

Symptom Relief Drug Program

Learner's Manual 2007

Updated by
Ontario Base Hospital Group Education Subcommittee
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INTRODUCTION TO THE SYMPTOM RELIEF PROGRAM

The introduction of symptom relief medications into the setting of pre-hospital care in the mid 1990s was both exciting and challenging. It imparted on the Paramedic a significant responsibility in the care of their patients and the tools to provide relief of suffering and save additional lives.

The symptom relief program was developed to assist emergency patients in the pre-hospital setting with serious or life-threatening emergencies. The medications included in the symptom relief program are salbutamol, epinephrine, ASA, nitroglycerin, and glucagon. They are used for conditions such as bronchospasm, croup, anaphylaxis, chest pain consistent with myocardial infarction or angina, congestive heart failure (acute pulmonary edema) and diabetic hypoglycemia.

Each of these symptom relief medications may be administered to patients where appropriate by symptom relief certified Paramedics under standing orders and protocol. The use of symptom relief medications are controlled medical acts that are delegated to the Paramedic by a recognized Base Hospital and Medical Director. The Paramedic is acting as a direct extension of that physician in the pre-hospital setting and is only authorized to perform controlled acts while on duty in the employment of an ambulance service and under the authority of a Base Hospital.

The symptom relief training program has been developed to assist the Paramedic in becoming competent in identifying patients requiring symptom relief medications and in the appropriate administration of these medications. It has been divided into specific sections to assist with learning each medication. Contained in each section is a brief overview of the pathophysiology of the clinical condition for which the medication is used. Following that is a description of the medication, general treatment algorithms for administration, and illustrative case scenarios. These are similar to those used in the evaluation during the symptom relief course. There is also a pre-test, and an administration procedure checklist to guide you through the steps of medication administration.

The first section, titled "Patient Assessment" provides an overview of assessment emphasizing patients for whom symptom relief medications would be indicated. It is recommended that you review this section first

As a Paramedic learner of symptom relief medications it is recommended that you review thoroughly this manual prior to attending your course. You should complete the pre-course tests included at the end of each section and bring this with you to your course.

The focus of the symptom relief training program is on the development of the knowledge, decision making abilities and psychomotor skills required for medication administration and complying with symptom relief standing orders and protocol.

The symptom relief training program has been designed to include:

- General class lectures
- Practical skills stations where the proper administration of each medication will be demonstrated and practiced.
- Small group oral exercises where participants will work through case-based scenarios to illustrate specific teaching points.

To successfully complete the symptom relief training program, the Paramedic is required to:

- obtain 80% on a multiple choice written examination
- pass the skills proficiency component demonstrating administration of each medication
- demonstrate sufficient knowledge to identify the situations in which symptom relief medications are to be administered or withheld during case-based scenarios.

Any questions that arise from your pre-course review of the material can be addressed with your Base Hospital.

It is through your continued commitment to patient care that we are able to advance the profession of pre-hospital care in such important areas as symptom relief medications.

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TEAM APPROACH TO PATIENT ASSESSMENT

With ongoing changes in emergency medicine, the evolution of Paramedicine and the scope of Primary Care Paramedic practice, the need to strive for a clinical approach to prehospital care versus a technical algorithmic approach is growing ever more important. The Paramedic's knowledge base must be sound, patient assessment has to be focused and accurate, and the Paramedic must have the clinical decision making skills to carefully and quickly weigh the risk/benefit ratio of any and all interventions. To do this, multi-tasking and teamwork are put to the test within the confines of pressure-cooker scene time limits.

A team approach has become more important than ever. With the increased responsibility of drug administration, the driver vs attendant role of the past is inadequate to meet today's needs. Paramedics have a shared responsibility for the patient and all decisions about care. One can no longer be absolved for patient care matters because their role was to drive the ambulance on that particular call. Partners must communicate findings and share in the decision making. Having the attending paramedic perform the entire history gathering while the second paramedic performs most of the technical roles is one suggested format that allows the patient to be assessed thoroughly and accurately in the shortest period of time. The following approach to patient assessment also allows both paramedics to be advocates in treatment of the patient.

Patient Assessment

There are several components to an organized approach to patient assessment. These include:

- I Scene Assessment
- II Initial Assessment
- III Focused history and Physical exam
- IV Ongoing assessment and treatment

Working together these components will assist you with categorizing your patient as injured or ill and help you manage immediate life threats. They will also aid in determining your patient's priority status (CTAS level) and guide further assessment and management techniques that may be required.

I - Scene Assessment

The first step in patient assessment is the initial approach, at this time it is appropriate to STOP and evaluate the scene for the following:

Environmental

Is it safe for you, your partner and patient?

Are there environmental clues that are important to your assessment? e.g. A patient presents on the toilet with chest pain, pallor, diaphoresis and confusion. Further

observation reveals frank red blood in the toilet suggesting chest pain secondary to hypovolemia.

Personal protection

SARS has increased awareness of the need for paramedics to take appropriate precautions to reduce the spread of communicable diseases. This situation highlighted the need for all Paramedics to employ precautions in the form of routine use of personal protective equipment (PPE). Refer to the provincial “Best Practices Manual” and/or local PPE policies and procedures for requirements in your area.

Casualties

How many patients are you working with? Approximate age(s).

Additional Resources

Are more ambulances or other emergency services required? e.g. A hypoglycemic patient may be easy to handle in most cases by two Paramedics. If, however, the patient is combative, additional help may be needed to treat the patient safely.

Introduce yourself and your partner.

Advise patient to limit movement to reduce further harm when appropriate.

II - Initial Assessment

At this time you are going to form a general impression of the patient’s condition and manage with any life threatening condition(s) before moving on with the assessment process. Use the ABC approach you are familiar and comfortable with. Begin by assessing the patient’s level of awareness, airway, breathing, circulation and level of distress. You will then have an idea of the patient’s priorities.

Determining Level of Awareness

Utilize the AVPU scale

A- Alert- does the patient look at you when you walk in the room

V- Verbal -does the patient respond to your **verbal** commands

P- Pain - does the patient only respond to **painful** stimulus

U- Unresponsive (patient does not respond to painful stimuli)

Ask

- What is your name?
- Where are you?
- What month is it?

Assess C-spine (this may need to be done concurrently while beginning assessment)

- Does the history or presenting injury/illness (HPI) or mechanism of injury suggest trauma?
- Ask - Do you have any discomfort in your head or neck region?

Assess Airway

- Patent or not
- Manageable
- Correct if needed

Assess Breathing

- Rate
- Volume
- Workload - Use of accessory muscles? Correct/assist if needed

Chest Auscultation

- Assess all lung fields (optimum is auscultation on the back)
- Assess for breath sounds apices to bases
- Equality
- Adventitious Sounds

Circulation

- Pulses - rate, where found (radial, brachial, carotid)
 - Rhythm – regular, irregular
 - Equality – radial match carotid; right equal left
 - Strength – weak, bounding, strong
- Does the pulse match monitor (pulse deficit)

Determining patient's level of distress (mild, moderate, severe)

- What is patients level of awareness
- Workload of breathing
- Position
- Skin (color, condition, temperature)
- Utilize pain scale (i.e.1-10;

III - Focused History and Physical Exam

Now that the scene assessment and initial assessment have been completed its time to move on to a focused history and physical exam. The pieces of information gathered here will identify any further life-threatening conditions. Keep these elements in mind while performing this assessment:

- **Gathering a history**
- **Performing a physical exam**
- **Assessing baseline vital signs**

Gathering a History:

History of presenting illness/Injury (HPI)

What events and/or signs and symptoms led to the patient's current presentation? Was the onset gradual or sudden? Was the patient at rest or awoken by the symptoms? Was exertion a possible contributing factor?

Chief Complaint

The chief complaint is one of the major pieces of information the Paramedic obtains once all life-threatening findings have been managed. The chief complaint is the patient's description (in their own words). The paramedic does not determine the chief complaint; the patient presents the information i.e. the reason they called.

The majority of chief complaints are characterized by pain or abnormal function. Two examples of a chief complaint are: "I have an ache in my jaw", and "I can't catch my breath".

A patient may have many complaints, but there is only one chief complaint. To determine the chief complaint, the Paramedic can ask, "What is troubling you the most?"

The chief complaint should be recorded and reported in the patient's exact words. By using this method the Paramedic avoids interpreting the patient's verbal response. Interpretation of the patient's words might obscure or change the chief complaint. For example, if the patient complains of chest tightness it is not accurate to report that the patient has chest pain.

