SAFE LABORATORY ACCESS



PATRAS MED

SAFE LABORATORY ACCESS AND USE FOR PEOPLE WITH DISABILITIES

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SAFE LABORATORY ACCESS AND USE FOR PEOPLE WITH DISABILITIES

A practical guide to accessible laboratory work and independent participation

PURPOSE AND SCOPE

This guide supports people with disabilities in accessing and using laboratories as students, researchers, technicians and other authorised laboratory users. It addresses routine work, equipment operation, handling of materials, information access and emergency response. Its purpose is to enable meaningful laboratory work with appropriate protection and the greatest practicable independence.

Accessibility planning should begin with the work the person intends to perform. Disability alone does not determine competence or justify automatic exclusion. Assess the actual task, working environment and agreed adjustments. Assistance should be available where needed without becoming a default condition for every laboratory user.

WHO USES THE GUIDE

Laboratory users and managers should use this guide together with the institution's accessibility service, occupational safety personnel and occupational physician where relevant. It supplements approved operating procedures and local risk assessments. Laboratory management retains responsibility for authorising work and verifying technical controls.

HOW TO APPLY IT

- Agree work requirements and assess each relevant task using Section 1.
- Use Sections 2 to 7 to configure spaces, information, procedures and protection.
- Agree independent work and any targeted assistance using Section 8.
- Verify emergency arrangements before work starts using Section 9.
- Use Sections 10 to 12 to report barriers, maintain the toolkit and record practical checks.

VALIDATION AND CONTRIBUTION

The guide has been validated by ANTHI-ZO Creative Activity Centre for People with Disabilities. It builds on the accessibility contribution of Patras-Med iGEM 2024 [1]. Its practical contribution is a documented link between an access barrier, the associated task risk, an agreed adjustment and an

observable check of effectiveness. Local implementation requires assessment of the specific laboratory and its procedures.

GUIDE NAVIGATION

Choose the relevant work and access modules rather than reading every section before each task. The section links below also support navigation in the digital Word edition.

1. Agree work requirements and assess risk
2. Make laboratory spaces and workstations usable
3. Provide accessible information and training
4. Apply adjustments to individual access needs
5. Adapt procedures and equipment for safe work
6. Preserve protection against laboratory hazards
7. Select usable personal protective equipment
8. Support autonomy and reliable working arrangements
9. Prepare accessible emergency arrangements
10. Report barriers and improve routine practice
11. Build and maintain a local accessibility toolkit
12. Reusable work and adjustment records
13. Sources and attribution

For laboratory users, start with the relevant access module in Section 4 and the equipment instructions in Section 5. For managers, use Section 1 with the checks and records in Sections 11 and 12. Review emergency arrangements in Section 9 before relying on any adapted work method.

1. Agree work requirements and Assess risk

Meet directly with the laboratory user to discuss their intended work, preferred methods and access requirements. A diagnosis is not a substitute for understanding how a person performs a task. Involve an interpreter or support person when requested while continuing to address the user directly.

Define the work before selecting adjustments

- Identify the procedures, equipment, materials, quantities and working locations involved.
- Discuss reach, grip, posture, vision, hearing, communication, concentration, fatigue and any fluctuating access needs relevant to that work.
- Ask which actions the user can perform independently and where a tool, accessible instruction or trained assistant would help.
- Consider preparation, transport, cleaning, waste disposal and emergencies as well as the main experimental procedure.

Use the laboratory's established risk assessment method. WHO and CDC emphasise assessment of the actual procedure and hazards [4, 5]. For this guide, add an accessibility review to that assessment. Do not assign a higher risk score solely because a person has a disability.

Assess the interaction between task and environment

For each task, record the hazard and possible exposure or injury, the barrier affecting control of that hazard and the people who could be affected. Select adjustments, test them in the actual working position and assess the remaining risk after controls are in place. Document evidence rather than relying on a statement that the area is accessible.

Responsibility	Who should act
Agree practical requirements	Laboratory user with the relevant accessibility contact.
Approve procedures and remaining risk	Laboratory manager with the designated safety personnel.
Review health or PPE concerns	Occupational physician and competent safety personnel where relevant.
Implement and maintain adjustments	Named owner for each equipment, facilities or information change.
Provide specific assistance	Trained staff with an agreed task and available backup.

Choose and Verify controls

Consider removing an unnecessary hazard, selecting a suitable alternative method or improving equipment and layout before relying only on instructions or PPE. A change must preserve the scientific purpose, required containment and protection of other users. BG RCI supports an individual assessment involving the person and relevant safety expertise

[3].

