthly) records of the quantity, nature and origin of the waste generated / received on the same site, completing a separate form for each waste category generated / received.

Waste management coding is according to the Annex 1 and Annex 2 of the Law on Wastes No 209/2016. Y-codes are the codes used in Basel Convention materials.

Healthcare facilities, as waste generators must report on waste resulting from medical activity and waste management is transmitted annually to the Environmental Agency, through the automated information system "Waste Management" (SIAMD), in accordance with article 33 of Law no.209 of July 29, 2016 on waste.

In accordance with the Government Decision no 501/2018 on approval de Instruction for waste records keeping and reporting of information on the waste management, the healthcare facilities **shall be registered in the WMAIS** and report annually the quantity of infection waste and their management.

# Chapter 6

## Findings and follow up

- Overall, the public procurement legislation in the Republic of Moldova establishes a framework for application of sustainable procurements, being consistent with the EU and international good practice; however enforcement capacity should be improved.
- The contracting authorities are provided with the necessary legal framework to include sustainability criteria at all stages of public procurement, including within clauses of the procurement contract;
- As regards the healthcare sector, the principles of sustainable procurement are not fully implemented. The procurement decisions are still based on price-only criteria and less on product life-cycle impacts - from sourcing to manufacturing, product delivery and end-of-life management. Environmental criteria, particularly avoiding use of chemicals of high concern has not been applied so far. The Center for Centralized Health Procurement is hesitant and concerned towards implementation of sustainable procurements, as it might imply the increase in costs, create unfair e competition for suppliers , or even lack of offers;
- The healthcare facilities awareness about the sustainable procurements needs to be improved. The national expert's team noted that for some categories of medical devices (mercury thermometers and sphygmomanometers) or consumer goods, such as mercury lamps, there is a tendency to replace them with less toxic or more efficient alternatives, due to legal restriction adopted by Waste Law 2009/2016,
- The healthcare facilities can set some specific requirements for some goods and services to be purchased by the Center, however, at the final stage of centralized procurements that requirements not always take into account, due to center's afore mentioned concerns;
- As for chemical products of concern used in disinfection, sterilization and cleaning (glutaraldehyde, ethylene oxide, formaldehyde, hypochlorite, xylol,) that are used by healthcare facilities in day by day activity, the awareness about the risk they pose is high. For some of them there are available alternatives (glutaraldehyde), while for others there should be applied precautionary measures. The expert's team consider that relevant guidance should be developed and provided to key stakeholders.
- In radiology, the healthcare facilities noted the use of the digital one, which does not involve generation of hazardous waste. The expert's team welcomed this approach.
- The indicated anesthetic gases used by healthcare facilities, are the one which proved to be less harmful from environment point of view (in particular with regards to GHG emissions). The expert's team welcomes this approach and encourage the Ministry of Health, Social Protection and Labour to apply this practice for other hospitals.
- There are some hazardous chemicals, whose negative impact is less known by healthcare facilities, and which can be found in products used daily in healthcare sector for service provision, but also in such items as furniture, construction materials or hospital buildings, such as PVC, bisphenol A, DEHP or flame inhibitors. The expert's team consider this issue as priority one and will recommend a further investigation of use PVC, bisphenol A, DEHP containing products used in health care sector.
- Healthcare waste management corresponds to the legal and regulatory requirements; the healthcare facility which does not have its own treatment capacities, hand over the infections waste to the authorized economic operators;
- The expired medicines are handed over to the Medicines and Medical Devices Agency, which treat them in accordance with the Sanitary Regulation GD 696/2018;
- Medicines and Medical Devices Agency is undertaking efforts to improve the management of expired medicines and is looking forward to set-up a collection system for population and to treat them by incineration, according to the Waste Law 209/2016. The expert's team recommend to take into consideration other medical waste such as used thermometers (Hg containing), medical devices, that should be collected as well from the consumers.
- Hospitals and health systems have the moral responsibility and social obligation to make responsible decisions that guarantee both human and environmental health, as well as social justice throughout their entire supply chain. There is a great opportunity for the healthcare sector to substitute medical devices with safer alternatives through procurement practices and build a national healthcare sector that truly does no harm.
- Implementing sustainable procurement practices in healthcare provides environmental and financial benefits for the procuring organisation and contribute to greater patient and employee safety, and social well-being.