The chief complaint should be stated as briefly as possible when reporting and recording. If the patient is unconscious the report and record should state "unconscious" as the chief complaint.

It is also important to record and report associated complaints. For example, nausea and dizziness may be associated complaints of a patient whose chief complaint is chest tightness. (record relevant negative findings as well as positive). The chief complaint might be obvious, an example being an open fracture. However, the Paramedic should ask the patient if he/she has any other serious complaints that might not be obvious. For instance, the patient with a fractured arm may be experiencing shortness of breath; this symptom may be an indication of a life threatening problem such as a chest injury or underlying medical condition.

History of Presenting Illness (HPI)

The history of the presenting illness/injury is the search for a more detailed explanation of the chief complaint or events leading up to the chief complaint. The Paramedic should gather and explore information regarding the patient's symptoms, signs, unusual events or complaints in the last 3 seconds, 3 minutes, 3 hours, 3 days, 3 weeks. The mnemonic **O P Q R S T** will help organize thoughts and questions and assist in the investigation of the chief complaint, especially if the chief complaint is pain or discomfort.

O – Onset of the complaint. When patient was last seen or spoken to; seemed their normal self, activity at onset of complaint(s)

P – Provokes/Precipitating factors/events (include alcohol/drug ingestion if patient's condition, scene observations are suggestive of same); or, palliating factors (what relieves the symptoms; e.g. change in position, rest, etc)

Past history of similar episodes:

- Duration of disorder or age at onset/diagnosis
- Cause (diagnosis) if known
- Usual pattern of attacks e.g. frequency, triggers, pain location/radiation, associated symptoms, features, duration, outcome

Q - Quality of pain or features of episode. Elicit bystanders' descriptions of the episode and number of episodes where applicable, e.g. seizure: any loss of consciousness - immediate, delayed, duration? Possible injuries? What does it feel like? Is it like anything you have had before? If SOB, is this like the last attack? Is current episode different? How is it different?

R - Region, Radiation

S – Severity: ask the patient to rate the pain/discomfort using a 1/10 scale & reassess the pain/discomfort following treatment (e.g. chest discomfort/pain and response to nitroglycerin and O₂); symptoms associated; similar/different from previous episode(s)?

Status of recent health, e.g. hospitalizations, surgery, general malaise, prolonged confinement to bed, changes noted in usual behaviours/appearance/level of function (by family, friends)

T - Time: steady, intermittent, waxing/waning, duration. Treatment prior to paramedic arrival: by patient and/or bystander; medications taken - dose(s), time(s); patient's response; status of rescuer(s), e.g. citizen, fire fighter, police officer, other.

CPR (when applicable)

Attempt to determine the duration of "downtime" prior to start of CPR and duration of CPR prior to paramedic arrival. If the CPR observed (by the paramedic) is incorrect or inappropriate, document it on the Ambulance Call Report.

Past Medical History

After investigation into the history of the current condition is complete in the pre-hospital setting, the Paramedic is primarily interested in the patient's past history as it pertains to the current problem.

Past Medical Problems

Diagnosed medical problems: i.e. MI, angina, hypertension, diabetic, respiratory disorders, CVA/TIA

Risk factors

Smoker (cigarettes/packs per day x how many years?); sedentary life style; bedridden for prolonged period; prescription medication that may have precipitated the event for which you were called; previous hospitalisations for same condition; co-morbidities (other medical conditions that place the patient at greater risk – e.g. respiratory disease is a co-morbid risk factor in a patient presenting with an AMI).

Note: some risk factors are listed when reporting the patient's past medical history. However, thinking of past medical conditions as risk factors as well helps ensure the Paramedic reports historical information that is particularly relevant.

Medications

What medications? Are you taking them regularly? As prescribed? Any new medications? Any over the counter medications? Are any of the drugs expired? Any use of specific medications pertaining to symptom relief, i.e. Nitroglycerin or other nitrates, salbutamol or other drugs used to treat bronchospasm? Insulin, diabetic pills? In the case of suspected overdose, is the pill count consistent with what it should be given the date the prescription was filled and the daily dose?

Does the patient's medication reveal anything about their medical condition(s) that you were not able to elicit through a history? Does the medication confirm the historical data you've ascertained at this point? Do any of the medications contradict what you've been told? Are any of the medications or combination thereof a suspect cause of the patient's chief complaint?

Allergies

Do any pills make you sick? Are you allergic to any medications? What happens to you when you come into contact with the medicine or products that you are allergic to? Do you carry medication for allergies? i.e. auto injectors

Physician

Physician name? Past visits? For what purpose?

Last Time in Hospital

For what? Recent surgery? Surgical problems? Recent infections? Previous diagnostic investigations, for example: coronary angiography? Tests?

Performing a Physical Exam:

Head to toe exam

(The exam should be a focused exam based on the patient's HPI and chief complaint)

The head to toe exam should only take a few minutes to complete at most. You may want to focus your secondary assessment to specific body systems. Example: For a patient complaining of chest pain, the first focus might be on the cardiorespiratory system. However, cardiac output is a determinant of cerebral perfusion, so assessment of the neurological system with a focus of GCS and orientation is also



CLINICAL CAVEAT

While eliciting a history from an asthmatic, a description of previous ER admissions or ICU admissions may signal a patient who is at high risk of respiratory failure/arrest and should prompt the paramedic to prepare for a potentially rapid patient deterioration.

appropriate. Assessment of range of mobility and pelvic stability is not appropriate at this time. When scene time needs to be minimized, assessments that are unlikely to alter treatments should be performed en route to the hospital.

It is also important to maintain the patient's dignity and privacy while performing an exam.

During the head to toe examination, the Paramedic will use three skills: *inspection*, *auscultation* and *palpation*.

Inspection:

To inspect a patient, expose the body area. Look at each area for normal and abnormal findings. Abnormal findings include edema, JVD, surgical scars, skeletal deformity, contusions, indrawing, accessory muscle use, hives, localized swelling, etc.

Auscultation:

Auscultation of the chest is used to determine the equality of breath sounds and the presence of adventitious sounds – e.g. crackles or wheezing.

Palpation:

To palpate a patient, feel each area of the body for symmetry or abnormalities. Abnormal findings include masses, pulsations, tenderness, pitting edema, deformities, etc.

Head

Examine the head and face for lacerations, contusions, deformities or facial distortions. For example, a CVA may cause unilateral facial droop. Check for any drainage from ears, nose or mouth. Examine for signs of pallor, cyanosis or diaphoresis. Check eyes for bleeding, pupillary shape, size, equality and reactivity, contact lenses and foreign bodies. Check mouth for hydration of mucous membranes, condition of teeth and note any unusual breath odour. Check for localized swelling of the face, tongue or pharynx when allergic reactions are suspected.

Neck

If trauma is suspected, maintain the head and neck in a neutral position. While supporting the neck, examine for posterior midline tenderness or rigidity of the cervical muscles and vertebrae. If the mechanism of injury and exam findings indicate a possible cervical spinal injury, manage accordingly with immobilization.

Assess for jugular vein distension. If pertinent to the call, assess for tracheal deviation.

Chest

Initial auscultation will have been done in primary assessment and repeated in secondary assessment with more attention to detail.

Expose and examine the chest, looking for contusions, lacerations, abrasions, paradoxical motions, surgical scars and the use of accessory muscles, intercostal or

supra sternal indrawing and symmetry. Look for hives or rashes. Palpate for subcutaneous emphysema, tenderness, bony crepitus or instability.

Auscultate the chest for air entry and the presence of adventitious breath sounds. When checking breath sounds, place stethoscope on midclavicular line just below clavicles (for apices), and on back to auscultate bases and middle portions of lungs, comparing right and left side of the chest. After listening, abnormal findings may include no air entry or decreased air entry, unequal air entry, wheezes or crackles.

Abdomen

Expose and examine the four quadrants of the abdomen, looking for contusions, lacerations, abscesses, surgical scars, penetrating wounds or objects, distension, pulsatile or non-pulsatile masses. Look for injection marks or bruising, suggesting insulin use. Palpate the four quadrants for tenderness and rigidity.

Back

Examine the patient's back for deformity, tenderness, rigidity of muscles and dependant edema. If the HPI (e.g. mechanism of injury) and exam findings suggest a possible spinal injury, ensure appropriate immobilization.

Pelvis

Examine the pelvis for deformity, contusions, abrasions, lacerations, tenderness or instability. Observe the genitalia for bleeding, priapism or incontinence when appropriate.

Extremities

Expose and examine the upper and lower extremities for fractures, bleeding, contusions, lacerations, abrasions, tenderness, deformity, edema, pulses, capillary refill, temperature of limb, muscle strength and sensation. Check arms for needle marks and medical information bracelet.