Record whether the task may proceed, needs adjustment and retesting or must pause until a critical control is available. Give a clear reason and an owner for resolving the barrier. Review the assessment when a procedure, workplace, equipment or access requirement changes.

2. Make laboratory spaces and workstations usable

Assess the complete working route, including entrances, doors, lifts, storage, wash areas, toilets, clean rest areas and exits. Facilities personnel should check dimensions and alterations against applicable local requirements. Test the layout with the user's actual mobility aid and working position.

Provide a stable and accessible working position

- Provide suitable bench height, knee clearance and seating where required. Check posture during real work rather than only at an empty bench.

- Place frequently used equipment, supplies and approved waste containers within safe reach. Avoid reaching across hot surfaces, open samples or other hazards.
- Keep turning areas and circulation routes clear after equipment, bags and stools are moved.
- Secure cables and tubing without obstructing movement, emergency controls or maintenance.
- Locate heavy or hazardous containers where handling and retrieval can be assessed safely.

Check equipment as part of the workstation

Before purchasing or relocating an instrument, check access to its controls, sample chamber, display, loading points and emergency stop. Include software operation and cleaning. A user may reach a machine yet still be unable to load it safely or interpret an error message. Confirm that adjustable furniture remains stable under the intended load.

Potential adjustments include suitable holders, racks, approved grips and accessible instrument interfaces. Select these with the user and verify them against the manufacturer's instructions. Adjustable work surfaces and accessible information are established approaches to laboratory access [2].

Maintain protective engineering controls

A fume hood or biological safety cabinet must remain effective from the chosen working position. Have competent personnel assess reach, viewing, airflow and any proposed modification. Do not exceed sash limits, block a grille, bypass an interlock or modify a guard to improve access. If access cannot be made safe at that unit, assess another suitable unit or an approved method with equivalent protection [6].

Use a predictable layout

Agree fixed locations for tools, samples and waste. Communicate changes before work resumes. Provide usable labels with text and appropriate contrast. Tactile identifiers may supplement labels where they are safe, durable and compatible with cleaning. Colour alone should not be the only way to identify a material or warning.

Check emergency equipment at the working position

Verify that alarms, emergency stops, eyewash and emergency washing facilities can be located and used promptly with any agreed assistance. Access to routine work is incomplete if emergency equipment cannot be used. Record unresolved barriers and prevent the affected hazardous task from starting until a workable control is established.

3. Provide accessible information and training

Provide laboratory rules, safety data, standard operating procedures, instrument instructions and emergency plans in formats the user can access before they are required. An accessible summary can support understanding, but it must preserve safety-critical information and remain linked to the current approved procedure.

Access requirement	Options to agree and test

Access requirement	Options to agree and test
Vision	Readable digital text, large print, contrast, magnification, spoken instrument output or appropriate tactile information.
Hearing	Written instructions, captioned training, agreed visual or tactile alerts and interpretation where requested.
Learning or processing	Clear numbered procedures, consistent terminology, diagrams where useful and practice at an appropriate pace.
Speech or communication	Writing, typing, gestures or augmentative and alternative communication with a tested backup.
Movement or dexterity	Keyboard operation, suitable input devices, voice control or accessible controls where technically appropriate.

These options are starting points, not prescriptions based on a disability category. Agree the format with the individual. Test it alongside gloves, protective clothing, background noise and the actual instrument or computer.

Train for competence and independence

Use the same task-specific safety objectives for all users while adapting the delivery and assessment. Demonstrate the procedure, allow practice and verify performance through an appropriate practical assessment. Extra time or another communication format should not be mistaken for a lack of understanding. Record the procedures for which the user has been trained and authorised.

Training should include identifying materials, locating controls, recognising instrument faults, stopping a procedure safely and requesting help. Make refresher training accessible when procedures or software change. For complex steps, agree a checklist that supports the user without requiring another person to issue every instruction.

Make warnings and communication reliable

Agree how the user receives urgent messages and communicates stop, help or a health concern. Test the signals from all relevant work locations. A routine text message or personal phone should not become the sole emergency alert unless its reliability has been assessed as part of the institutional arrangement.

Maintain Accessible Records

Use editable text with structured headings and clearly labelled fields. Avoid making essential procedures available only as scanned images. Check electronic lab notebooks, booking tools, reporting forms and instrument software with the assistive technology actually used. Provide an approved alternative process when a system cannot yet be operated accessibly. W3C guidance supports clear headings and table structure in digital information [9, 10].

4. Apply adjustments to individual access needs

Use the following modules to identify practical options. A person may use several modules or need an arrangement not listed here. Begin with the user's preferred way of working, then verify the relevant controls. Each check below is a proposed implementation test, not a claim that a particular adjustment has already been installed or tested.