# Chapter 7

## Recommendations

- Developing collaborative approaches among stakeholders involved in healthcare procurement to tackle issues such as life cycle approach and use of the best price-quality ration as Most Economically Advantageous Tender (MEAT);
- Developing additional consistent and transparent practices to ensure the sound procedures on procurement and monitoring of healthcare products;
- Investigating the market on chemicals of concern's available alternatives and piloting of the replacement practices within healthcare institutions *(for example substitution of disinfectant glutaraldehyde with safer alternative (for instance peracetic acid), substitution of the PVC containing medical consumables within the neonatal intensive care units (NICUs), maternity departments, and pediatrics);*
- Engaging partnership on receiving the clinical/carer's and patient's association input in the procurements;
- Training of healthcare staff on safety data sheets and personal protection measures regarding use and manipulation of the chemicals of high concern;
- Raising awareness and creating partnerships to share best practice, training /knowledge & capacity building;
- Inclusion in the tender documentation of green procurement criteria and considering the guidelines for procurement of safer medical devices (see point 8.1);
- Including within the tender specification documents the provisions related to avoidance of restricted/prohibited chemicals and other compounds (such as HMs, POPs, flame retardants, etc) and energy consumption requirements within the purchased items (according to provisions of Law nr 277/2018 on chemicals, Law 209/2016 on waste, Law on the labeling of products with energy impact no. 44/2014, GD No. 856/2016. (see point 8.2).

## 7.1. Guidelines for the procurement of safer medical devices – tender preparation and contract monitoring

### A. PRE-TENDER PHASE

1. Develop a list of hazardous substances to avoid, that initiators and procurers can easily consult. Having a comparative list of certifications and labels is equally essential. Health systems should be ambitious in their scope; implement the precautionary principle and go beyond currently restricted substances.
2. When performing market research and market consultation, careful documentation should be kept (as required by law) to avoid any conflict of interest and/or unfair competition.
3. Engage with manufacturers to better understand the feasibility and availability of products to meet newly defined environmental and social criteria.
4. Ensure that each bidder is fully informed about the weighting given to the different criteria (e.g. price, technical characteristics, and environmental and social aspects).

### B. TENDER PUBLICATION

The tender should be simple, clear, and specify:

1. Buyers' needs (e.g. need for safer alternatives and associated employee training).
2. Suppliers' eligibility and evaluation criteria (i.e. "value for money", life cycle assessment, environmental footprint, occupational health and safety, and social considerations).
3. Contract provisions (i.e. timeframe, monitoring, penalties for breach, etc.).
4. Provisions regarding the possibility to test the products for compatibility and maintenance (e.g. compatibility with disinfectants already purchased or in use).

### C. SELECTION OF SUPPLIERS

1. If none of the bids meet your criteria, engage with the closest competing suppliers to understand their challenges and find a consensus on the criteria, engaging an innovation procurement approach if needed.

### D. IMPLEMENTATION AND MONITORING

1. Train staff to ensure the appropriate use and disposal of new devices.
2. Compare the performance of alternatives with the expected outcomes through audits and site visits throughout the duration of the contract. Maintain a constant dialogue with suppliers to ensure the quality and correct implementation of the framework agreements.
3. To reduce costs, consider partnering with other organisations using the same supplier, this can avoid duplication of work and time-consuming exercises. Collaborate with other organisations in administering a survey to common suppliers to identify any risks. Share your results and provide feedback, or introduce corrective actions.
4. Engage with environmental and human rights NGOs working on the ground, particularly in low and middle-income countries where production takes place. Also regularly check local news outlets for information regarding environmental risks and working conditions.
5. In the case of a breach of contract, depending on their gravity, there are corrective actions that can be taken to improve the situation before terminating the contract. When following up with suppliers, provide feedback and suggest areas for improvement, allowing them the appropriate amount of time to implement such recommendations and meet expectations.

## 7.2. Recommendations of legal provisions be used as benchmark for green criteria for products and suppliers

| Type of legal requirement | Reference to the legislation | Criteria that can be applied |
|---|---|---|
| For products – chemical substances in products | **Law on waste 209/2016** | |
| | **Art. 50. Waste Electrical and Electronic Equipment** | |
| | Alin (3) To protect human health and the environment, and to prevent the formation of hazardous waste, the following products may not be placed on the market: electrical and electronic equipment exceeding the maximum concentration of 0.1% by weight of mercury, lead, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ether and 0.01% of cadmium, except for the equipment for which exceptions are established according to the regulations approved by the Government | the purchased EEE and batteries& accumulators shall correspond to the requirements related to presence/ concentration of certain hazardous chemicals |
| | **Art. 49. Waste Batteries and Accumulators** | |
| | Alin (5)To protect human health and the environment, and to prevent the formation of hazardous waste, the following products may not be placed on the market:<br>a) all batteries or accumulators, whether or not incorporated into appliances, that contain more than 0.0005% of mercury by weight;<br>Alin (7) The prohibition provided for in para. (6)(a) shall not apply to button cells with a mercury content of no more than 2 % by weight. | |
| | **Art. 53. Persistent Organic Pollutants Stocks and Waste** | |
| | To protect human health and the environment, and prevent the formation of hazardous waste – marketing and using substances listed in the in Annex 6 (Section 1), either individually or in preparations or as constituents of articles shall be prohibited | The purchased articles shall not contain certain POPs. |

