

EFLM

EUROPEAN FEDERATION OF CLINICAL CHEMISTRY
AND LABORATORY MEDICINE



Green Labs



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ADDENDUM EFLM GUIDELINES FOR GREEN AND SUSTAINABLE MEDICAL LABORATORIES

EFLM CHECKLIST FOR GOOD ENVIRONMENTAL PRACTICES IN CLINICAL LABS

Ed. 2022

PRODUCED BY THE EFLM TASK FORCE "GREEN & SUSTAINABLE LABORATORIES"



Checklist - Hazardous Chemicals Management

| n. | ACTION | Always OR already completed | Sometimes OR In progress | No OR Rarely; (agree to be regular within 3 months) | No plans to start within the next year | Not applicable |
|----------------|--|-----------------------------------|--------------------------------|--|---|-------------------|
| GENERAL | | | | | | |
| 1 | Has your lab received higher management support to introduce sustainable practices? | | | | | |
| 2 | Has your lab made a public commitment to engage in or introduce sustainable practices? | | | | | |
| 3 | Have you formed a sustainability committee or appointed a senior person (Sustainability Officer) to introduce and maintain sustainable practices? | | | | | |
| 4 | Have you prepared a programme to educate the staff in sustainable practices? | | | | | |
| 5 | Have you taken steps to reduce the number of requests tests and where relevant tests offered? | | | | | |
| | | | | | | |
| 6 | Do the laboratory scientists know the 12 principles of Green Chemistry? https://www.worldcat.org/title/green-chemistry-theory-and-practice/oclc/39523207 | | | | | |
| 7 | Are Green Chemistry practices implemented in the laboratories where possible as a response to the health, environmental and economic burden caused by hazardous chemicals, including toxic spill events? | | | | | |
| 8 | Is there a chemical tracking system routinely used? | | | | | |
| 9 | Does the laboratory purchase only the necessary amounts of chemicals instead of large amounts? | | | | | |
| 10 | Are excess chemicals shared with other laboratories that may need them? | | | | | |

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| 11 | Is chemical sharing implemented within the laboratory? | | | | | |
| 12 | Is chemical sharing implemented between laboratories? | | | | | |
| 13 | Are chemicals labelled? | | | | | |
| 14 | Are waste containers labelled? | | | | | |
| 15 | Are all chemical waste and chemical containers capped and closed? | | | | | |
| 16 | The definition and classification of hazardous chemicals are key to identify and prevent exposure to these substances, which can be done through labels and safety data sheets. Are there sufficient labels in the lab to identify certain chemical reagents? | | | | | |
| 17 | Are there labels in waste rooms summarizing adequate procedures for chemical waste? | | | | | |
| 18 | Are empty chemical containers disposed of according to the hospital/clinical laboratory procedures? | | | | | |
| 19 | Is chemical waste disposed in the correct container, labelled appropriately and collected in the correct collection area? | | | | | |
| 20 | Are there written Standard Operating Procedures for chemical waste management? | | | | | |
| 21 | Are there written Standard Operating Procedures for common high-risk laboratory methods? | | | | | |
| 22 | Is chemical use reduced when possible? | | | | | |
| 23 | Can hazardous substances use be eliminated, substituted or reduced? | | | | | |
| 24 | Are computer simulations used instead of chemical reactions when possible? | | | | | |
| 25 | Does the laboratory scale down experiments for education and research/home-made tests when possible? | | | | | |

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| 26 | Is the minimal number of experiments or micro-scale experiments used where possible? | | | | | |
| 27 | Is there an effort to consolidate several tests in a reduced number of laboratory equipment? | | | | | |
| 28 | Is there a policy of rational testing implemented at the laboratory? | | | | | |
| 29 | Is there an annual audit of ordered laboratory tests performed? | | | | | |
| 30 | Does the lab keep an updated chemical inventory at least annually? | | | | | |
| 31 | Is a chemical inventory kept for hazardous and non-hazardous chemicals. | | | | | |
| 32 | Are Chemicals dated when opened and used on a first-in, first out-basis to keep supplies fresh. | | | | | |
| 33 | Are old and obsolete chemicals disposed of annually? | | | | | |
| 34 | Are green chemistry alternatives searched and used whenever possible (e.g. ethidium bromide)? | | | | | |
| 35 | Does the laboratory use mercury-free thermometers? | | | | | |
| 36 | Does the laboratory use mercury and metal halide free microscope light bulbs? | | | | | |
| 37 | Does the laboratory recycle solvents? | | | | | |
| 38 | Is there a list of solvents according to (i) Worker Safety, (ii) Process Safety, and (iii) Environmental and Regulatory Considerations (preferred, usable, undesirable)? | | | | | |
| 39 | Is the development of solventless chemical reactions considered? | | | | | |
| 40 | Are chemical bottles reused as waste bottles? | | | | | |

