Accidents and Emergencies

Module 2

ROYAL SOCIETY OF CHEMISTRY

Health & Safety Essentials

Registered charity number 207890

Accidents and emergencies typical responses

This brief guide does not attempt to replace the first aid or emergency response procedures provided by your organisation but should help those in chemical laboratories to be better prepared and plan a safe working environment using a risk management approach.

You should make yourself aware of your organisation's procedures for first aid and emergencies.

Details of your organisation's procedures for first aid and emergencies will be found in the safety policy or manual.

The order of priority when dealing with accident & emergency conditions is the protection of the:

1. health and safety of people on and off site
2. environment from pollution
3. public from avoidable nuisance
4. organisation from avoidable interruption

How you actually respond at the time requires recognition and evaluation of:

- what is happening / has happened
- the significance of the deviation from 'expected'
- the scale or consequence (is it small and quick or large and protracted?)
- the urgency required (is the severity immediately obvious?)
- the likely escalation (will the scale or consequence increase with time if no action taken?)

Listed in the table below are typical injury, accident and emergency events relating specifically to laboratory work with example responses. All laboratories should have at least one member of staff who is both first aid trained and has specialist chemical knowledge to deal with these situations. Other incidents that are not specific to a lab, for example bruises and falls can be dealt with using routine procedures by other first aid trained personnel (not necessarily with specialist chemical knowledge).

Personal Injury Accidents *"an unplanned event that leads to actual bodily harm (injury or ill-health)"*	
A primary consideration for responding first aid attendants is ensuring their own safety and the same applies to untrained staff helping in the early stages of a response. This should be kept in mind when reading the possible responses detailed below; nominated persons need to be competent to give First Aid and the injured encouraged to seek medical advice.	
Cuts / puncture wound: *no chemical*	Routine first aid procedure: wash – bleed – report.
Cuts / puncture wound: *chemical contact*	The properties of the chemical will dictate the course of action but in almost all cases, thorough and continuous irrigation of the area with clean water will be the first response. It is unlikely that a large amount of chemical will enter the body via this route but if it is highly toxic or a potent biological agent, then immediate medical attention should be sought as irrigation continues.
Asphyxiation: *not involving harmful, chemicals*	Move casualty to fresh air - routine CPR procedures.
Inhalation hazardous chemical: *acute effect*	Where the expected impact is acute, remove casualty to fresh air and monitor recovery rate. If the person has been using cyanide or something toxic the first aider needs to be careful not to contaminate themselves.
Inhalation hazardous chemical: *chronic effect*	Once any acute effects and their treatments are completed, recommend the casualty seek medical attention for further examination / tests to establish the extent of the exposure.
Corrosive chemical burn to skin **OR** **Contact with substance that is toxic by skin absorption**	The properties of the chemical will dictate the course of action but in almost all cases, **thorough and continuous irrigation of the area with clean water** will be the first response. A number of substances, such as phenol or hydrofluoric acid, have very specific responses to contamination or exposure. The specific response or treatment should be readily available at the work location prior to handling these materials.
Corrosive chemical burn to eyes	The properties of the chemical will dictate the course of action but in almost all cases, **thorough and continuous irrigation of the area with clean water** will be the first response. In the special case of eye injuries, speed of response is even more critical than other exposures so it is vital that the provision of equipment and facilities for rapid response is checked before work starts.
High temperature burn & scalds **OR** **Electrical burns**	Remove the cause and halt the burning process and relieve pain by dousing the affected area **with cold water for 'many' minutes** whilst taking into account risk of hypothermia. Expect and prepare for the casualty to show signs of shock in all cases.
Low temperature burn	Remove the cause, loosen clothing to improve circulation and **apply lukewarm water** to affected area. Loosely wrap the affected area to keep warm.

Ingestion of toxic or very harmful chemical	If there is a specific response or treatment (e.g. antidote) for the substances being handled, it should be already be available at the work location prior to handling these materials. If someone has ingested a significant amount of toxic material, emergency medical support should be called without delay and the casualty reassured pending their arrival. It is *not* best practice to induce vomiting or allow the casualty to drink fluids unless a medical practitioner specifically defines this.
Electric Shock	Assess danger, and ensure all power sources are isolated. A typical First Aid response would be a rapid assessment of response, and would depend on the levels of consciousness, and if a state of danger remains. Even if the injured appears well, it is still advisable to attend a hospital or a medical facility for a check up as certain organs and systems may be affected several hours after the shock
Emergencies *"an event that needs internal or external intervention to regain control"*	
Responding to emergencies requires actions that are both rapid and considered. The intention is to prevent escalation by simple and immediate activities, whilst not placing the responders at unreasonable risk. Requesting support / back-up at the start or during the early stages of response is always required.	
Fire	The priority on discovering a fire is raising the alarm and ensuring everyone can reach a place of safety. The option to tackle the fire may be available but should only be taken if safe to attempt, and by persons who have been trained to do so. In many facilities, activating the fire alarm will turn off the fume cupboards (to eliminate the chimney effect they create) so remaining for any period would be unwise and may activate dampers within the extract ducts to seal off the duct work.
Run-away / out of control experiment	Turn off the energy (e.g. heating) source from outside the fume cupboard or other remote location. Leave cooling water flowing and the fume cupboard switched on if hazardous gases / vapours are expected to be released. Consider if escalation is possible / likely or if the event can be dealt with locally.
Chemical spillage or leaking container: *liquid*	The location of the spill will dictate the response. In many cases, barriers / marshals may be needed to prevent others from approaching. The response could include deployment of absorbent or addition of a neutralising agent. Where the material is flammable, an evaluation has to be made based on scale and location as to whether ignition is likely or if the material can be absorbed and disposed of. A fire extinguisher should always be at the ready when dealing with a flammable spillage.
Chemical spillage or leaking container: *solid*	It may be possible to take a more measured approach to dealing with solids, unless there are pyrophoric materials or it is outdoors (where wind and rain will have a significant effect). In general, protect the area and collect the material using a method that doesn't create dust clouds or spreads the material outside the already affected zone.

Chemical spillage or leaking container: gas / vapour	A significant release may require an evacuation. Marshals can guide people along correct routes to a place of safety, and should be set up before sounding an alarm if possible. If a chemical release is outside, staying in-doors may be the best response. For small releases, general dilution ventilation by opening windows and doors may be adequate.
Flooding & severe weather events	Areas at risk from flooding are normally well-categorised both from severe weather events and from dam/storage failures and should have response plans in place. Various severe weather events can affect lab operations and chemical storage. If a sudden, rapidly escalating and unexpected weather extreme is experienced, then the priority order shown above (people, environment, nuisance and business) should still be followed. Local responses range from evacuating people, assessing impact on chemical storage, equipment and processes. The final response regarding severe weather conditions is resuming normal operations. This requires a thorough inspection of vulnerable areas such as access routes and equipment & service pipelines.
Medical emergency *(serious ill health)*	These ill health conditions do not usually arise from a single event in the lab, though there may have been a trigger for a pre-existing medical condition. Normal first aid will be the immediate response but this situation may require immediate back-up from external services. The organisations emergency plan should describe how external response is summoned and who carries this out. In all cases, if there is any doubt about the emergency services response, a follow up phone call should be made.
Utility failures	The utility failure in itself is not a problem; it is the impact on processes, storage, safe access & egress and possibly the proper functioning of emergency response equipment. The risks and control measures should be within the COSHH assessment and in the organisations' emergency plan. Fridge and freezer failures can result in the thawing out of hazardous (and valuable!) samples, for which care in clearing up may be necessary.