| | | |
|---|---|---|
| | **Article 54. Packaging Waste** | |
| | (6) To protect the environment and human health and prevent waste production, including hazardous waste, the packaging shall follow these essential requirements to the concentration of heavy metals:<br>1) essential requirements specific to manufacturing and composition of packaging:<br>a) packaging shall be so manufactured that the packaging volume and weight be limited to the minimum adequate amount to maintain the necessary level of safety, hygiene and acceptance for the packed product and for the consumer;<br>b) packaging shall be designed, produced and commercialized in such a way as to permit its reuse or recovery, including recycling, and to minimize its impact on the environment;<br>c) packaging shall be so manufactured that the presence of noxious and other hazardous substances and materials as constituents of the packaging material or of any of the packaging components is minimized with regard to their presence in emissions, ash or leachate when packaging or residues from management operations or packaging waste are incinerated or landfilled.<br>2) essential requirements specific to the reusable nature of packaging:<br>a) the physical properties and characteristics of the packaging shall enable a number of trips or rotations in normally predictable conditions of use;<br>b) possibility of processing the used packaging in order to meet health and safety requirements for the workforce,<br>c) fulfil the requirements specific to recoverable packaging when the packaging is no longer reused and thus becomes waste.<br>3) essential requirements specific to the recoverable nature of packaging:<br>a) packaging shall be manufactured in such a way as to enable the recycling of a certain percentage by weight of the materials used into the manufacture, when it becomes waste. This percentage may vary, depending on the type of material that the packaging is composed of.<br>b) packaging shall be manufactured in such a way as to make it recoverable in the form of energy recovery, when it becomes waste, so as for the waste processed for the purpose of energy recovery to have a minimum inferior calorific value to allow optimization of energy recovery.<br>c) packaging shall be manufactured in such a way that, when it becomes waste and it is treated for composting, to be biodegradable enough;<br>d) biodegradable packaging waste shall be of such a nature that it is capable of undergoing physical, chemical, thermal or biological decomposition such that most of the finished compost ultimately decomposes into carbon dioxide, biomass and water;<br>4) the sum of concentration levels of lead, cadmium, mercury and hexavalent chromium present in packaging or packaging components shall not exceed 100 ppm by weight, except for packaging entirely made of lead crystal glass containing lead. | the packaging of the purchased goods shall correspond to the requirements related to composition, reusable and recoverable nature, concentration of heavy metals |
| | **Law on chemicals 209/2016** | |
| | **Article 17. Prohibitions and restrictions for certain substances and mixtures** | |
| | (2) In the context of the para. (1) of this Article and in order to implement the international treaties to which Moldova is a party, it is prohibited the manufacture, place on market and use **mercury** and its compounds in:<br>1) medical thermometers;<br>2) other measuring devices intended for sale to the general public, such as:<br>a) manometers,<br>b) barometers,<br>c) sphygmomanometers,<br>d) thermometers, other than medical thermometers | the medical devices shall be mercury free |

| | | |
|---|---|---|
| | 3) measuring devices intended for professional and industrial use, such as:<br>a) barometers;<br>b) hygrometers;<br>c) manometers;<br>d) sphygmomanometers;<br>e) deformation measuring devices used in plethysmographs, tensiometers, thermometers and other non-electrical thermometric applications.<br>The restriction shall also apply to devices which are placed on the market empty if intended to be filled with mercury.<br>4) dental amalgams | |
| | **Law on the labeling of products with energy impact no. 44/2014** | |
| **products** – energy efficiency | **Article 10. Responsibilities of the economic agents**<br>The economic agents that place products on the market that fall under the scope of the present law have the following responsibilities:<br>a) provides a label and a product sheet in accordance with the provisions of this law;<br>b) delivers to the distributors, free of charge, the labels and product sheets;<br>c) include a product sheet in all brochures about energy impact products delivered. If the trader does not offer brochures about the product, he / she will provide the sheets together with another document supplied with the product;<br>d) complete the labels and records they provide with accurate information, for which they bear responsibility;<br>e) make available to the supervisory and control bodies the technical documentation of the product for the last 5 years from the manufacture of the last product concerned.<br>f) display the labels in a visible, legible way and include the record in the product brochure or other documents accompanying the product when it is sold to the end users;<br>g) each time when they exhibit for sale, rent or distribution a product that falls within the scope of the present law, it displays the corresponding label;<br>h) the information on the label or on the record does not fall under the legislation on the protection of copyright and related rights. | The household appliances and other products with energy impact shall be accompanied by certain documents. |
| **For products** – ODS | **GD No. 856 from 13.07.2016 on the approval of the Program for the phased suppression of halogenated hydrochlorofluorocarbons for the years 2016-2040 and the Action Plan for its implementation in the years 2016-2020** | |
| | Presents the schedule of phased suppression of hydro chlorofluorocarbons in the refrigeration and air conditioning sector for 2016-2040. | |