Obtaining Baseline Vitals:

Vital Signs

It is important that all six (6) vital signs be taken together as a group. The 6 vital signs are:

- **Glasgow Coma Scale (GCS) where applicable**
- **Skin-colour, condition and temperature**
- **Blood Pressure**
- **Pulse (rate, rhythm, volume, does pulse match monitor)**
- **Respirations (rate, rhythm, volume)**
- **Pupils (size, reaction)**

Vital signs serve as a good gauge of the patient's condition. For stable patients, vital signs should be taken every 10 minutes at a minimum. For unstable patients, vital signs should be assessed every 3-5 minutes.

The purpose of these measurements is to provide a baseline of comparison for later readings. Comparison may indicate any improvement or deterioration in the patient's condition.

It is essential to document, and deliver these baseline vital signs to receiving hospital staff.

Treatment Decision

At this stage, the Paramedic has completed the initial (primary) assessment, obtained the chief complaint, made a decision as to the severity of the patient's condition, obtained a history, gathered the base line vitals, and completed a focused (system specific) head to toe exam. Next, the Paramedic decides on initiation of a symptom relief medication adhering to protocol.

The patient's condition must be reassessed for improvement or deterioration after treatment has been given. Findings may indicate additional care is required; for example, assisting ventilations or additional Symptom Relief protocols.

Transport

After the *initiation* of symptom relief treatment the patient is then transported to hospital code 3 or 4 as their condition dictates. Accurate CTAS determination reporting and documentation is required. The goal is to have initiated treatment and be transporting patient to the hospital within 10-15 minutes upon arrival at patient's side.



CLINICAL CAVEAT

Transport should not be delayed beyond the first dose of a symptom relief drug.

IV - Ongoing Assessment and Treatment

Assess the patient for improvement or deterioration in response to any interventions. Treat patient until asymptomatic as long as patient's vital signs and condition remain within the protocol. Keep these steps in mind as you continually assess and monitor your patient:

- Repeat the initial assessment
- Reassess and record vital signs
- Repeat the focused assessment for additional complaints
- Check interventions

Remember this ongoing assessment needs to be performed on any patient regardless of their level of acuity. A stable patient should be reassessed at a minimum of every 15 minutes and an unstable one every 5 minutes at minimum.

“Team Work” Patient Assessment

EFFECTIVE QUESTIONIONING TECHNIQUES

Paramedic 1

Paramedic 2

SCENE ASSESSMENT		
Initial Assessment	<p>Assess LOA (AVPU) *C-Spine Control (If Indicated) Level of Distress</p> <p>↓</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;">Assess: Airway Breathing Circulation</div> <div style="display: inline-block; vertical-align: middle; font-size: 2em;">}</div> <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-left: 10px;">Intervene if required</div> <p style="margin-left: 20px;">Position Patient on Stretcher</p>	<p>Remove equipment from, and prepare stretcher</p> <p>Be prepared to attach oxygen delivery & assist as required</p>
Focused History & Physical Exam	<p>Gather Chief Complaint ↓</p> <p>Auscultate Chest ↓</p> <p>History of Current Condition ↓</p> <p>Past Medical Conditions ↓</p> <p>Medications ↓</p> <p>Allergies ↓</p> <p>Physical Exam pertinent to patient presentation</p>	<p>Attach Cardiac Monitor SPO2 ↓</p> <p>Obtain Vital Signs ↓</p> <p>Obtain Blood Glucose ↓</p> <p>Report findings to partner</p>
Ongoing Treatment & Assessment	<p>↓</p> <p>Transport</p> <p>Re-evaluation Continual Assessment Treatment</p> <p>Report</p>	<p>Treatment decision (5 minutes) ↓</p> <p>Provide Treatment</p> <p>Provide safe transport Advice, hospital updates as required</p>

It is important for the Paramedic to understand three types of questions that can be used, and the type of answer produced by each. The way a question is asked can influence a patient's response, therefore attention to the type of question should be carefully considered.

Open-ended questions – In an open-ended question, the paramedic does not influence the patient's response. An open-ended question cannot be answered by "yes" or "no".

Examples of open-ended questions:

"What is the reason you called for an Ambulance"?

"Can you describe what it feels like?"

Closed-ended questions - A closed-ended question can be answered by "yes" or "no", thereby limiting the response. Closed-ended questions should not be used until the chief complaint is determined. After the chief complaint is determined, closed-ended questions can help to obtain a relevant past history.

An example of a poor closed-ended question:

"No shortness of breath today sir?"

A closed-ended checklist approach to questioning can be helpful in gathering a history. Example: "Have you ever had Angina? MI? Diabetes? Has the doctor ever said you have had water in your lungs"?

NOTE: Closed-ended questions can be used to determine the chief complaint and to obtain past history *only if* the patient is so distressed that he or she can only respond in one or two word answers, such as a patient with severe shortness of breath.

Leading questions - A leading question is formed with key words that influence the patient's answers. The correct way to ask these questions is to use an open-ended question.

Example of a leading question: "Are you having trouble breathing"?

Example of an open-ended, non-leading question: "How is your breathing"?

Open-ended questions allow the patient to describe complaints accurately and in their words.

TIPS, TRICKS AND TRAPS ON HOW TO IMPROVE YOUR HISTORY TAKING TECHNIQUES

- Follow up on the particulars. A patient might say, "I had a mild heart attack last year". By following up on the particulars, the Paramedic may find that this patient was defibrillated by paramedics at home and spent two weeks in C.C.U.
- Accompany colleagues and listen to them take a history. How does their history taking skill differ from yours?
- Clarify lay expressions, such as, "he had a seizure", by asking the lay bystander to describe exactly what he/she saw.
- Avoid asking questions that may lead the patient, "So you have chest pain"? "Are you sure you're not SOB"?
- Attempt to ask the same questions in the same order during each history to avoid errors or omissions.
- Try not to put words in the patient's mouth. If the patient complains of abdominal pain, don't ask if the pain is sharp or dull. Instead, ask "can you describe the pain for me please?" The patient's response to the open-ended question may be "tearing" which may indicate a dissecting aneurysm.
- Be patient! The patient's anxiety, fear or age may hinder your abilities to obtain an accurate history. A calm, practised approach will create a more comfortable environment for the patient, impart a sense of confidence in your abilities as a professional and get results.
- Commit to memory a history mnemonic or a list of questions you can call upon, for example, OPQRST.
- Ask about pertinent negatives. For example, a patient with chest pain can be asked about sweating, dizziness, palpitations, shortness of breath and nausea.
- Use language that the patient understands. "Do you sleep on two or more pillows at night"? As opposed to "Do you suffer from orthopnea"?

HOSPITAL REPORT

Effective communication between the Paramedic and hospital will improve the care received by patients. Communication is often overlooked as a key component of good patient care and continuity of care.

The three methods of reporting are:

1. Radio communication
This report should be brief (1 -2 minutes maximum) and provide the following information:
 - the unit number identification
 - number of patients with patient's age, gender, degree of distress (including level of consciousness)
 - CTAS level and code you are travelling
 - chief complaint **with a brief history of present illness/injury**
 - **treatments given, results, vital signs and a brief summary of working assessment problem(s)**
 - destination and ETA.

2. Ambulance Call Report (ACR)
A complete, thorough legal document covering all pertinent information and details with regard to the call. See ACR completion manual for details.

3. Verbal report to the Emergency Department staff
At this time the staff will require:
 - current CTAS level
 - brief patient history, including incident and relevant past medical history
 - pertinent physical findings
 - details on any treatment at scene/en route (and results)
 - allergies
 - most recent vital signs.

It is important to document on the ACR that a report was given to receiving facility staff. Document the name of the staff member and have them sign the ACR when possible.

SALBUTAMOL

SALBUTAMOL

For treatment of: Asthma / Bronchitis / Emphysema

Objectives

At the conclusion of studying the module and participating in a classroom lecture/demonstration, the learner will:

- a) Explain the pathophysiology of Asthma and COPD (Chronic Bronchitis/Emphysema).
- b) List four (4) clinical signs and symptoms of Asthma and COPD.
- c) Demonstrate the appropriate history taking and physical assessment for the patient with Asthma and COPD.
- d) Demonstrate PCP treatment of Asthma/COPD.
- e) List the indications and contraindications for administration of Salbutamol.
- f) List the effects and side effects of Salbutamol inhalation.
- g) Demonstrate the appropriate preparation and administration of Salbutamol.
- h) Demonstrate appropriate use of the Salbutamol protocol/algorithm.

