Outside The Hospital
Following decisions may have to be made when patient(s) is/are seen outside the hospital e.g. chemical accident, terrorist attack etc.

1. Make a check for dangers to the medical personnel.
2. As the poisoned person can suddenly become very sick or may need immediate resuscitation, the team should be ready for it.

The dangers to look out for are:

1. Inside a burning building
   a. Smoke and hot air, which arises because of fire
   b. Poisonous gases may be there in case of chemical accident or if plastics are burning.
   One has to be careful as these quickly build up in a closed space.
2. Risk of poisoning of medical personnel from contact with skin or clothes of patients contaminated with poisonous chemicals such as cyanide, organophosphorous compounds, nerve gases like sarin etc.
3. Danger from traffic if the accident had happened on road.
4. Risk of injury from collapsing buildings

What to do:

1. Keep calm and make sure you are safe
2. Raise the alarm and call for help if you happen to be the first person at the site of accident
3. Move the victims away from site
4. Give first aid

Do not go in a burning building or at the site of chemical explosion, unless you are wearing proper protection gear and have breathing equipment. If you do without these, you may become unconscious yourself. A wet rag over mouth or nose will not protect you.
After the first aid has been given to a poisoned patient may have to be taken hospital, which should be done without delay.

It may be worthwhile to contact a poisons information center or a clinical toxicologist if one is available in area.

In The Hospital
If the patient is brought to hospital directly or reaches following should be done

1. Find out what happened and what substance patient got exposed to
2. Do a thorough examination
3. Take measures to prevent further absorption of poison

Looking for Poison

a. Nature of poison
   The information regarding what patient may have ingested (in a suicidal attempt) or exposed to (accidental) may be available from patient if conscious or may have to be obtained from attendants. Ask for information regarding any medicine, pesticides or other chemical products, plants, animals or fish that might have caused poisoning. Ask the attendants to bring any containers, remains of food or any suspected matter. Examine any suicidal note if available, as information may be available regarding poison from it.
   The patient or attendants may not be able to tell. This is likely to happen when patient is unconscious and no attendant was present around the patient or when the poison has no smell or the nature of chemical may not be known or patient may tell lie. Remember that more than agent might have been taken or exposed to.

Circumstances of Poisoning
In any poisoning it is important to know what happened as it is easier to treat if circumstances of poisoning are known. The treatment will not only be more successful, it will be also possible to avoid patient from further being poisoned as it will be possible to undertake preventive measures. Try to find out whether poison was swallowed or breathed in, did it come in contact with skin or eyes. Try to find about any injury or fall. It is also important to know the interval between exposure and patient being brought to hospital.

Examination of Patient
Patient may not show symptoms or signs of poisoning initially as some poisons may take some hours to produce any effect. e.g. paracetamol overdose, mushroom poisoning.

It may be possible to identify poison from certain signs and symptoms. Some of the common signs/symptoms and causative agents are:

1. Tachycardia medications : aminophylline, tricyclic antidepressants, salicylates, atropine, ephedrine, MAO inhibitors etc. drugs of abuse: amphetamines, cocaine, and ecstasy pesticides: Chlorophenoxy acetate, arsenic chemicals: Carbon monoxide
2. Bradycardia medications: digitals, propranolol and other beta blockers, opiates, yellow oleander pesticides: carbamates, organophosphates
3. Smell of breath ethanol, methanol, aluminium phosphide, organophosphates, petroleum distillates, camphor
4. Buccal activity: burns: corrosives ; pieces of tablets may be seen; change in color e.g. poisonous berries
5. Hypothermia: Unconscious patient lying in open and cold place; medications like opiates, phenothiazines, barbiturates, tricyclic antidepressants etc.
7. Hyperthermia: dry hot skin-dhatura, atropine and like, antihistaminics
   wet hot skin-aspirin, salicylates, pseudo- ephedrine, cocaine, amphetamines
8. Convulsions: Cocaine, ecstasy, camphor, methanol, ethylene glycol, arsenic, organophosphates,
   carbamates, strychnine, thallium.
9. Renal failure: aspirin, salicylates, iron, quinine, camphor, methanol, ethylene glycol,
   naphthalene, aluminium phosphide.
10. Pupils : dilated-atropine and like, ephedrine, pseudo-ephedrine, tricyclic antidepressants,
    amphetamines, cocaine, methanol
    narrow-opiates, organophosphates, carbamates
11. Blurred vision: methanol, quinine
12. Sensorium : Changes in behaviour, confusion, hallucinations, drowsiness, and unconsciousness
    are common with sedatives, hypnotics, alcohols etc.
13. Liver damage: iron, paracetamol, rifampicin, aluminium phosphide, zinc phosphide, poisonous
    mushrooms, carbon tetrachloride, benzene, phenol

Poisoning Syndromes
Some of the poisons lead to typical clinical picture which helps in identifying them\(^2\). Some of the syndromes
caused by common poisons are shown in table I.