| | | |
|---|---|---|
| **For suppliers as regards EEE, B&A, packaging** | **Law on waste 209/2016** | |
| | **Art. 49 Waste Batteries and Accumulators** | |
| | Alin (9) To implement the extended producer responsibility requirements in accordance with Article 12 and the state policy objectives in terms of waste management – the manufacturers of batteries and accumulators shall ensure the establishment of a network for the separate collection of waste batteries and accumulators from consumers and shall develop material recovery systems for waste batteries and accumulators, where it is economically and technically feasible. | the economic operators that provide goods, including packed goods shall comply with Extended Producer Responsibility requirements and shall be part of a collective and individual scheme. |
| | **Art. 50. Waste Electrical and Electronic Equipment** | |
| | Alin (4) To implement the extended producer responsibility requirements in accordance with Article 12 and the state policy objectives in terms of waste management – the manufacturers of electrical and electronic equipment shall ensure the establishment of a network for the separate collection of used electrical and electronic equipment from consumers and shall develop material recovery systems for waste electrical and electronic equipment. | |
| | **Article 54. Packaging Waste** | |
| | Alin (7) To implement the extended producer responsibility requirements in accordance with Article 12 and the state policy objectives in terms of waste management – the packaging manufacturers shall ensure the establishment of systems to take or collect packaging waste and the development of material or energetic recovery of packaging waste that cannot be recycled, being unusable for material recovery. | |
| **For suppliers as regards chemicals** | **Law on chemicals no 277/2018** | |
| | **Article 13. Information on the hazard and risk of substances and mixtures** | |
| | Alin (2) The supplier of a chemical for professional use, which fulfills criteria for classification as hazardous, particularly hazardous or posing major risk to human health must provide the receiver a Safety Data Sheet, set by Government Decision, with detailed information on compounds, physico-chemical properties, environmental data and toxicological data, information on hazards, exposure and personal protective measures, as well as first aid and response in the event of unintended spread in environment, as well as other information that might be necessary to protect health and the environment. | The economic operators providing chemicals shall present the SDS |

# Annex

**Annex 1.** ***Questionnaire for centralized procurements public authorities on application of sustainable procurement practices***

| Question | Answer |
|---|---|
| **General aspects and trainings** | |
| 1. Please comment on the medical procurement process after your facility was set up.<br>*(please refer to the relationship with the beneficiaries, service providers, importers of procured goods)*<br>2. Have you attended training seminars on sustainable procurement? If so, what was their impact? If not, please indicate their need.<br>3. If your beneficiaries (medical facilities) apply for grant projects/foreign assistance for carrying out certain works, procurement of specific equipment/devices, etc. - to what extent are such initiatives consulted with/ endorsed by you?<br>4. To what extent are the generic specifications available on the website mandatory? What underlay their development? | |
| **Procurement process** | |
| 1. Have you applied the life cycle cost approach in establishing the goods selection criteria? (*life cycle cost* - taking into account all costs - from procurement, to maintenance, and to disposal of the good). If yes, indicate the legal provision according to which this criterion can be applied (law, regulatory act, order).<br>2. Have elements specific to sustainable public procurement been applied in the technical specifications, such as:<br>• eco-labels, energy efficiency requirements, European criteria for green procurement<br>• environmental management systems: EMAS (EU) and ISO 14001?<br>3. Indicate if you have applied product labeling requirements or the presence of warnings for safe handling, including information on the need to use personal protective equipment for handling and hazardous waste generation once use is complete. If yes, indicate the legal provision (law, regulatory act, order).<br>4. List the eco-labels that aim to identify organic and/or sustainable products or services and that have been noticed/identified on the products/services procured.<br>5. What award criteria do you apply most often?<br>1. The lowest price<br>2. The economically most advantageous offer with the following specific criteria:<br>• savings in water and energy use<br>• savings on disposal costs.<br>6. Have you applied any of these contractual clauses?<br>*For goods:*<br>• delivery of the product in larger quantities, in a single transport (ecologically more efficient)<br>• deliveries are made outside peak traffic hours to minimize the effects of traffic on the delivery process<br>• suppliers take back (for recycling and reuse) the packaging in which the products come.<br>*For services or works:*<br>• application, where appropriate, of specific environmental management measures in accordance with a third party certified system, such as EMAS or ISO 14001;<br>• use of dosage indicators to ensure that appropriate quantities of cleaning products are used;<br>• efficient use of resources, such as electricity and water. | |