Asthma

Asthma is caused by increased responsiveness of the trachea and bronchi to various stimuli, resulting in narrowing of small airways.

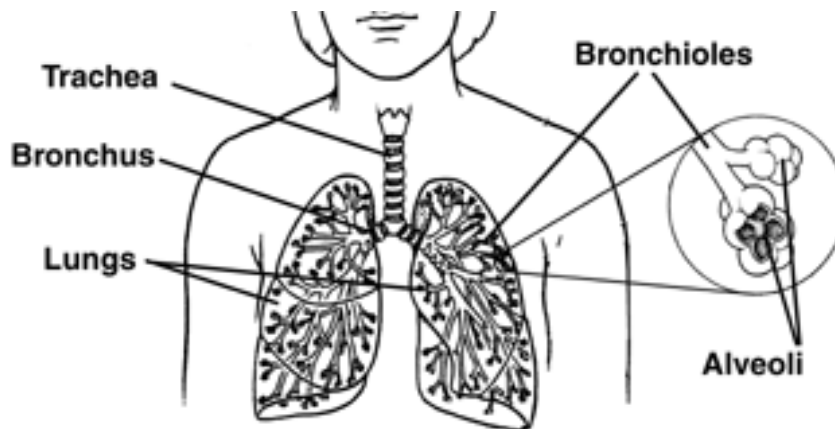
Examples of stimuli:

- allergens (dust, pollen)
- stress
- exercise
- cold

Narrowed small airways in asthma result from:

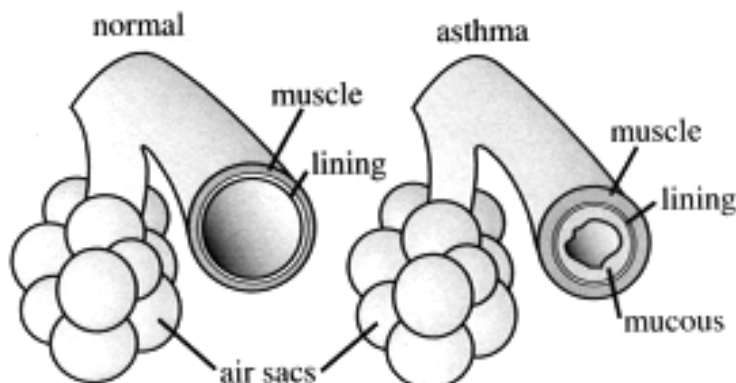
- contraction of smooth muscle in the tiny bronchioles
- mucosal edema and increased mucous in the airways

Together these cause increased workload of breathing and decreased tidal volume resulting in hypoxia.



Clinical Features:

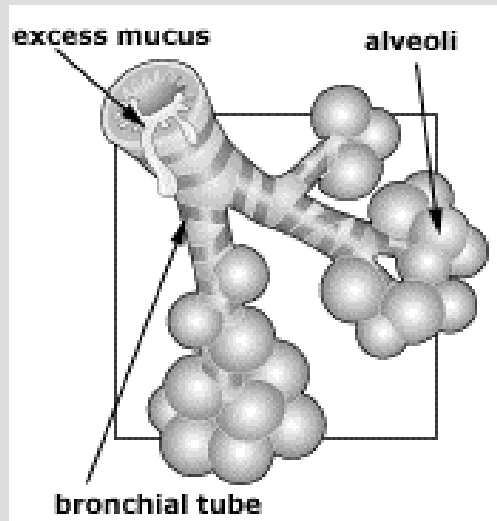
The classic symptom of asthma is high-pitched wheeze on expiration. The patients tend to sit up to breathe and are often sweaty. Severe asthma may cause a quiet, or silent chest (profound bronchoconstriction with limited or no air movement) and cyanosis. There will be tachycardia and tachypnea (rapid breathing). Status asthmaticus describes a severe asthma attack not responding to bronchodilators over several hours.



Chronic Obstructive Pulmonary Disease (COPD)

COPD is a blanket term for diseases that obstruct lung function. In most patients cigarette smoking is named as a cause. Other causes such as environmental exposure, pollutants, recurring infections, and genetic predisposition are known. COPD is further broken down into two main categories:

Chronic Bronchitis:



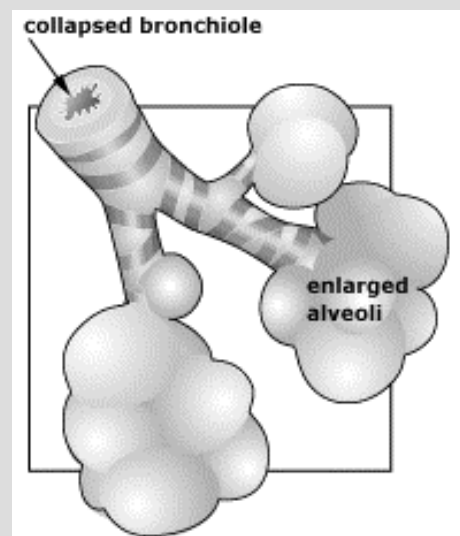
Chronic inflammation of the bronchi resulting in scarring and increased mucous production in the bronchial tree.

Patients tend to have a chronic cough and are somewhat obese with chronically low blood oxygen levels and a characteristic appearance causing them to be known as “blue bloaters”. On auscultation crackles (formerly rales), and rhonci (sonorous wheezes – low pitched rumbling sounds not involving small airways) are usually heard in addition to wheezes.

Emphysema:

An abnormal increase in the size of the alveoli and destruction of alveolar walls results in a loss of gas exchange surface area in the lung.

Patients are typically thinner, with large barrel chests. They often hyperventilate in an attempt to maintain normal blood oxygen concentrations leading to their being known as “pink puffers”. On auscultation lung sounds seem distant.



Clinical Features:

COPD patients tend to be older than the average asthmatic and most will have elements of emphysema and chronic bronchitis. Most are smokers. Pursed lips on expiration are common. The patient will usually sit up, lean forward and use accessory muscles (neck and shoulders) to help with breathing.

Often a respiratory infection will tip a COPD patient into respiratory failure. Wheezes, crackles, diminished breath sounds, rapid respiratory rate and tachycardia are common. Ultimately, respiratory rate may drop as CO₂ build-up causes narcosis (sleepy, depressed, comatose state caused by rising carbon dioxide levels - can be fatal).

How Salbutamol Works

Salbutamol stimulates Beta 2 (B2) receptors in the lungs causing bronchodilation thus helping patients with tight, constricted, small airways. Since the drug has little effect on Alpha 1 (A1) and Beta 1 (B1) receptors of the sympathetic system, increased heart rate (tachycardia), blood pressure, tremors and anxiety should not be concerns but careful monitoring is required with high doses.

Effect of drugs affecting the sympathetic nervous system

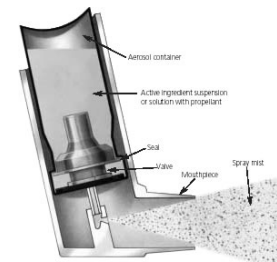
Receptor	Location	Effect
Alpha 1 (A1)	heart	Peripheral vessel contraction (↑ BP)
Alpha 2 (A2)	heart	Coronary artery dilation (↑ coronary blood flow)
Beta 1 (B1)	heart	Increased heart rate & contractility (↑ BP and pulse)
Beta 2	lungs	Dilation of bronchioles (↑ air entry; ↓ wheeze)

Inhalation provides an excellent delivery route for treatment of pulmonary and non-pulmonary conditions. Inhalation generally requires smaller doses, results in a rapid onset of drug action and less side effects compared with other routes. Efficacy of inhaled medications may be affected by the patient's age, severity of disease and inhalation technique. Proper instruction to the patient is of utmost importance when utilizing inhaled drugs. Salbutamol will be administered using either:



Nebulizer (with O₂ at 6-8 L/min) - provides excellent relief within 2 to 10 minutes to most asthmatics and many COPD patients who are in distress.

Metered-Dose Inhalers (MDIs) – typically used by patient's with a history of asthma/COPD, these devices deliver a dose of salbutamol by a propellant each time the device is used. An MDI with spacer will be used with any patient who has a fever (> 38 C) OR in the event the Medical Officer of Health declares a Severe Respiratory Illness (SRI) outbreak.



Spacers for MDIs can increase aerosol medication delivery if patients use them correctly. Spacers are used for two main reasons:

- to help overcome problems associated with poor technique and coordination for patients using a pressurized MDI
- to improve drug delivery to the lungs.