A) Blindness and low vision

Separate spatial orientation from material identification and measurement. A person may navigate independently yet need an accessible instrument display. Agree a stable bench layout with a defined preparation area, active work area and waste position. Provide a usable map and an orientation session in which the user locates routine and emergency destinations. Explain changes to the layout before they encounter them.

- Give each instrument and sample position a stable identifier that matches the procedure and inventory. Pair readable text with the agreed tactile or digital format.
- Place tactile identifiers on safe external surfaces. Do not require touching open vessels, hot components or potentially contaminated areas to identify them.
- For similar containers, use a verified combination of identifiers and fixed locations. Confirm identity from the current record before use rather than relying on shape or colour alone.
- Provide usable access to values, units, signs, decimal points, selected settings and instrument errors. Magnification, audio or compatible data output should preserve all these details.

Verification: ask the user to locate the required items and retrieve a representative value and its unit from the actual instrument. Include an unexpected label or error message. If identification is uncertain, stop that step and correct the information system. A consumer liquid-level alarm indicates a threshold. It is not automatically a calibrated volume measurement or chemically compatible laboratory device.

B) Mobility limitations and reduced dexterity

Assess the complete movement required by each procedure, including lifting lids, fitting tips, opening caps and reaching waste containers. Check the setup with the user seated or standing as they normally work. Keep samples on a stable working surface rather than balancing hazardous containers on a lap or mobility aid.

- Position the work so the user does not need to lean across an exposure source. Check left- and right-handed use where relevant.
- Consider compatible racks, holders and low-force controls. Verify that clamps do not damage vessels or obstruct safety mechanisms.
- Assess suitable pipettes and opening methods. Do not improvise by modifying an instrument or cutting gloves to obtain grip.
- Use an approved transport arrangement that leaves the user able to control their mobility aid. Match the carrier to the load and route.

Verification: complete the whole handling sequence with safe substitutes while wearing required PPE. Include placing the item down and using the stop control. Check stability, reach and sustained

effort. A successful single movement does not demonstrate that repeated work will remain comfortable or controlled [11].

C) Deafness and Hearing loss

Identify information that is communicated only by speech or sound: timers, instrument beeps, colleague warnings, door signals and building alarms. Provide an appropriate alternative for each safety-critical message. The replacement must convey the event and required response, not simply attract attention.

- Supply written operating steps before work and caption training videos. Agree interpretation where requested.
- Locate screens and colleagues so visual communication is possible without turning away from a hazardous operation.
- Where suitable, use approved visual or tactile alerts alongside the original alarm. Check visibility from the workstation and continuity during power or communication failure.
- Agree with an urgent stop signal that colleagues recognise and can use when the user is not facing them.

Verification: test each critical warning under normal noise, lighting and PPE conditions. Ask the user to identify the warning and demonstrate the relevant safe response. A timer notification must not be confused with an evacuation alert. If a safety-critical warning cannot be received reliably, resolve that barrier before authorising the affected task.

D) Learning disabilities and Intellectual disabilities

Describe the task in concrete language, with one action per numbered step, where helpful. Explain why each safety-critical action matters. Use diagrams or symbols only when the user understands their meaning. Keep reagent names, instrument labels and units consistent with the actual procedure. Adapt instruction to the person's experience without assuming childlike preferences or reduced competence.

Provide practice and a check of the specific procedure. Ask the user to identify the next step, explain a stop condition or demonstrate safe shutdown using a suitable communication format. For time-dependent work, mark what must happen immediately and where a pause is permitted. Record the level of support that is effective for that task and review it as skills develop.

Verification: include a recoverable interruption in a safe practice run. Check that the user can identify the last completed step and resume correctly or request help. If a safety-critical step cannot yet be performed reliably, adapt the instruction or assign targeted support while preserving access to other authorised work.

E) Neurodivergence and Sensory access needs

Agree how noise, lighting, interruptions and crowded work areas affect the user's concentration or comfort. Provide predictable scheduling, advance notice of planned changes and a clear way to request a pause. A quieter workstation may help, provided ventilation, containment and emergency access remain suitable. Assess hearing protection or sensory aids alongside the need to perceive warnings. Do not disable essential alarms to reduce distraction.

F) Chronic conditions and Fluctuating stamina

Agree safe stopping points before fatigue, pain or another symptom makes a procedure difficult. For each pause, specify how samples and equipment are made safe and how work restarts. Schedule demanding handling steps when appropriate and avoid expecting the user to disclose private medical information to colleagues. Food, drink or medication needs should be planned through clean areas and the relevant occupational health arrangements. Personal health needs do not justify eating or drinking at a contaminated bench.