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| 41 | When rinsing, is the minimum amount of water used to dilute chemical in bottles then the rest of the water is put down the sink? | | | | | |
| 42 | Do laboratory professionals know which chemicals can go down the sink? | | | | | |
| 43 | Do laboratory professionals know how to check if a chemical can go down the sink? | | | | | |
| 44 | Do laboratory professionals know where the spill kit is located? | | | | | |
| 45 | Is appropriate spill equipment available? | | | | | |
| 46 | Do laboratory professionals know how to dispose of liquid chemicals that cannot go down the sink? | | | | | |
| 47 | Do laboratory professionals know how to dispose of solid chemicals? | | | | | |
| 48 | Are laboratory professionals trained in green chemistry practices? | | | | | |
| 49 | Are laboratory professionals trained in chemical waste management? | | | | | |
| 50 | Are laboratory professionals trained in chemical hygiene and safety? | | | | | |
| 51 | Do you educate laboratory staff for chemical occupational injuries and illnesses? | | | | | |
| 52 | Do you know how to manage chemical accidents if it happens even if you spend attention to prevent them? | | | | | |
| 53 | Do you purchase water or alcohol-based white board markers over petroleum-based ones? | | | | | |
| 54 | Does the laboratory invest in new procedures to minimize chemical use and waste? | | | | | |
| 55 | Are chemicals-related legislations, directives and regulations followed closely? | | | | | |

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Comments

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Checklist - Energy Management

| n. | ACTION | Always OR already completed | Sometimes OR In progress | No OR Rarely; (agree to be regular within 3 months) | No plans to start within the next year | Not applicable |
|----|---|-----------------------------------|--------------------------------|--|--|-------------------|
| 1 | Do you switch off lights, computers, instrumentation and equipment at the end of the day or when not in use? | | | | | |
| 2 | Do you shut down analyzers and other analytical equipment when not in use? | | | | | |
| 3 | Do you use sensor lights in corridors and infrequently used areas or storage rooms? | | | | | |
| 4 | Do you use energy efficient lighting (e.g., LED lighting)? | | | | | |
| 5 | Do you use natural light in the laboratory as much as possible? | | | | | |
| 6 | Do you use task lighting and modular lighting that follows modular laboratory furniture? | | | | | |
| 7 | Have you ensured that energy saving or sleep mode is active on computers, printers and scanners? | | | | | |
| 8 | Have you reduced printing? | | | | | |
| 9 | Have you installed timers on equipment that may delay work practices or take time to initialise when switched on? | | | | | |
| 10 | Do you keep the fume hood sashes closed when those workspaces are unused? | | | | | |
| 11 | Do you switch off biological safety cabinets when not required or at the end of day? | | | | | |

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| 12 | Are your refrigerators and freezers energy efficient/smart? | | | | | |
| 13 | Are the contents of refrigerators and freezers organized (e.g., with bins and labels)? | | | | | |
| 14 | Do you regularly throw away from refrigerators and freezers items no longer required? | | | | | |
| 15 | Do you regularly change the filters that need changing, clean of the exposed refrigeration coils of refrigerators and freezers, and clean the door sealing? | | | | | |
| 16 | Do you defrost freezers at least once a year? | | | | | |
| 17 | Have you raised the freezers' temperature setpoint from -80 °C to -70 °C? | | | | | |
| 18 | Do you return packaging materials to suppliers for reuse or recycling after supply of instruments and equipment? | | | | | |
| 19 | Do you send old equipment for recycling? | | | | | |
| 20 | Do you ensure that the windows are not open, space heaters are not used and the doors in rooms are closed while air conditioning units are in operation? | | | | | |
| 21 | Do you adjust temperature and humidity controls relative to seasonal demands? | | | | | |
| 22 | Is energy efficiency an important criterion for selection of a new laboratory equipment? | | | | | |
| 23 | Do you use locally produced reagents and consumables, when available? | | | | | |
| 24 | Do you perform regular adequate maintenance of all the equipment? | | | | | |
| 25 | Do you use autoclaves and dishwashers to full capacity (do you run them only when full)? | | | | | |
| 26 | Do you share your equipment (autoclaves, freezers, printers, fume hoods, thermal cycles, water filters/deionisers) with other departments? | | | | | |