| | |
|---|---|
| *Transportation of necessary materials and tools*:<br>• delivery of materials in concentrated form and subsequently can be diluted on the site;<br>• reuse of containers or packaging for transportation;<br>• disposal of packaging;<br>• takeover by the supplier of the packaging for reuse, recycling or storage.<br>7. Do you consider it appropriate to include the criteria of the requirements listed in the points above when making procurements? If so, what would be the impediments to enforcing such requirements? What would be the premises for their application?<br>8. Does the Centre have a register of accredited suppliers/a list of verified suppliers? Is such information found in the Medical Register, medical waste treatment and disposal services?<br>9. What criteria applicable to suppliers are used to award the contracts? For example, to what extent is the ISO 140001 accreditation an advantage criterion for the supplier company?<br>10. When procuring medical waste management services (especially hazardous waste) what are the basic requirements applied? | |
| **Product specifications** | |
| 1. Do you request from the suppliers complete and reliable information about the characteristics of their products as well as about all the ingredients?<br>2. Is the safety data sheet mandatory for all chemicals?<br>3. As to the *procurements for children's public medical facilities, including neonatology/children's wards,* given the vulnerability of this category of patients, how different are the specifications/technical specifications/materials proposed for procurement for this segment of public facilities? (bottles, pacifiers, teats, probes, catheters, cannulas, masks and bags, thermometers, pediatric medication doses).<br>4. When setting the specifications for disinfectant procurement, is only the action (e.g. bactericidal virucide) or also the active substance taken into account?<br>5. To what extent may hospital administrators request a certain active substance, arguing the desired option?<br>6. Does the Centre keep track of the procurements by product name/active substance?<br>7. Please present the trends/quantity of procurements of products containing *triclosan* for the last few years. | |
| **Medical supplies:** | |
| In the document issued by your facility, entitled *List of medical supplies, laboratory supplies and disinfectants* for 2020, in the medical supplies item, there are 32 positions with technical parameters - PVC (Polyvinyl chloride) is indicated as the material. Polyvinyl chloride, better known as PVC, is the second most used type of plastic, resistant to fire, water, ultraviolet rays and acid chemicals. Plasticizers are added to PVC to make soft and flexible plastics, which are the most desirable properties for medical products. The issue of phasing out PVC is more relevant than ever. The most commonly used PVC plasticizer - DEHP - has now been investigated in more detail and is classified as harmful to reproduction. Evidence has been collected internationally, which indicates that phasing out has already been in use.<br><br>Based on the above:<br>1. How do you estimate the possibility of phasing out this material from the current medical supply flow?<br>2. Please tell us to what extent the distributors/importers of such consumables propose non-PVC alternatives and promote them within the facility. | |
| **Other recommendations and conclusions** | |

## Annex 2. *Checklist for identification of hazardous or high-risk chemicals, as well as evaluation of medical waste management practices*

| **1. Data on the medical facility** | |
|---|---|
| Name | |
| Number of beds | |

| **1. Tick the cell for the sections of your medical facility that use hazardous chemicals** | Tick |
|---|---|
| Oncology | |
| Laboratory | |
| Haemodialysis | |
| Pathological anatomy | |
| Autopsy | |
| Radiology | |
| Sterilization | |
| Dentistry | |
| Nuclear medicine | |
| Pharmacy | |
| Neonatology | |
| Endoscopy | |
| Operating rooms (disaggregated) | |

| **1. Study on the hazardous chemicals used** | | |
|---|---|---|
| | **Yes/No** | **Comments** |
| 1) Has a study been carried out to identify the hazardous substances used? If so, please specify the substances that have been identified. | | |
| 2) Have the chemicals been identified as hazardous or high risk? (specify) | | |
| 3) Are product safety data sheets containing hazardous substances/chemicals available? | | |
| 4) Do product suppliers deliver safety data sheets? | | |
| 5) Do you have adequate personal protective equipment in all services? Specify. | | |
| 6) Other data | | |

| 1. Tick the box of the substances used. In the comments, specify the department that uses the substance. | | | Comments |
|---|---|---|---|
| 1) Cleaning | Sodium hypochlorite | | |
| | Ammonium | | |
| | Quaternary ammonium | | |
| | Alcohols | | |
| | Ethanolamine | | |
| | Ethylene glycol ethers | | |
| | Hydrogen peroxide | | |
| | Phenols, chlorinated phenols | | |
| 2) High level disinfection | Peracetic acid | | |
| | Hydrogen peroxide | | |
| | Glutaraldehyde | | |
| | Ortoftalaldehida | | |
| | Other (specify) | | |
| | High level disinfection is not done | | |
| 3) Sterilization | Steam autoclaves | | |
| | Dry heat autoclaves | | |
| | Hydrogen peroxide plasma | | |
| | Ethylene oxide | | |
| 4) Laboratory / Hematology / Pathological anatomy | Xylene | | |
| | Formalin | | |
| | Ether | | |
| | Hydrochloric acid | | |
| | Sulfuric acid | | |
| | Ethidium bromide | | |
| | Potassium cyanide | | |
| | Paraffin | | |
| | Eosin | | |
| | Ethanol | | |
| | Methanol | | |
| | May-Grünwald solution | | |
| | Giemsa solution | | |
| | Methylene Blue | | |
| | Methylene violet | | |
| | Toluene | | |
| 5) Other | Triclosan | | |
| | Triclocarban | | |
| | .. | | |
| | | | |
| | | | |

| 1. Specify the substances/chemicals used inside the medical facility according to their hazard characteristics; indicate the department that uses them. | | |
|---|---|---|
| | **Substances/products used** | **Section** |
| Inflammable | | |
| Toxic | | |
| Corrosive | | |
| Harmful or irritating | | |
| Toxic to the environment | | |
| Oxidizing | | |