Verification: review performance over the intended work period, not only a short demonstration. Ask the user whether the arrangement creates avoidable strain or makes them dependent on help they did not request. Combined access needs require a combined test of the setup [2, 3].

5. Adapt procedures and equipment for safe work

Adapt the method around the user's actual abilities and the task's hazards. Test changes with safe substitutes before introducing hazardous materials. Confirm that the adjustment preserves sample integrity, measurement quality and the approved operating limits. Do not assume that directing someone else is the only feasible way to perform laboratory work.

Work step	Possible barrier or failure	Adjustment and verification
Pipetting and dispensing	Grip, repeated force or unstable receiving vessels	Assess suitable pipettes, stable racks and positioning. Verify control and required measurement performance.
Weighing and measuring	Unreadable output or inaccessible controls	Assess usable readouts and interfaces. Verify identification of units, values and error messages.
Loading instruments	Awkward reach, heavy components or moving parts	Assess positioning and approved loading aids. Confirm safe loading without bypassing guards.
Observation and analysis	Visual-only results or inaccessible software	Assess accessible output, magnification or compatible analysis tools. Check access to raw data and warnings.
Internal transport	Need to hold containers while using a mobility aid	Assess suitable closed secondary containment and a compatible transport method. Test stability on the route.
Cleaning and disposal	Waste openings or cleaning tools outside reach	Reposition approved containers or provide suitable tools. Check segregation and safe completion.

Handle hazardous materials with verified controls

Use the task's approved material identification, labelling, containment and waste procedures. Make safety data and spill instructions accessible. Review container size, opening force and stability. Where the scientific purpose allows, assess less hazardous substitutes or smaller quantities. A change to concentration or volume requires review of both safety and experimental performance.

For biological work, maintain the required aseptic practices and containment. An adapted tool must be compatible with cleaning and decontamination and must not introduce uncontrolled aerosols or sharps risks. For chemical or physical hazards, retain the required enclosure, guarding and handling controls [4-6].

Validate the adjustment before routine use

Record a task-specific pass condition, such as reliable access to the stop control or successful dispensing with the required accuracy. Verify normal operation and foreseeable problems. If an adjustment changes the instrument or its safety functions, obtain competent technical review. Add the approved change to the operating procedure and train anyone who will provide assistance.

Pipetting and Liquid transfer

Select a pipette or dispenser with usable volume controls, tip fitting and ejection. Arrange receiving tubes in a stable rack and place waste within safe reach. Check that an electronic aid does not add a difficult menu, charging dependency or inaccessible error display. Tool selection should reduce repeated force where possible [11].

Implementation test: using a safe compatible liquid, perform the intended sequence from volume selection to disposal of the tip. Confirm that the user can verify the selected volume, hold the vessel stable and avoid contact with the tip. Check accuracy and precision using the laboratory's accepted verification method. Do not invent a new numerical tolerance or increase hazardous volumes merely to make handling easier.

Stop the affected step if the selected setting cannot be verified, the receiving vessel moves unpredictably or a new tool fails its performance check. Keep the approved rack positions and relevant controls in the local procedure.

Weighing and Preparation of solutions

Provide access to the balance display or its compatible data output. The user must distinguish tare, zero, sign, unit and a stable reading. Position the balance and receiving vessel so the sample can be transferred without stretching across the pan. Accessible output should describe a value accurately rather than relying on a rounded or delayed announcement.

Implementation test: demonstrate taring, a representative measurement and an error or unstable reading. Use a reference appropriate to the instrument's normal verification process. Check that accessibility software does not omit warnings. For hazardous powders or liquids, perform the actual preparation only with the containment and PPE specified in the risk assessment.

Centrifuges and Equipment with moving parts

Assess lid access, sample placement, rotor identification and selection of settings. A rack or loading aid may support handling, but must not alter the rotor or defeat the lid interlock. Retain the

manufacturer's balancing and tube requirements. Different rotor types and sample systems require their own procedure [12].

Implementation test: first use an empty or safe training load to verify loading, balancing, settings and retrieval after the rotor has stopped. Confirm access to the normal stop control and instrument errors. If the user cannot verify a safety-critical setting, improve the interface or agree a trained check for that step. Do not reach into moving equipment or improvise a repair.

Microscopy and Instrument data

Assess eyepiece height, posture, focus controls and sample loading separately. Where suitable, camera output can support magnification or an alternative viewing position. Check that the output preserves the detail needed for the intended analysis. Provide access to raw data, scale information and annotations so the user can interpret results rather than receiving only someone else's conclusion.

Implementation test: let the user acquire or retrieve a representative result and complete the relevant analysis. Document limits of the adjustment, such as inaccessible controls or unavailable metadata. An accessible display does not solve an inaccessible loading step.