Patients using MDIs without spacers need to inhale as they activate their MDI to get medication into the lungs. With a spacer attached to the MDI, the patient no longer has to coordinate inhalation and MDI activation; the spacer acts as a holding chamber from which the patient can inhale the medication. A study comparing salbutamol MDIs with and without spacers found that MDIs with spacers increased medication delivery to the lungs by 23%.

To Use an MDI with a Spacer

1. Remove the cap from the MDI and prepare spacer device. Shake the MDI well.
2. Insert the MDI into the open end of the spacer, which is opposite the mouthpiece.
3. Place the mouthpiece of the spacer between patient's teeth and instruct patient to seal their lips tightly around it.
4. Have patient exhale completely.
5. Press the canister once to release the medicine. The medicine will be trapped in the spacer.
6. Have patient breathe in slowly and completely through their mouth. With some spacers, there will be a hornlike sound if patient is breathing too quickly. Have patient slow their next breath if this happens.
7. Have patient hold their breath for at least 10 seconds to allow the medication to deposit in the lungs.
8. Have patient take 4 breaths before repeating steps 1-7 for every puff of medication.
9. Replace the caps on MDI and spacer (if applicable) when finished.
10. Spacers are disposable, MDI may be used again

Numerous studies show no real difference in results for patients treated with nebulizer or MDI. Pediatric patients may have an increased peak expiratory flow rate, but there

are otherwise no discernible differences in patients in either age group treated with either method.

Administration: Special Considerations

Nebulized - Choose the appropriate dose by weight. Twist off cap, and add contents to nebulizer. Apply mask to patient and adjust O₂ flow to 6-8 L/min. Treatment will last approximately 10 minutes.

Remember – if the patient has a fever or the Medical Officer of Health has declared an SRI, nebulizer is NOT to be used.

Congestive Heart Failure (CHF) & Use of Salbutamol

Some patients who are dyspneic will have Congestive Heart Failure (CHF) rather than asthma or COPD. CHF is caused by a build-up of fluid in the lungs as a result of backpressure of blood in the lung capillaries from a failing left ventricular pump.

Clinical signs of CHF are dyspnea, tachycardia, distended jugular veins in the semi-sitting position and wet crackles (pulmonary edema) in the bases of the lungs on auscultation. Often there is a prior history of heart disease. Salbutamol will generally not help CHF as impressively as it relieves the bronchospasm of asthma.

If the patient has both COPD and CHF and there are signs of pulmonary edema and bronchoconstriction (diminished breath sounds, wheezing), it is often difficult to distinguish the two, it is appropriate to give Salbutamol in this setting.

SALBUTAMOL (Salbutamol, Albuterol) - Pharmacology

CLASSIFICATION	Bronchodilator Sympathomimetic (selective B2 agonist)
MECHANISM/ THERAPEUTIC ACTION	Relaxes the smooth muscles of the bronchial tree and peripheral vasculature by stimulating Beta-adrenergic receptors of the sympathetic nervous system.
INDICATIONS	Chief complaint of shortness of breath in a patient with a history of asthma or COPD, Salbutamol use or wheezing.
CONTRAINDICATIONS	Known allergy or sensitivity.
CAUTIONS	Caution in patients sensitive to sympathomimetic amines. Caution in patients with myocardial insufficiency, arrhythmia, hypertension, diabetes mellitus or thyrotoxicosis.
DOSE	See Appendix I _ Symptom Relief Protocols
ROUTE AND METHODS OF ADMINISTRATION	Nebulizer mask MDI
ONSET, DURATION	Max effect 3 to 10 minutes Duration up to 4 hours
ELIMINATION	Metabolized in liver into inactive metabolites
SIDE EFFECTS	CNS Restlessness Tremor Dizziness Headache CVS Palpitations Blood pressure changes (up or down) Tachycardia Arrhythmias Resp Coughing Bronchospasm GI Nausea Skin Pallor Flush Sweating

SPECIAL CONSIDERATIONS Careful charting of air entry, degree of respiratory distress considerations and use of accessory muscles should be done pre and post treatment.

Salbutamol – Pre Test

Administration of Salbutamol Skill Proficiency

You have been called to a nursing home for a patient who is experiencing shortness of breath that has become worse over the last hour. Upon your arrival you notice a frail elderly male patient sitting forward using accessory muscles to breath. The patient is also receiving oxygen via nasal cannula at 3 L/min. The patient's chart indicates an extensive cardiac history and COPD. Included in the long list of medications is a prescription you recognize for asthma. Your partner Robin says, "Make sure you include this in the medication area of your ACR, because its relevant to his shortness of breath." After assessing vitals you determine that this patient meets SOB/Respiratory Distress Protocol. This is the procedure you would follow to administer the medication.

Skill Proficiency Checklist: Inhalation of Salbutamol (Salbutamol); Assuring that a primary exam, history and physical exam has been completed, the Paramedic will:

Nebulized delivery:

- 1. Obtain Salbutamol nebulers, nebulizer/oxygen mask.
- 2. Confirm no allergies to Salbutamol.
- 3. Check expiry date, colour of Salbutamol, ensure nebulers were isolated from light.
- 4. Put contents of Salbutamol nebule (and NS if needed) into lower half of nebulizer.
- 5. Reassemble nebulizer.
- 6. Connect nebulizer to oxygen tubing and tubing to oxygen supply.
- 7. Place mask on patient and turn non-humidified oxygen on at 6-8 L/min.
- 8. Have patient take deep breaths through mouth.
- 9. When fog diminishes and nebulizer container is empty, take mask off.
- 10. Reassess for air entry.
- 11. Replace 100% oxygen.
- 12. Re-evaluate patient and ABC's of life support.
- 13. Re-evaluate secondary assessment.
- 14. Rapid transportation.

To use MDI & Spacer delivery:

1. Remove the cap from the MDI and prepare spacer device. Shake the MDI well.
2. Insert the MDI into the open end of the spacer.
3. Place the mouthpiece of the spacer between patient's teeth and instruct patient to seal their lips tightly around it.
4. Have patient exhale completely.
5. Press the canister once to release the medicine.
6. Have patient breathe in slowly and completely through their mouth. If patient is breathing too quickly have patient slow their next breath.
7. Have patient hold their breath for at least 10 seconds to allow the medication to deposit in the lungs.
8. Have patient take 4 breaths before repeating steps 1-7 for every puff of medication.
9. Replace the caps on MDI and spacer (if applicable) when finished.
10. Spacers are disposable, MDI may be used again

Answer the questions on the following pages based on the following scenario

Scenario for Salbutamol in Asthma Pre-Test

You and your partner, Robin, are called to a local park where the Smith family are having a family reunion. Uncle Joe has become quite short of breath following a soccer game. Upon your arrival you observe Uncle Joe sitting at a picnic table. He is pale and sitting forward with his hands on his knees using accessory muscles to breath. You instruct Robin to immediately start Joe on high concentration oxygen. Robin also attaches the cardiac monitor. You auscultate the chest and note expiratory wheezes in both lungs. A memo was posted in the bases this morning notifying you that the Medical Officer of Health has declared a Severe Respiratory Illness outbreak and use of all nebulized medications is suspended.

Vitals

BP	140/80
Pulse	120 regular, full
Respirations	30 shallow, wheezing
Skin	pale, cool, dry

Joe tells you he got progressively worse over the last hour. He tells you his only problem is a little angina, which he takes nitroglycerin for. Joe's wife tells you that, "he's had asthma for years and he has been on a puffer for a long time." Following this discovery you now know that Joe fits the SOB/Respiratory Distress Protocol. Joe is an adult who you assess to be 70 kgs. You administer Salbutamol. Within five minutes Joe is breathing much easier. En route to hospital the treatment ends and you switch Joe over to a non-rebreather at 15 L/min. A second set of vitals reveals the following:

Vitals

BP	120/80
Pulse	92 regular, full
Respirations	20 deep, regular
Skin	pale, dry, warm

Upon arrival at hospital Joe compliments you on a job well done.

1. Describe the signs and symptoms of Joe's respiratory distress.

2. Describe the BLS treatment for a patient complaining of dyspnea.

3. Describe the typical patient with congestive heart failure (CHF).

4. Describe the typical patient with chronic bronchitis.

5. Describe the typical patient with asthma.

6. Describe the typical patient with emphysema.

7. Describe the action of Salbutamol on the lungs.

8. State the dosage of Salbutamol using the MDI and nebulizer:

a) patients \geq 30 kg.

b) patients $<$ 30 kg.