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| 27 | Do you select fuel-efficient vehicles for transport of samples? | | | | | |
| 28 | Do you regularly review routes and usage of vehicles for transport of samples? | | | | | |
| 29 | Do you encourage and motivate your staff to use public transport or bicycles? | | | | | |
| 30 | Do you use one of the sustainable energy sources - solar power, sustainable biofuel, combined heat and power systems, to supplement the electricity and heat requirements? | | | | | |

Comments

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Checklist - Waste Management

| n. | ACTION | Always OR already completed | Sometimes OR In progress | No OR Rarely; (agree to be regular within 3 months) | No plans to start within the next year | Not applicable |
|---|---|-----------------------------------|--------------------------------|---|---|-------------------|
| GREEN PURCHASING POLICIES | | | | | | |
| 1 | Have you introduced sustainability requirements at the tendering stage for purchases of goods and services? | | | | | |
| 2 | Do you give preference to manufacturers who use environmentally friendly manufacturing processes and/or to those who have ISO certification for good environmental practices? | | | | | |
| 3 | Do you negotiate with current IVD suppliers to reduce/minimise packaging or use more environmentally friendly packaging? | | | | | |
| 4 | Do you insist that minimum packaging materials be used? | | | | | |
| 5 | Do you negotiate with suppliers to take back used containers? | | | | | |
| 6 | Do you negotiate with current suppliers to take back packaging? | | | | | |
| 7 | Do you negotiate with IVD vendors to reduce plastic content of their instruments? | | | | | |
| 8 | Do you use locally manufactured reagents/supplies from sources that are as near as possible to the lab to reduce carbon footprint associated with transport or at a minimum have a clear sustainability report that sets out how they are going to achieve net zero carbon emissions? | | | | | |
| 9 | Do you negotiate with cleaning services that they use environmentally friendly detergents? | | | | | |
| MANAGEMENT OF NON-BIOLOGICAL SOLID WASTE | | | | | | |
| 10 | Did you announce a policy to reduce, reuse and recycle where possible all solid wastes? | | | | | |

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| 11 | Do you have a specific policy to reduce the use of plastics, especially single-use plastics? | | | | | |
| 12 | Do you identify single-use plastics that could be recycled, reused or substituted with other materials such as glass? | | | | | |
| 13 | Where possible and safe to do so, is washable or reusable labware used in place of single-use disposable items? | | | | | |
| 14 | Are cleaning staff familiar with correct procedures for disposal of recycling waste streams? | | | | | |
| 15 | Did you purchase a Styrofoam compressor? | | | | | |
| 16 | Are obsolete computer equipment, printer toners, mobile phones, tablets & laptops recycled, sold or repurposed? | | | | | |
| 17 | Does the lab use central multifunction printers that scan, fax, print and copy, eliminating the need for costly personal printer equipments? | | | | | |
| 18 | Does the lab purchase and use rechargeable batteries as available? | | | | | |
| 19 | Are used batteries collected and recycled where facilities exist? | | | | | |
| 20 | Are cardboard boxes collapsed before being added to recycling? | | | | | |
| 21 | Are all lab-sponsored functions zero waste? (No garbage; only compostable and recyclable items). This means using reusable cups, bottles, crockery, and cutlery | | | | | |
| 22 | Is clean, uncontaminated outer packaging material which has not entered the clinical lab recycled? – Cardboard, polystyrene, paper, bubble wrap etc. | | | | | |
| 23 | Is there a plan in place to reduce the use of blood collection tubes and other plastics where feasible? | | | | | |
| 24 | Is there a plan in place to reuse specimen collection bags and urine collection bottles? | | | | | |
| 25 | Do you use recycled and recyclable lab furniture where possible? | | | | | |