Fume hoods and Biological safety cabinets

These devices control different hazards and are not interchangeable. Review the workstation with the designated safety professional and a competent technician. The user should reach materials without compromising the prescribed working opening, airflow or safe work zone. A support surface must not cover air grilles. Cables, holders and accessibility devices require the same review as other objects placed inside the enclosure.

Implementation test: check reach, sample movement and access to alarms in a safe setup before work begins. Where the change affects performance, obtain the technical checks required by the institution and manufacturer. Record the approved position and accessories. Do not use a comfortable posture as evidence that containment remains effective [6, 13].

Storage and Internal transport

Place routinely used materials in accessible locations while preserving compatibility segregation and restricted access. Give shelves and containers identifiers that match the inventory. For transport, assess closed secondary containment, carrier stability, door operation and the destination's receiving space. A carrier must not interfere with mobility controls or emergency movement.

Implementation test: transport a safe substitute through the real route, including doors and turns. Confirm that the user can stop and set the load down safely. Plan assistance for an identified heavy or awkward movement rather than requiring another person for all transport.

6. Preserve protection against laboratory hazards

Accessibility adjustments must retain the protection required by the actual hazard. Use this section to review how access interacts with the laboratory's approved controls. It does not assign a biosafety level or replace the specialist procedure for a chemical, biological agent or instrument.

Chemical identification and Exposure control

Before handling a chemical, the user needs reliable access to its identity, concentration where relevant, hazards and required controls. Link each local identifier to the approved label and safety data sheet. Supplementary tactile or digital information must not obscure mandatory labels. A QR code is useful only when it resolves to the correct current information and can be accessed without contamination or loss of protection.

- Check that dispensing, measuring and returning containers can be completed within the required enclosure or work area.
- Choose chemically compatible holders, covers and aids. A material suitable for water may fail with a solvent, disinfectant or corrosive reagent.
- Confirm accessible waste identification and segregation. Do not rely on colour alone to distinguish incompatible waste streams.
- Include prompt exposure response in the assessment. Use the material's safety data and local instructions rather than a universal cleanup or rinsing rule.

If a spill occurs, alert the designated personnel and follow the approved procedure. Cleanup depends on the substance, quantity and available training. Accessibility must not be addressed by expecting the user to investigate an unidentified spill by touch or smell [6].

Biological materials and Containment

Review how the adjustment affects opening vessels, transferring samples, generating aerosols and decontaminating the work area. Keep sample and waste identifiers usable throughout the procedure. A holder, tactile tag or input device that enters a contaminated area must have an assessed cleaning method or be kept within that area under the approved arrangements.

Check the sequence for changing gloves and returning to clean controls. Agree how a user operates a communication or mobility device when hands may be contaminated. Do not replace an inaccessible handwashing facility with an unreviewed alternative. Document the equivalent hygiene arrangement with the laboratory's safety personnel. Apply agent-specific containment and emergency procedures [4, 5].

Sharps and Breakable materials

Where the scientific method permits, assess suitable alternatives that reduce breakage or sharps handling. Otherwise provide stable supports, clear identification and an accessible disposal point. Do not select material substitutions without checking chemical, thermal and experimental compatibility. Users should not have to reach across a sharp or move it from hand to hand to reach the waste container.

Check an empty training setup to verify the handling and disposal route. Broken glass is recovered using the laboratory's approved tools and method, not by bare or gloved hands. Needlestick or cut incidents require immediate reporting and the prescribed exposure response.

Heat and Pressure

Autoclaves, ovens, hot plates and pressurised equipment need checks of loading, controls, release conditions and unloading. Reduced sensation may make touching an object an unreliable way to determine whether it is safe to handle. Use the procedure's temperature or status information in an

accessible form. Approved handling aids must support the load without placing the user in the path of steam or hot liquid.

Practice loading and unloading with a safe cool setup. Confirm that the user can recognise the conditions permitting opening. Changes to a chamber, pressure boundary or interlock require qualified technical review. Do not use the guide to authorise hazardous pressure work without the relevant training and procedure [12].

Electrical and optical equipment

Keep electrical isolation and emergency controls reachable and clearly identified. Inspect leads and connections under the local procedure. Isolate equipment before connection or servicing as required. A one-handed technique is not a substitute for removing electrical hazards. Repairs and modifications belong to qualified personnel.

For lasers and UV sources, assess the user's actual seated or standing eye position and the movement needed to operate controls. Preserve enclosures and interlocks. Protective eyewear must match the source and approved hazard assessment. Tactile labels or magnifiers must not encourage approaching an exposed beam. Agree accessible status information with the designated specialist. Radioactive materials and other specialised hazards require their own authorised programme [14].