9. Describe the common side effects of Salbutamol.

10. What is/are the contraindication(s) for nebulized delivery of Salbutamol?

11. Describe in detail the protocol for the pre-hospital administration of Salbutamol.
(Draw a flow chart)

ORAL SCENARIO EVALUATION

You are called to a local campground where an 18-year old camp councillor has become acutely short of breath. She has a history of asthma.

LOC	alert, anxious
A	clear
B	rapid, wheezing, using accessory muscles
C	pulse 120
Quick body exam	using accessory muscles, no cyanosis, chest wheezing on expiration
Skin	pale
Allergies	none
Meds	Salbutamol, Advair
Weight	50 kg

Vital Signs

GCS	15
Pulse	120 regular, full
Respirations	32 laboured, wheezing
Skin	pale, sweaty
BP	110/70
Pupils	PERL

Describe your course of action and treatments:

- Completed Critical Actions:
- BLS Treatment
 - oxygen treatment
 - initiate SOB/Respiratory Distress Protocol
 - decision for rapid transport
 - prepare to ventilate if patient deteriorates
- Pass Repeat

Evaluator's Signature: _____

EPINEPHRINE

EPINEPHRINE

For the treatment of Anaphylaxis / Severe Asthma / Croup

Objectives

At the conclusion of studying the module and participating in a classroom lecture/demonstration, the learner will:

- a) List the causes and mechanism of Anaphylaxis.
- b) Describe the signs and symptoms of Anaphylaxis.
- c) Explain the difference between a local allergic reaction and an anaphylactic reaction.
- d) Demonstrate the appropriate history taking and physical assessment for the patient with Anaphylaxis.
- e) Define and recognize a Severe (silent chest) Asthmatic.
- f) List signs and symptoms of a severe asthmatic.
- g) Demonstrate the appropriate history taking, physical assessment and treatment for the patient with severe asthma.
- h) Describe the cause and pathophysiology of Croup.
- i) Describe the signs and symptoms of Croup.
- j) Demonstrate the appropriate history taking, physical assessment and treatment for the patient with croup.
- k) Describe the difference between Stable and Unstable Croup.
- l) List the indications and contraindications for the administration of Epinephrine.
- m) List the actions and side effects of Epinephrine.
- n) Demonstrate the correct dose selection, administration and storage of Epinephrine.
- o) Demonstrate the appropriate use of the Anaphylaxis, Severe Asthma and Croup protocol/algorithm.

What Causes Anaphylaxis?

The human immune system exists to protect us from invading microorganisms and substances. When a foreign protein (antigen) enters our body, especially by inhalation, injection or ingestion, our immune system generates proteins (antibodies) to bind and destroy the invaders.

Histamine is one of a number of chemical substances that causes anaphylaxis and is stored in immune cells called **MAST CELLS**. When antibodies on the surface of mast cells bind invading antigens, the mast cell releases potent chemicals to help the body react to the antigen. One of these potent chemicals, **HISTAMINE**, increases blood flow and attracts white blood cells to the area. The result is localised swelling, redness and warmth. Leakage of serum through the capillaries results in local swelling.

An overactive immune system may suddenly dump a huge amount of chemicals, such as histamine, into the local tissues and into the entire blood stream. The result is an **ANAPHYLACTIC** reaction.

Common antigens that cause anaphylactic reactions:

- bee, wasp, hornet stings
- penicillin, cephalixin (Keflex), aspirin
- foods - egg whites, nuts, shellfish, food additives (MSG)

Signs and Symptoms of Anaphylaxis

A local reaction to an insect sting - local pain, redness, local swelling and itching is normal.

An **ANAPHYLACTIC** reaction includes some or all of the following:

- urticaria (red, raised hives with itch)
- shortness of breath (wheeze or decreased breath sounds)
- hypotension/shock with tachycardia
- generalized swelling and redness (angioneurotic edema)
- severe nausea, vomiting, diarrhea
- oral and facial swelling
- stridor

Body Systems Directly Involved (Respiratory, Vascular, Integumentary, G.I.)

Wheezing is caused by bronchial constriction. Hypotension and swelling result from massive leaking of fluid out of the circulation (histamine effect) and relaxation of blood vessels.

Early Phase vs Late Phase (full-blown) Anaphylaxis Patients

(Early phase and late phase refer to symptoms and not time of onset because patients may progress rapidly to late phase symptoms)

*** All anaphylaxis patients meet rapid transport criteria.**

Early Phase

If the presenting symptoms are urticaria (hives), nausea and pruritus (itch) and the patient can follow instructions with no airway compromise and no hypotension, he/she exhibits early anaphylaxis.

Treatment includes high concentration O₂, vital signs, transport, and careful observation. The early anaphylaxis patient may rapidly deteriorate to full-blown anaphylaxis.

Late Phase/Full-Blown Anaphylaxis

In addition to widespread urticaria (hives) or diffuse erythema (redness), the unstable patient may have:

- respiratory distress (wheeze)
- hypotension
- possible collapse or decreased level of consciousness
- swelling causing airway obstruction

The patient may also have tachycardia, itch, diffuse edema, chest tightness, nausea, vomiting and diarrhea.

*** Remember to ask for a history of allergic reaction.**

Treatment with Epinephrine

Don't forget the ABC's:

- A - Airway with high concentration O₂
- B - Breathing, ventilate if necessary
- C - Circulation



Two-thirds of deaths from anaphylaxis occur within the first hour. Some patients with a history of anaphylaxis may have injected themselves with prescribed epinephrine prior to ambulance arrival.

Some patients with a history of anaphylaxis are prescribed "auto injectors"

Note: The half-life of epinephrine is shorter than the duration of the inflammatory mediators responsible for anaphylactic reactions. Patients who have self-administered epinephrine prior to ambulance arrival may be in minimal distress due to the effects of epinephrine and, as a result, may attempt to refuse to go to hospital. If these patients

do not receive additional treatment the effects of the initial epinephrine can wear off leaving the patient in a situation with progressing anaphylaxis and without any more epinephrine to treat it. Remember, epinephrine does not cure anaphylaxis, it buys you time to get to hospital.

Epinephrine is a potent natural stimulator of the sympathetic nervous system. Epinephrine has the following actions:

- bronchodilation to reverse wheeze (B2 effect)
- reverses capillary leaking to stop excessive swelling
- constriction of blood vessels to elevate blood pressure (A1 effect) and increasing cardiac output (B1 effect)

* **CAUTION:** Epinephrine can produce severe hypertension (risk of MI/Stroke), tachycardia and anxiety if given inappropriately to a patient without anaphylaxis. Measure BP **before** considering epinephrine in the anaphylaxis setting.

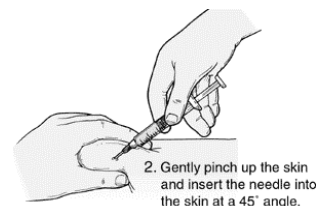
EFFECT OF DRUGS WHICH ACTIVATE THE SYMPATHETIC NERVOUS SYSTEM	
Alpha Effects	A ₁ – peripheral vessel constriction (↑ BP)
	A ₂ - dilation of coronary arteries (↑ heart blood flow)
Beta Effects	B ₁ – increased heart rate and contractility (↑ BP)
	B ₂ - dilation of bronchi (↓ wheeze)

Administration: Special Considerations

Obtain verbal consent to treat and record full vital signs including GCS. Although epinephrine should be given by intramuscular (IM) or subcutaneous (SC) injection as quickly as possible, **TAKE THE TIME TO ASSESS THE PATIENT. (ABC's, VITAL SIGNS, RESPIRATIONS).**

SC Injection

- if in transport, and patient requires epinephrine, stop vehicle;
- wipe deltoid site with alcohol swab;
- check epinephrine for cloudiness or expiry date. Do not use if cloudy, discoloured or expired;
- select the appropriate sized needle/syringe (1/2" for SC, 1" for IM)
- remove needle cap;
- break open ampoule & draw up epinephrine;
- Clean injection site with alcohol swab;



- pinch skin & subcutaneous tissue to create a bulge;
- enter bulge created at 45°;
- penetrate 1/2";
- aspirate for blood;
- inject; massage site after injection;
- dispose needle sharp safely in sharps container;

IM Injection:

- landmark site correctly (usually deltoid muscle)
- clean injection site with alcohol swab;
- depress and stretch skin at injection site;
- “dart” into skin at about 90°;
- penetrate to a depth appropriate to patient size and musculature;
- aspirate for blood;
- inject; massage site after injection;
- dispose needle sharp safely in sharps container.