| 1. Indicate the substance or product that corresponds to the type of imaging and radiology | | |
|---|---|---|
| | **Yes/No** | **Substance/Product** |
| Analog radiology | | |
| Digital radiology | | |
| Analog mammography | | |
| Digital mammography | | |
| Analog Arc C | | |
| Digital Arc C | | |
| Digital tomography | | |
| Analog dental radiology | | |
| Digital dental radiology | | |

| 1. Identification by substance or group of substances | | | |
|---|---|---|---|
| **Substance** | **Device/product** | **Tick** | **Comments** |
| 1) Mercury | Mercury thermometers | | |
| | Infrared thermometers | | |
| | Digital thermometers | | |
| | Mercury sphygmomanometers | | |
| | Digital sphygmomanometers | | |
| | Aneroid sphygmomanometers | | |
| | Amalgams in dentistry | | |
| | Alternative materials such as composite and resins | | |
| | Fluorescent lamps for general lighting | | |
| | Alternatives (LED) | | |
| | Other mercury equipment and devices. To be specified. | | |
| | When procuring measuring devices, priority is given to those without mercury content. | | |
| | Additional comments: | | |

| | | | |
|---|---|---|---|
| 2) PVC and DEHP products. Only some products are listed. | Blood bags | | |
| | Tubes | | |
| | Drain bags | | |
| | Urine collection bags, urological catheters | | |
| | Examination gloves | | |
| | Enteral nutrition systems | | |
| | Nasogastric tubes | | |
| | Catheters | | |
| | Trays for diagnostic elements and medical equipment | | |
| | Nebulizer and oxygen masks | | |
| PVC products. Some products are listed | Endotracheal and tracheostomy tubes | | |
| | Inflatable mattresses | | |
| | Nasal cannulas and catheters | | |
| | Infusion bags | | |
| | Floors | | |
| | Other: please specify | | |
| 3) Bisphenol A (BPA) | Milk bottles | | |
| | Polysulfone membranes in hemodialysis | | |
| | Hemodialysis machines | | |
| | Other: please specify | | |
| 4) Flame retardants (BFRs)* | Curtains | | |
| | Carpets | | |
| | Padding material | | |
| | Foam rubber pillows | | |
| | Mattresses | | |
| | Intravenous pumps (IV pumps) | | |
| | Other | | |
| | Is is possible to ask your product supplier if your products contain flame retardants? | | |

* Examples: decabromodiphenyl ether (Deca-BDE): textiles, furniture, sound insulation materials, electrical and electronic equipment; Hexabromocyclododecane (HBCDD) mainly in polystyrene, textile materials; Octabromodiphenyl ether (Octa-BDE): plastics, textiles, cables, sound insulation materials, upholstery; Pentabromodiphenyl ether (Penta-BDE): mainly plastics, textiles, cables, materials, sound insulation, upholstery; Tetrabromobisphenol-A (TBBP-A): plastics, electronics.

| **1. Tick which harmful chemicals are used in the medical facility** | | | |
|---|---|---|---|
| | | Tick | Examples |
| 1,1,2 Trichloro-1,2,2-trifluoroethane (Freon 113) | Ecotoxic | | refrigerant |
| 2-bromo-2-nitropropane-1,3-diol (bronopol) | Ecotoxic. Allergen | | Soaps, paints, adhesives |

| | | | |
|---|---|---|---|
| Dibutyl phthalate | Ecotoxic. Harmful during pregnancy for the fetus | | Plastic, soft plastic, PVC binder materials |
| Triclosan | Ecotoxic | | Sutures, slippers, bed linen |
| hydroquinone | Ecotoxic. Allergen | | Used in dentistry |
| d-Limonene | Ecotoxic. Allergen | | Perfume in cleaning products. |
| Beta-citronellol | Ecotoxic. Allergen | | Perfume in cleaning products |
| Chlorhexidine | Allergen | | Disinfection |
| Cobalt chloride | Ecotoxic. Allergens. Toxic. | | Dentistry. Histochemical enzymatic stains. |
| Citronellol or Dihydrogeraniol | Toxic to aquatic organisms | | Perfume in cleaning products |

| **1. Anesthetic gases and equipment used in the medical facility** | **Yes/No** | **Comments** |
|---|---|---|
| Desflurane | | |
| Sevoflurane | | |
| Isoflurane | | |
| Nitric oxide | | |
| Other | | |
| Anesthetic equipment used: | | |

| **1. Requirements/conditions for the procurement of substances/chemicals** | **Yes/No** | **Comments** |
|---|---|---|
| When making procurements, are there any requirements for the chemical composition of certain products indicated? | | |
| In procurement, is it possible to give priority to less hazardous products or substances? | | |
| Are there rules regarding the acceptance and receipt of donations of medications? | | |
| Is the expiry date indicated for the donated medications or chemicals? Specify if you have received donations that included products that were difficult to use before their expiry. | | |
| Is it possible to return expired products without appealing to the supplier? | | |
| Comments: | | |