7. Select usable personal protective equipment

PPE must match the hazard and remain effective in the user's actual working position. Check fit, coverage, removal and interaction with glasses, hearing devices, prostheses, mobility aids and communication tools. A different design may be appropriate, but reduced protection is not an acceptable accessibility adjustment.

Protection	Check before approving use
Laboratory coat or protective clothing	Coverage while seated or standing, freedom of movement, snagging risks and prompt removal.
Gloves	Required material compatibility, fit, grip, dexterity and ability to remove them safely.
Eye and face protection	Required coverage, fit over corrective lenses and compatibility with other devices.
Respiratory protection	Selection, fit testing where required, communication and suitability through the institutional programme.
Foot or lower body protection	Task-specific coverage and compatibility with posture, prostheses or mobility aids.

Test protection during the procedure

Practise manipulation, reading controls and using communication tools while wearing the full required PPE. Check that the user can stop work and remove contaminated equipment using the agreed method. Where assistance is needed for removal, ensure trained staff are available at the relevant times.

A face shield alone does not replace required primary eye protection [8]. Do not loosen a fitted respirator, remove required gloves or cut protective clothing as an improvised solution. Assess another suitable design or a revised method. Obtain occupational health advice when fit, allergy, tolerance or health concerns affect selection.

Keep assistive equipment functional and clean

Agree how personal devices will be used in clean and potentially contaminated areas. Prevent transfer of contamination to phones, communication aids, handles or mobility controls. A protective cover must not obstruct ventilation, movement, sensors or communication. Confirm cleaning compatibility with the manufacturer and the laboratory's decontamination requirements before applying chemicals.

Plan breaks and Recovery

Agree safe stopping points, removal of contaminated PPE and access to clean rest areas. Keep required protection available for restarting work. Rest breaks, posture changes and flexible scheduling should be integrated into the work plan rather than treated as an unexpected interruption.

8. Support autonomy and Reliable working arrangements

Determine supervision from training, the task assessment and the effectiveness of the agreed controls. A disability does not automatically require continuous supervision. Independent work should be supported where the user can carry out the authorised procedure and respond to foreseeable difficulties with the available arrangements.

Agree targeted assistance

- Specify which actions need assistance and which remain independent.
- Name the trained person providing each agreed action and identify a backup where continuity is safety-critical.
- Agree how help is requested and the response time needed for the task.
- Ask before physical assistance or moving personal equipment.
- Record what happens if the assistant is unavailable. Pause only the affected work when its required control is missing.

An assistant entering a restricted area must have appropriate training and authorisation. A companion or interpreter is not automatically qualified to handle laboratory materials. Preserve the user's control of scientific decisions, data and workflow when someone assists with a physical step.

Assess lone and out of hours work

Apply the institution's lone-working rules and assess whether help, alarms and emergency response remain available at the proposed time. An arrangement that is safe during staffed hours may not be

adequate at night. Record any limits for the specific task and the reason for them. Do not substitute a general ban based on disability for this assessment.

Account for changing access needs

Discuss how fatigue, pain or fluctuating symptoms may affect particular tasks and how the user wishes to manage them. Offer safe stopping points, suitable scheduling and alternatives within the approved work. Reassess when a change affects hazard control. Occupational health should address relevant confidential health questions, rather than requiring users to disclose them to the whole team.

Maintain safety and security together

Provide usable access controls, booking and reporting tools. Do not solve an inaccessible door or login by leaving a restricted area open or sharing credentials. Arrange approved individual access and document authorisation for assistants. Maintain sample identity, inventories and responsibility for restricted materials when tasks are shared.

Where assistance involves sensitive data or materials, define the permitted scope and follow institutional confidentiality and security procedures. Accessibility should allow an authorised person to perform their role while preserving the same safeguards expected of other laboratory users.

9. Prepare Accessible Emergency Arrangements

Emergency planning must cover the actual work locations, alert systems, routes and operating hours. Develop a personal emergency evacuation plan where the general arrangements do not meet the user's needs. Involve the user, building management and designated emergency personnel. Technical guidance on inclusive evacuation is available from the UK Home Office [7].

Verify alerts and response

- Confirm that emergency signals can be perceived while the user is working and wearing PPE.
- Identify the approved escape route, assembly point and any planned alternative.
- Name trained assistants and backups if the plan requires them.
- Confirm that any evacuation equipment is available and its operators trained.
- Test the agreed communication method and its backup.
- Arrange a safe drill and record any problem requiring correction.