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| 26 | Do you reduce paper usage, such as using both sides of paper? | | | | | |
| 27 | Do you reduce paper usage, such as recycling used paper? | | | | | |
| 28 | Do you reduce paper usage, such as introducing paper audits to monitor usage? | | | | | |
| 29 | Do you reduce paper usage, such as switching to non-paper electronic systems where possible? | | | | | |
| 30 | Is paper and cardboard recycled? | | | | | |
| MANAGEMENT OF BIOLOGICAL WASTE | | | | | | |
| 31 | Is there a protocol for the chemical decontamination and disposal of all liquid biological waste such as blood, plasma, and other biological fluids? | | | | | |
| 32 | Is there a protocol for the decontamination and disposal of sharps? | | | | | |
| 33 | Is there a protocol for the decontamination by autoclaving? | | | | | |
| 34 | Has a recycler been purchased in the lab for organic solvents recycling? | | | | | |
| 35 | Do the protocols for the storage and transport of biological waste meet with local and/or European legal requirements? | | | | | |

Comments

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Checklist - Water Management

| n. | ACTION | Always OR already completed | Sometimes OR In progress | No OR Rarely; (agree to be regular within 3 months) | No plans to start within the next year | Not applicable |
|----|---|-----------------------------------|--------------------------------|---|---|-------------------|
| 1 | Do you have a clear strategy on choosing water saving/water efficient devices when selecting new laboratory equipment? | | | | | |
| 2 | Has your lab identified clearly which level of water purity is needed for the work, to minimize the cost and environmental impact? | | | | | |
| 3 | Do you coordinate and share your equipment (autoclave loads, water filters, deionizers, etc) with neighboring labs? | | | | | |
| 4 | Do you have a strategy to raise awareness of the environmental impact of water usage? | | | | | |
| 5 | Do you minimize the use of distillation to purify water? | | | | | |
| 6 | Is reverse osmosis water used to feed the deionizing system when possible? | | | | | |
| 7 | Do you use the lowest grade water appropriate to the task and use RO water sparingly? | | | | | |
| 8 | Do you use timers for water valves and are these set to minimum necessary time? | | | | | |
| 9 | Did you install water misers on sterilizers / autoclaves? | | | | | |
| 10 | Do you use a waterless water bath or a bead bath as an alternative to a traditional water bath to reduce water use, energy use and bacteria growth? | | | | | |
| 11 | If you are using autoclaves / sterilizers /glass washers in your lab, do you run them in full capacity? | | | | | |
| 12 | If you are using autoclaves / sterilizers in your lab, do you share them with other departments? | | | | | |

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| 13 | Do you wash lab ware efficiently? Do you use water efficiently for cleaning and rinsing? | | | | | |
| 14 | Do you check entering and leaving water temperatures and flow rates to ensure they are within the manufacturer's recommendations? | | | | | |
| 15 | Do you set to stand-by mode or turn them off when not autoclaves / glass washers /water baths are not in use? | | | | | |
| 16 | Are awareness posters/stickers for water awareness visible throughout the lab? | | | | | |
| 17 | Do you have signage with reminders to turn off the water? | | | | | |
| 18 | Do you instruct staff and visitors with clear signage on how and where to report leaks at all points of water use? | | | | | |
| 19 | Do you educate facility staff, on water management program goals? | | | | | |
| 20 | Do you use closed-loop water recirculation equipment in all your cooling systems? | | | | | |
| 21 | Do you make sure that water for cooling is recirculated rather than running continuously to waste? | | | | | |
| 22 | Do you follow the Non-Hazardous Chemical Disposal guidelines for disposing of chemicals down the drain? | | | | | |
| 23 | Do you neutralize corrosive liquids (to pH between 5.5-10.5) before pouring down the drain? | | | | | |
| 24 | Do you harvest rainwater? | | | | | |
| 25 | Do you recycle and reuse paper? By purchasing paper with recycled content, water consumption to make the paper is reduced by 60%. | | | | | |
| 26 | Do you regularly monitor consumption to detect leaks and to identify improvement opportunities? | | | | | |
| 27 | Do you report dripping and leaking faucets to building maintenance immediately? | | | | | |

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| 28 | Do you replace water-cooled equipment with air-cooled equipment or best available energy/water-efficient technology? | | | | | |
| 29 | Are water-vacuum aspirators replaced with membrane/diaphragm/oil-free pumps? | | | | | |
| 30 | Are laboratory faucets fitted with aerators or water misers to reduce water flow? | | | | | |

Comments

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