IMPORTANT: DO NOT RECAP SYRINGE

Guidelines for Patients with Asthma and the Elderly Pertaining to Treatment of Anaphylaxis

- If the patient has a history of asthma with wheezing after exposure to inhaled antigen (eg. pollens, animal dander) treat by the **SOB/Respiratory Distress Protocol**.
- Asthmatics who wheeze after exposure to insect venom or food allergen (eg. peanuts) should be assessed for anaphylaxis. Collapse, hypotension, head or neck edema or hives along with wheezing should result in treatment by the **Anaphylaxis/Allergic Reaction Protocol**.
- In dealing with the elderly and frail with borderline indications for Epinephrine (ex. diffuse redness, no wheeze, no hives, no hypotension), call for Base Hospital Medical direction.
- If the patient is wheezing as a feature of anaphylaxis, they should additionally be considered for the SOB/Respiratory Distress protocol.
- Patients should have their ECG monitored enroute.

Who is considered a Severe (Silent Chest) Asthmatic?

The term silent chest is used to describe a patient that is suffering profound bronchoconstriction with limited or no air movement, **severe SOB, diminished breath sounds and requires positive pressure ventilation**. These patients are so severely bronchoconstricted that air movement in and out of their lungs can no longer produce sounds of wheezing. Severe bronchoconstriction and mucous production lead to a decrease in tidal volume and a substantial increase in workload of breathing. This soon results in an altered LOA due to hypoxia and hypercarbia, if not acted upon quickly death will soon follow. Patients suffering from a severe asthma attack (silent chest) will present with extreme SOB, increased rate and workload of breathing, and decreased tidal volume. Breath sounds will be diminished with minimal wheezing being auscultated, even with assisted ventilation. As stated above these patients will have a decreased level of awareness that quickly can lead to unconsciousness and death.

Treatment of a Severe Asthmatic

Treatment for these patients includes assisting respirations with a BVM and early treatment with subcutaneous epinephrine. Assisting a patient's respirations will increase tidal volume improving oxygenation and will decrease the patient's work of breathing. Epinephrine given subcutaneously works by stimulating B2 receptors causing bronchodilation and it may also have some effect on decreasing mucous production by stabilising capillary walls.

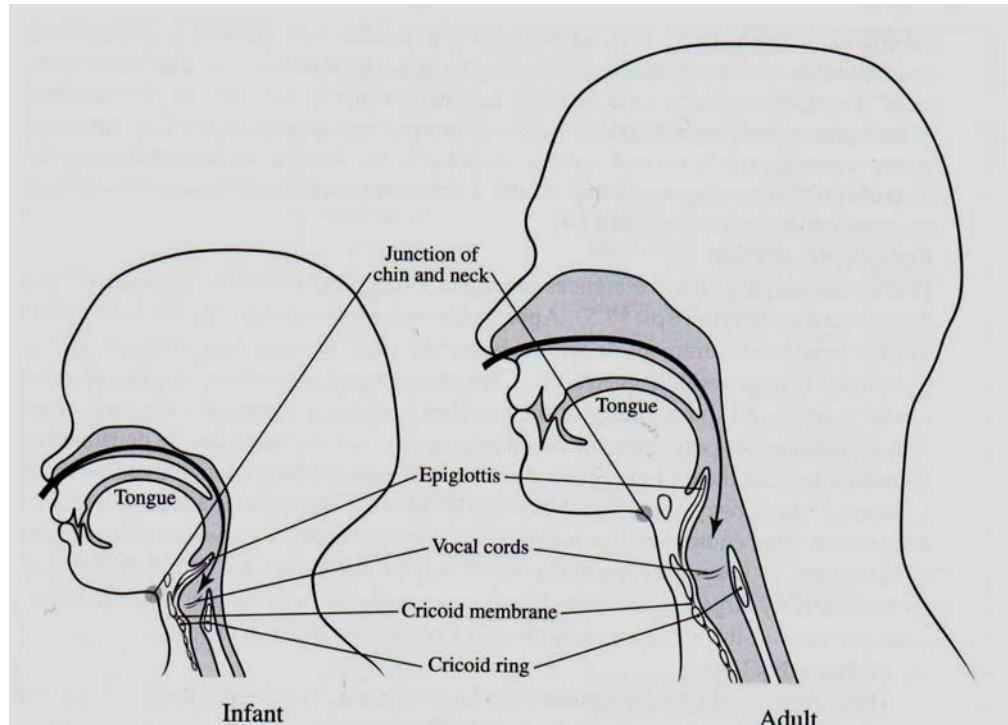
CROUP

Pathophysiology of Croup

Croup is an acute viral infection that is characterized by a barking cough, hoarseness and inspiratory stridor that causes varying levels of difficulty breathing. Symptoms can be mild to severe depending on the severity of swelling in the airway; it can lead to complete airway obstruction. The infection mainly involves the larynx but can also involve the trachea and the lungs.

Croup typically occurs in children from 6 months to 3 years old. The virus is transmitted via the respiratory route, with the portal of entry being the nose and nasopharynx. As the infection spreads distally it involves the walls of the larynx and the trachea causing edema. This edema causes narrowing of an already narrow airway, especially at the level of the cricoid cartilage.

COMPARISON OF THE ADULT AND PEDIATRIC AIRWAY NOTE THE SIZE OF THE AIRWAY LUMEN BELOW THE EPIGLOTTIS



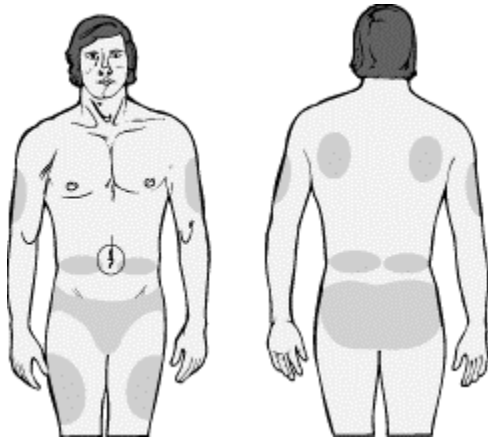
Signs and Symptoms of Croup

Croup has an onset over a few days beginning with a respiratory infection, cough, nasal congestion, sore throat and mild fever. As the infection progresses the patient presents with a hoarse voice, stridor and a harsh bark like cough. Respiratory stridor usually occurs at night often waking the child from sleep. Symptoms can range from mild to severe; hypoxia and respiratory failure is due to airway lumen narrowing. Children in more severe distress have stridor at rest, nasal flaring and intercostal indrawing. Other symptoms can include tachycardia, tachypnea, lethargy, slight fever and pallor. Cyanosis is a late sign in a child that is in severe distress. **Patients who are considered to be in severe distress are ones that present with stridor at rest, an altered level of awareness or cyanosis.**

Special Considerations and Side Effects

Effects of Epinephrine will be seen quite quickly but even with relief of symptoms all patients must be transported to the hospital. Although uncommon once the edema is relieved some patients may revert back to their baseline status. Other adverse effects may include tachycardia, dysrhythmias, palpitations, hypertension, tremor, agitation, nausea, vomiting and headache

Common Sites for Subcutaneous (SC) Injection

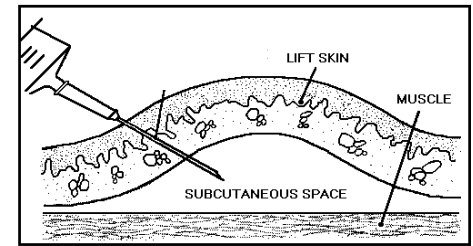
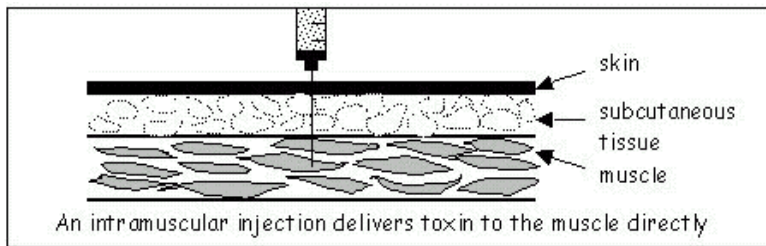


Common sites for subcutaneous injection

Intramuscular (IM) Injections

- Hold the syringe in the hand you use to write as if it were a pen/pencil.
- Clean injection site with an alcohol swab; let dry.
- Depress and pull the skin a little with your free hand. Keep holding the skin a little to the side of where you plan to put the needle.
- Use your wrist to inject the needle at a 90-degree angle (straight in) in the same motion you would use to throw a dart. *Do not push the needle in.* The needle is sharp and it will go through the skin easily when your wrist action is correct.
- Let go of the skin. The needle will want to jerk sideways. As you let go of the skin, hold the syringe so it stays pointed straight in.
- Aspirate to ensure an absence of blood. (If positive for blood you have entered a blood vessel. Remove the needle, do not inject, and dispose of the syringe and medication. Start over with a new syringe, needle and medication. Make your next attempt on the other side.) Pulling back on the plunger may not be as easy as it seems. Use your other hand to pull back on the plunger while keeping the syringe in the straight up position. It will feel clumsy at first.
- Push down on the plunger and gently inject the medication in order not to cause unnecessary pain.
- Once all the medicine is injected, pull the needle out quickly at the same angle it went in.
- Using sterile gauze, gently massage the injection site. You may apply a small band-aid to the site.