Avoid improvised evacuation

Do not rely on an untrained person carrying someone down stairs. Use only approved evacuation equipment and techniques. An ordinary lift is not a fire evacuation route unless designated and operated under the building's approved plan. A refuge requires communication and planned onward assistance. Confirm arrangements for every relevant shift and location.

Prepare for spills and exposure

Make task-specific emergency instructions and safety data available in usable formats. Verify that eyewash and emergency washing can be used promptly from the working position. If assistance is

required, define it and test its availability. Prevent the affected hazardous procedure from starting when prompt emergency response cannot be achieved.

During an incident, stop work if this can be done safely, alert the designated responders and follow the laboratory's exposure or spill procedure. Spill cleanup is performed only by appropriately trained and equipped personnel. Do not improvise decontamination of skin, clothing or assistive devices. Provide responders with the information needed to support communication and safe assistance.

Record local arrangements

Laboratory and work areas _____

Emergency contact and method _____

Alarm format and backup _____

Assembly point and plan location _____

Assistance and backup where required _____

Plan owner and date of last drill _____

Review the plan after a failed drill, an incident, a change in equipment or a change in access needs. The existence of a written plan does not demonstrate that it works. Record the result of the practical check and close outstanding actions before relying on it.

10. Report barriers and improve routine practice

Treat an access barrier as an operational issue that requires a response. Users should be able to report inaccessible equipment, failed adjustments, missed warnings, incidents and near misses through a usable route. Reporting must remain possible when the normal digital form cannot be operated accessibly.

Document and follow up

Record the task, location, barrier, failed control, immediate action and any injury or exposure. Include the user's account and the effect on work. Assign an owner and a completion date to the corrective action. Tell the user how the concern will be addressed and check the revised arrangement before closing the record.

If an institutional system restricts submission to designated staff, provide an accessible route to an eligible staff member who documents the report and confirms receipt. This should not prevent the user from raising a concern. Urgent hazards require immediate escalation through the laboratory's emergency procedures.

Evaluate usable access and meaningful work

What to review	Evidence to record
Task access	Which authorised procedures can be performed with the agreed adjustments.
Autonomy	Which steps remain independent and whether assistance matches the user's preference.

What to review	Evidence to record
Reliability	Whether adjustments, warnings and emergency controls work consistently.
Resolution of barriers	Time to implement changes and evidence that the corrected method was tested.
User experience	Reported difficulty, fatigue, clarity of information and suggestions for improvement.

Do not infer successful inclusion simply from entry to the laboratory or the absence of injuries. Include the quality of access to equipment, procedures and scientific work. Report any measured outcomes with clear definitions and denominators, without claiming results that have not been collected.

Protect privacy and Maintain ownership

Restrict personal access records to those who need them. Share practical arrangements with colleagues without unnecessary medical details. Public descriptions, photographs and quotations require the appropriate consent. Keep the laboratory's risk records separate from promotional accounts of the guide.

11. Build and Maintain a local Accessibility Toolkit

The toolkit below is a specification for local implementation. Select only components needed for the laboratory's users and tasks. It extends beyond navigation to identification, procedure execution, warning recognition and recovery from a failed adjustment. Components must be checked before use and maintained alongside the laboratory's other safety controls.

Component	Required content	Acceptance check
Access profile	Work locations, information formats, task-specific support and emergency plan reference.	The user confirms the record and can request a change.
Workstation record	Approved layout, instrument identifiers, working position and accessories.	The user performs the intended sequence without compromising controls.
Information set	Current procedures, labels, units, hazard information and accessible outputs.	Identity, values and urgent instructions are retrieved reliably.
Communication set	Routine messages, urgent stop signal and tested backup.	The relevant message is received and acted on at each work location.

Component	Required content	Acceptance check
Procedure access sheet	Adjusted steps, unchanged safety controls, stop points and recovery actions.	Safe practice verifies each affected step and the restart method.
Maintenance record	Owner, inspection trigger, defects, replacement and retesting.	A failed component is removed from reliance until corrected.

Create a usable workstation record

Record the instrument model and the specific workstation, not just a room name. Use a clear layout description or accessible diagram showing where materials and waste are placed. List approved accessories and the settings relevant to access. Agree how other users restore the arrangement after shared work. Do not publish sensitive access or security details on an unrestricted noticeboard.

Control identifiers and Information versions

Assign a stable identifier to each item in the local access record. If a label, sample position or equipment location changes, update the matching procedure and inventory. Keep the approved version and its revision date visible. A spoken label must include enough information to avoid confusing similar items. A tactile identifier should not become detached during routine cleaning.