| **1. Energy efficiency** | **Yes/No** | **Comments** |
|---|---|---|
| Have energy efficiency projects been implemented or planned? Specify in the comments. | | |
| When procuring general lighting sources, is LED given priority? | | |

| 1. **Waste management** | **Yes/No** | **Comments** |
|---|---|---|
| a) **General requirements** | | |
| 1) A medical waste management plan is in place. | | |
| 2) You keep waste records according to GD 501/2018 and 99/2018. | | |
| 3) Is waste from medical devices containing remnants of hazardous chemicals collected separately? Specify the manner of their management in the comments. | | |
| 4) Temporary waste storage facilities are organized. | | |
| 5) The estimation of waste management costs is based on the number of beds. | | |
| 6) Cost estimation is based on other methods. Specify. | | |
| 7) Do you have your own hazardous waste treatment capacity? | | |
| 8) Do you receive hazardous waste from other medical facilities for treatment? | | |
| 9) The hazardous waste generated is treated by authorized business companies. | | |
| 10) Documentation related to waste delivery to an authorized business company (tick) | | |
| Contract ☐ Invoice ☐ Delivery-Acceptance Act ☐ Treatment confirmation ☐<br>other documents _____ | | |

| a) **Treatment/disposal methods** | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1) Indicate the method of treatment/disposal of each type of waste | | | | | | | |
| | incinera-tion | autoclav-ing | chemical treatment | biological treatment | thermal treatment | composting in special pits | other |
| infectious | | | | | | | |
| anatomical pathologic | | | | | | | |
| cutting-sharps | | | | | | | |
| other hazardous waste | | | | | | | |
| radiology fluids | | | | | | | |
| other fluids (blood, urine, etc.) | | | | | | | |
| expired medications | | | | | | | |
| disposable clothing | | | | | | | |
| chemicals containing hazardous substances | | | | | | | |
| other | | | | | | | |
| 2) Medical waste is treated by (tick): | | | | | | | |
| mortar encapsulation ☐ chemical degradation ☐<br>dilution in large amounts of water ☐ incineration at temperatures of +1200°C and above ☐<br>discharged into the sewer ☐ returned to manufacturer/donor ☐ | | | | | | | |

| |
|---|
| 3) Other comments: |
| 4) What pest control and sanitation practices are used within the medical facility?<br>5) What chemicals (phytosanitary products) are applied? |

| **1. List the adverse effects on the medical staff as a result of the use of certain chemicals/equipment/consumables** |
|---|
| Allergy ☐ Skin irritation ☐ Asthma ☐ Other adverse conditions ☐ (note) |
| From the use of:<br>disinfectants ☐ sterilizers ☐ other chemical products/substances ☐ (glutaraldehyde, formaldehyde) (note)<br>gloves ☐ anesthetic gases ☐ other ☐ (note) |

## Annex 3. *Excerpt from Sanitary Regulation on Medical Waste Management GD 696/2018*

### ARTICLES RELATED TO MEDICAL WASTE TREATMENT

103. The treatment of hazardous waste can be outsourced, by handing over, on the basis of the service contract, to the authorized economic operators in accordance with art. 25 of Law no. 209 of July 29, 2016 regarding waste by the authorities empowered by art. 24 of the aforementioned law for the treatment of waste resulting from the medical activity on types of waste, except for the infectious waste identified with the code 18 01 03 * in the annex to this Health Regulation, produced in the microbiological laboratories and / or from patients with highly communicable communicable diseases, which requires treatment at the source of generation.
104. Each waste treatment process resulting from medical activity is recorded in the Register of treatment of waste resulting from medical activity, kept by the Ministry of Agriculture, Regional Development and the Environment according to the provisions of Law no.71-XVI of March 22, 2007 on registers.
105. The treatment of the cutting-stinging and infectious waste identified with the code 18 01 01 and 18 01 03 * in the Waste List and in the annex to the present Sanitary Regulations is done by thermal treatment at low temperatures that ensure disinfection / sterilization with the cutting-shredding of the waste.
106. Other methods for treating the cutting and infectious waste identified with the code 18 01 01 and 18 01 03 * in the Waste List and in the annex to this Sanitary Regulation are accepted after the approval by the Ministry of Agriculture, Regional Development and the Environment, provided the insurance their disinfection / sterilization and compliance with Law no.209 of July 29, 2016 on waste.
107. The medical-sanitary institutions can treat the cutting and stinging and infectious wastes identified with the code 18 01 01 and 18 01 03 * in the Waste List and in the annex to the present Sanitary Regulations in their own installations for thermal decontamination at low temperatures, provided with shredding equipment. - waste disposal.
108. Autoclaves with the following principles of activity are used in the list of wastes and in the annex to this Sanitary Regulation for the treatment of cutting and infectious wastes identified with the code 18 01 01 and 18 01 03 *: gravitational, prevacuum autoclaves or other advanced technologies.
109. The validation of the process of autoclaving of the cutting and stinging and infectious waste identified with the code 18 01 01 and 18 01 03 * in the Waste List and in the annex to this Sanitary Regulation is carried out at least every time by applying chemical and periodic indicators ( weekly or every 40 hours of use) biologically, but not limited to the ones listed.
110. In the treatment of the cutting and stinging and infectious waste identified with the code 18 01 01 and 18 01 03 * in the Waste List and in the annex to the present Health Regulations, the level of microbial inactivation is ensured: for the vegetative bacteria, fungi, lipophilic / hydrophilic viruses, parasites and mycobacteria - at least 6 Log10; and for the spores of Geobacillus stearothermophilus and Bacillus atrophaeus at - at least 4 Log10.