Table I: Common Poisoning Syndromes

<table>
<thead>
<tr>
<th>Poison</th>
<th>Symptoms/Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>sedatives, hypnotics</td>
<td>Unconsciousness, hypo tension, hypothermia, bradycardia, hallucinations</td>
</tr>
<tr>
<td>amphetamines, cocaine, ecstasy</td>
<td>dilated pupils, fever, tachycardia confusion, over activity, flushed skin, hallucinations, seizures, hyperthermia</td>
</tr>
<tr>
<td>sweating,</td>
<td></td>
</tr>
<tr>
<td>aluminium phosphide</td>
<td>hypo tension, shock, vomiting, diarrhea, liver damage, renal failure</td>
</tr>
<tr>
<td>yellow oleander</td>
<td>vomiting, digitalis like toxicity, cardiac arrhythmias</td>
</tr>
<tr>
<td>organophosphates, carbamates</td>
<td>miosis, sweating, vomiting, diarrhea, fasciculation’s seizures, altered sensorium</td>
</tr>
<tr>
<td>atropine like (belladonna, dhatura)</td>
<td>dry hot skin, hyperthermia, dilated pupils, hallucinations, altered sensorium</td>
</tr>
<tr>
<td>tricyclic antidepressants</td>
<td>dilated pupils, altered sensorium, dry hot skin</td>
</tr>
</tbody>
</table>

How to Prevent Poison from being Absorbed

1. Washing of skin and Removal of contaminated clothes
   Though no randomized controlled trials are available, seems to be the most obvious way of
   reducing further dermal and mucosal absorption. However, care should be taken by health
   workers to protect themselves by using gloves, aprons, eye protection etc. as they run the risk of
   getting poisoned\(^3\). More over this should not be given priority if patient needs resuscitation first.

2. Induction of vomiting /Use of Ipecac
   Vomiting can be induced by tickling the throat or by administering syrup of ipecac. Following
   use of ipecac, the complications reported are aspiration, diarrhea, ileus etc.\(^4\) One systematic
   review suggests that it does not improve outcome in any poisoning. Moreover induction of
   vomiting is likely to delay the administration of activated charcoal.

3. Gastric lavage
   It is most effective when done with in 4 hrs. of ingestion where as some studies suggests it
   helps if done with 1 hr. Use wide bore Ryles tube, instill 100-200 ml of water and remove
   it. Repeat this till 3-4 liters are gone. The complications include aspiration, laryngeal spasm,
   esophageal perforation, and hypoxia\(^5\). These complications are common in a struggling and
   non- consenting patient. Though anecdotal reports suggest that some pesticides like OPC’s, the
commonest poisoning reported from India may remain in gut for prolonged duration, there is no evidence that it helps in removal. In India, as suicide is still an offence, gastric lavage is being done routinely to collect gastric sample for medico legal purpose but it may do more harm to patient than benefit them.

4. Activated Charcoal
   It is fine black powder, which is most effective if administered within 4 hr. of ingestion. 10gm of activated charcoal are given for 1gm of poison. Give it after vomiting has stopped or after gastric lavage is completed. Generally given in dose of 5-10gm dissolved 100-200ml of water till 50gm is given, being the single dose. This may be administered as single dose or may be given as multiple doses. The complications include vomiting, aspiration, constipation, paralytic ileus and reduced absorption of oral medications e.g. antidotes which may have to be given orally. One non-systematic review of single dose activated charcoal in all forms of poisoning, has found it does not improve the outcome. There are some trials to suggest that complications are low with multiple dose regimen. However no studies are available in pesticide poisoning which are most common in developing countries including India. There is need for RCT’s in pesticide poisoning for role of activated charcoal.

Antidotes
   For a number of poisonings, specific antidotes are available. These should be administered as soon as the poison. These are shown in Table II.

<table>
<thead>
<tr>
<th>Poison</th>
<th>Antidote</th>
</tr>
</thead>
<tbody>
<tr>
<td>paracetamol</td>
<td>acetylcystein</td>
</tr>
<tr>
<td>met- hemoglobinemia</td>
<td>methylene blue</td>
</tr>
<tr>
<td>cyanide</td>
<td>dicobalt edetale, sodium nitrite and nitrate</td>
</tr>
<tr>
<td>carbamates</td>
<td>atropine</td>
</tr>
<tr>
<td>atropine, pralidoxime</td>
<td>Organophosphorous compounds</td>
</tr>
<tr>
<td>amphetamines, ecstasy, cocaine</td>
<td>dilated pupils, fever, tachycardia, confusion, over-activity, ushed skin, sweating, hallucinations, seizures</td>
</tr>
<tr>
<td>iron</td>
<td>desferioxamine</td>
</tr>
<tr>
<td>heavy Metals like arsenic, lead</td>
<td>d-Penicillamine, BAL, DMPS, DMSA</td>
</tr>
<tr>
<td>naloxone</td>
<td>opiates</td>
</tr>
<tr>
<td>ethanol</td>
<td>methanol</td>
</tr>
</tbody>
</table>

Management of Complications
   The common complications observed in first few hrs. are vomiting, diarrhea, hypothermia, hyperthermia, respiratory failure, cardiac arrhythmias, renal failure, liver damage and alterations in sensorium including unconsciousness. All these may require institution of treatment along with other measures.

1. If not passing urine: The cause can be dehydration or renal damage. Give i.v. uids, frusemide if needed. Measure the urine in first 6 hrs. and if urine output is less than 500 ml then possibly dialytic support will be required.
2. Pulmonary edema: non-cardiogenic pulmonary edema is not uncommon following organophosphates, toxic gases etc. Make patient lie at 45° and provide respiratory assistance, which may include ventilatory support.
3. Repeated vomiting: given antiemetic like promethazine or metclopramide. I.V. uids may need to be given.
4. Diarrhoea: Generally no medicine is required. Give ORS or i.v. fluids to prevent dehydration.
5. Hyperthermia: is said to be present if temp > 40°C. Remove the patient to cool area, undress the patient, and cover the whole body with wet sheet and fan. If patient is awake, give cool drinks.
6. Hypothermia: Hypothermia is there if temp <35°C. Do not put the patient near direct heat but remove the patient to warm area and cover head, neck and body with blankets but do not cover the face. If awake give hot drinks.
7. Unconscious patient: Keep the patient in recovery position and make sure eye balls are closed. Check vitals. May require respiratory support.
8. Seizures: Seizures are not uncommon. I.V. diazepam is the drug of choice to control them in most of the patients.

References