Check assistive devices as laboratory equipment

Before using an aid, record its intended function, compatibility with the task, cleaning requirements and limits. Check electrical safety and installation where relevant. Confirm that required values and warnings remain available with the chosen interface. For software, test keyboard or assistive-technology access after an update. For portable alerts, include power, connectivity and a backup appropriate to the hazard.

Make failure recovery explicit

For each safety-critical aid, state what the user does if it fails, how the procedure is made safe and who restores the control. A new accessible method should not depend on a single colleague remembering an undocumented workaround. Keep a verified alternative when feasible. Reassess the affected procedure if no safe alternative is available.

Prioritise implementation

Address barriers that prevent reliable hazard recognition, stopping work or emergency response before starting the affected task. Next implement adjustments needed for routine handling and information access. Then improve sustained comfort, efficiency and access to additional procedures. These priorities organise action. They are not numerical scores that can be averaged to approve an unsafe task [15].

12. Reusable work and Adjustment records

Use these records alongside the laboratory's risk assessment and authorisation process. Complete them with the user and relevant staff. Record only information required to implement the agreed arrangements. Repeat the task record when different procedures need different controls.

Individual laboratory work plan

User name or confidential identifier _____

Laboratory and manager _____

Intended procedures and equipment _____

Preferred information and communication formats _____

Independent work and agreed assistance _____

Approved working hours and any task limits _____

Training and authorisation record location _____

Emergency plan location _____

Review date and responsible contact _____

Task risk and adjustment record

Procedure and operating document version _____

Hazard and possible exposure or injury _____

Access barrier affecting safe performance _____

Agreed adjustment and implementation owner _____

Effect on containment and scientific performance _____

Practical test and observable pass condition _____

Test result and remaining risk _____

Authorisation decision and any conditions _____

User feedback and next review _____

Check before starting work

- The intended procedure is within the user's training and authorisation.
- The workstation, equipment and required adjustments are available and functioning.
- Instructions, material identities and relevant warnings are accessible.
- Required protection is usable and effective in the working position.
- Any safety-critical assistance is available at the agreed time.
- Emergency alerts, equipment and the agreed response arrangements are usable.

Pause and Reassess when a control fails

A missing assistant, failed device, inaccessible warning or blocked exit may invalidate an arrangement for a particular task. Make equipment safe using the approved procedure, report the problem and restore the control before restarting the affected work. Record changes rather than relying on an informal workaround.

Authorising person and date _____

Decision and conditions _____

Actions required before work resumes _____

Procedure Access Sheet

Use one sheet for each procedure that needs an adjustment. Keep it with the approved operating procedure. The user and laboratory manager should confirm the steps and the practical test result before routine reliance on the change.

Procedure and document version _____

Workstation and instrument identifier _____

User preferred working method _____

Required protection and containment _____

Adjusted step and tool used _____

Safety-critical setting or value to verify _____

Accessible way to confirm it _____

Safe pause point and shutdown instruction _____

Failure condition and recovery action _____

Assistance for the specific step if required _____

Scientific performance check and result _____

Authorising person and review date _____

Practical Verification Record

Check	Evidence required
Normal work	The adjusted step is completed in the actual position with required PPE.
Identification	The user verifies the correct material, setting and unit.
Interruption	The user locates the last completed step and resumes correctly or requests help.
Fault or warning	A safe simulated fault is recognised and the correct response demonstrated.

Check	Evidence required
Recovery	The agreed backup or safe stop method is available.
Sustained use	The intended work period does not introduce an unresolved control or strain problem.

Record pass, needs adjustment or not applicable for each relevant check, with evidence. Not applicable needs a reason. Safe simulations must not disable a real safeguard or expose anyone to hazardous material. Unresolved safety-critical checks prevent approval of the affected procedure.

Record and Close a barrier

Barrier and affected task _____

Immediate restriction or safe alternative _____

Corrective action and named owner _____

Target date and user informed on _____

Retest evidence and user feedback _____

Closure decision and review trigger _____

13. Sources and Attribution

The workflow, task records and review prompts are an original synthesis for this guide. The sources provide technical and accessibility foundations. Their inclusion does not imply endorsement by the organisations named. Foreign guidance is used as a technical resource, not as a statement of Greek legal requirements. Local institutional procedures govern implementation.

[1] Patras-Med iGEM 2024. Inclusivity and laboratory safety resources, including the general safety guide and Lethe navigation kit. Acknowledged as prior work. This guide uses an independently written structure, procedures and implementation tools. The 2024 wiki is licensed CC BY 4.0.

[2] University of Washington DO-IT. Making Science Labs Accessible to Students with Disabilities. Universal design and individual accommodations.

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[15] University of Washington DO-IT. Checklist for Making Engineering Labs Accessible to Students with Disabilities. Procurement and review considerations.