111. Both the medical and sanitary institutions and the economic operator holding treatment facilities by thermal decontamination at low temperatures of hazardous medical waste must submit to the final disposal operator a supporting document attesting that the waste has been decontaminated and does not present biological danger.

112. The treatment of infectious waste identified with the code 18 01 03 * in the Waste List and in the annex to the present Sanitary Regulation by chemical disinfection is allowed only for liquid waste (blood, urine, fecal and vomiting masses, etc.).

## ARTICLES RELATED TO MEDICAL WASTE DISPOSAL

119. The disposal of hazardous waste resulting from the medical activity is carried out in accordance with the regulations specific to each category of waste, in accordance with the disposal operations stipulated in Annex no. 1 to Law no. 209/2016 on waste.

120. For the purpose of final disposal, chemicals, in particular those containing mercury and cadmium, cytotoxic / cytostatic and medicines that have become waste identified with codes 18 01 06 , 18 01 08 and 18 01 09 in the Waste List and in the Annex to the present Sanitary Regulation are returned to the producer or donor.

121. The disposal methods used must ensure the rapid and complete destruction of the potential harmful factors for environment and health.

122. The final disposal methods of waste resulting from the medical activity are the following:
    1) storage at municipal non-hazardous waste landfills, authorized in accordance with art. 25 of Law no. 209/2016 on waste, by the authorities empowered by art. 24 of the said law;
    2) incineration, only for the types of medical waste for which the treatment by thermal decontamination at low temperatures is forbidden, the anatomo-pathological, chemical, cytotoxic and cytostatic medicines identified with the codes 18 01 02, 18 01 06 and 18 01 08 in the Waste List and in the annex to this Regulation, in compliance with the legal provisions. Emissions to air and water from waste incineration facilities resulting from medical activity must not exceed the emission limit values set by the environmental legislation and the international treaties to which the Republic of Moldova is a party. The sedimentary residues arising from the cleaning of boilers, filters, channels and chimneys of incineration facilities, as very dangerous, need to be disposed of in special places destined for the burial of hazardous waste;
    3) storage of hazardous waste in authorized hazardous waste storages, ad of sharps and infectious waste identified with the codes 18 01 01 and 18 01 03 * in the Waste List and in the annex to this Regulation - after the compulsory treatment.

123. The anatomo-pathological waste identified with the code 18 01 02 in the Waste List and in the annex to the present Regulation are disposed by burial in the cemetery, in specially designated places, and in their absence they can be composted in special pits. Composting in special pits shall be applied until establishment of cremation facilities.

124. The requirements of the pits destined for the composting of the anatomo-pathological waste identified with the code 18 01 02 in the List of waste and in the annex to the present Regulation provided in point 123 of the present sanitary Regulation are:
    1) located in the area of medical-sanitary institutions, isolated from the curative functional areas and the auxiliary services with hygienic requirements through a green corridor of steam or shrubs at a distance of at least 30 m from them;
    2) location on the territory of the sanitary protection zones and / or territory crossed by engineering, communal, urban or rural buses (water, sewerage, thermal, power lines, oil and gas lines) is not allowed;
    3) it does not pollute the groundwater;
    4) is made of concrete that ensures the impermeability of the pit;
    5) upper part is closed with a lid with lock that ensures the authorized access;
    6) after filling each 0.5 m a layer of minumum 15 cm thick of soil is poured, which ensures the exclusion of the formation of gases and / or odors;
    7) after the final filling, the archiving of the documentation regarding the location and capacity is built and ensured, in order for the burial site to be cleaned in the future.

125. The anatomo-pathological waste identified with the code 18 01 02 in the Waste List and in the annex to the present Regulations before disposal, by using the compost, are disinfected.

126. Waste similar to the municipal ones identified with the code 20 03 01 in the Waste List does not require special treatment and is included in the cycle of municipal waste disposal.

127. Exceptions from the provisions of section 126 of this Regulations are waste from hospitals and / or from people with contagious diseases that are treated as infectious waste identified in code 18 01 03 * in the Waste List and in the annex to this regulation, before being taken over by sanitation services.

128. Biodegradable waste can be disposed of by composting.