- Dispose of syringe and needle in sharps container.



Comparison of the angles of insertion for subcutaneous (45 degrees) and intramuscular (90 degrees) injections

SR Program IM Injection Sites

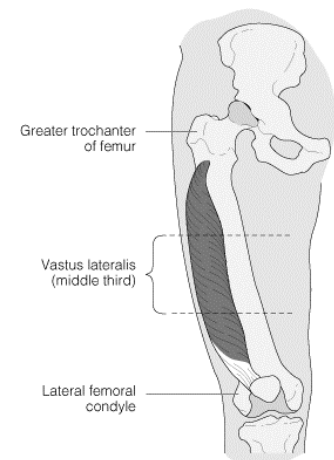
When administering an IM injection you want to avoid nerves, blood vessels and bones. There are 4 areas on each side of the body (8 areas in total), typically used as they avoid these structures. The two that will be used in the Symptom Relief program are the Vastus Lateralis and the Deltoid.

Vastus Lateralis (VAS-tuss lat-er-AL-is) Muscle (Thigh):

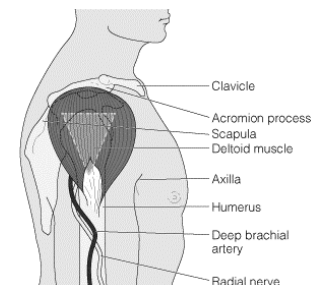
The thigh is used often for children, especially under the age of 3 years since the muscle is well developed. It is also a good place for an adult. Patients who are required to regularly inject themselves may use this site because it is easy to see.

Look at the thigh – the area between the knee and the hip - you will use for the injection and in your mind, divide it into three equal parts. The middle third is your injection site.

This muscle is called the vastus lateralis. It runs along the top/front of the thigh and a little to the outside. Put your thumb in the middle of the top of the thigh, and your fingers along the side. The muscle you feel between them is the vastus lateralis.



Deltoid (DEL-toyd) Muscle (Upper arm muscle): The patient can be in any position of comfort. Completely expose the upper arm and feel for a bony prominence that goes across the top of the upper arm (acromion process). In your mind draw a line straight across this area. Choose a point directly below the middle of this line at about the level of the armpit. Join this point with either end of your line forming an upside down triangle. Your injection site is in the center of the triangle, 1 to 2 inches (2.5 to 5 cm) below the bottom of the acromion process.



EPINEPHRINE HYDROCHLORIDE (Adrenaline, "Epi") - Pharmacology

CLASSIFICATION	Sympathomimetic Natural catecholamine with alpha and beta effects
MECHANISM/ THERAPEUTIC ACTION	Stimulates alpha and beta adrenergic receptors within the sympathetic nervous system Beta effects: <ul style="list-style-type: none">• increases heart rate• increases heart contractility• increases AV conduction• increases cardiac irritability• bronchodilation Alpha effects: <ul style="list-style-type: none">• peripheral vasoconstriction (in higher doses)
INDICATIONS	anaphylaxis/ asthma/ croup
CONTRAINDICATIONS	known allergy to epinephrine
CAUTIONS	narrow angle glaucoma caution in pregnancy; may decrease placental blood flow and induce labour
DOSE	See Appendix I – Symptom Relief Protocols
ROUTE AND METHOD OF ADMINISTRATION	vastus lateralis (thigh) or deltoid (upper arm) SC/IM nebulizer mask
ONSET, DURATION	SC 5 - 10 minutes onset (5 - 10 minutes duration) IM - Nebulized -
ELIMINATION	Rapidly metabolized by enzymes in the liver and excreted in urine

Epinephrine Hydrochloride (Continued)

SIDE EFFECTS

CNS

- Nervousness
- Tremor
- Euphoria
- Anxiety
- Vertigo
- Headache
- Cerebral hemorrhage
- Agitation

CVS

- Tachycardia
- Ventricular fibrillation
- Palpitations
- Hypertension
- CVA
- Angina

Resp

- Pulmonary edema

Skin

- Pallor
- Sweating

**SPECIAL
CONSIDERATIONS**

Keep in light resistant container.
Do not use if discoloured or has precipitates.

CAUTION:

Accidental digital injection requires prompt medical attention.

Epinephrine Pre-Test

Administration of Epinephrine Skill Proficiency

You have been called to attend a patient who has been stung by a yellow jacket. Upon your arrival you note an adult male sitting in a lawn chair having obvious difficulty breathing. His face is very swollen and you can see that he is covered with hives. Your partner has started high concentration oxygen, and attached the cardiac monitor. You have taken a complete set of vitals. The patient described meets the Anaphylaxis/Allergic Reaction Protocol. This is the procedure you would follow:

Skill Proficiency Checklist:

Subcutaneous or IM injection of epinephrine for anaphylaxis; assuring that a primary exam, history and physical exam has been completed, the Paramedic will:

1. Obtain an ampoule of epinephrine 1:1000, a 1 ml syringe (with 27G 1/2" needle), alcohol swabs, gloves, and sharps container.
2. Confirm no allergies to epinephrine.
3. Check expiry date, colour and check for presence of precipitate.
4. Tap or rotate ampoule to get medication to the bottom of the ampoule.
5. Break top of ampoule with 2 x 2 gauze or ampoule cracker.
6. Insert syringe into ampoule and draw up medication.
7. Remove air in syringe leaving appropriate dose of epinephrine 1:1000.
8. Landmark and prepare site with alcohol swab.
9. With non-dominant hand, "pinch" prepared site (SC) or stretch & compress site (IM)
10. With dominant hand, insert needle at a 45° angle (SC) or about 90° (IM).
11. Aspirate for blood.
12. Inject medication.
13. Dispose of sharp safely in sharps container.
14. Reassess for additional epinephrine injections.
15. Re-evaluate patient and ABC's of life support.

Scenario for Epinephrine in Anaphylaxis

You and your partner, Jean, are called to a local restaurant for a possible allergic reaction. Upon arrival you observe a male patient five years of age. His face is swollen and he is having obvious difficulty breathing. You immediately have Jean begin administering high concentration oxygen. while you assess the patient. When you ask what happened, the mother says, "He's allergic to shrimp and we didn't realize that this salad has bits of shrimp in it."

Vitals

BP	70 palpation
Pulse	120 weak and regular
Respirations	30 shallow with audible wheezing
Skin	pale, diaphoretic and hives

Following your assessment you determine that the patient meets Epinephrine protocol. When you ask family members how much the child weighs, they are too upset to remember. The patient is also unable to tell you. Jean says, "Hey, remember if we take his age and double it, then add ten this will give us an approximate weight." After a bit of arithmetic, you and your partner figure the patient to be approximately 20 kg. $10 + (2 \times 5 \text{ years})$. This being the weight you administer 0.2 mg of epinephrine subcutaneously in the left arm. Following the injection the patient is immediately prepared for transport. Enroute to hospital the patient's condition dramatically improves.

Enroute a second set of vitals are obtained.

Vitals

BP	110 palpation
Pulse	92 regular and full
Respirations	20 deep and regular
Skin	warm, moist, and pale

When you arrive at the hospital the patient appears to have fully recovered.

1. Explain the need for rapid treatment of this patient.

2. From the scenario, list fully the signs and symptoms of anaphylaxis which this patient exhibits.

3. List the most common causes of anaphylactic reactions.

4. Describe the BLS treatment for anaphylaxis.

5. Briefly describe the action of epinephrine in anaphylaxis.

6. Describe fully the protocol for the administration of epinephrine to the patient with anaphylaxis. (Draw a flow chart)

7. Indicate the appropriate doses of epinephrine for patients with the following weights:

75 kg _____

25 kg _____

15 kg _____

8. The dose of 0.2 mg of epinephrine was appropriate for the patient described in the scenario.

Yes No

9. List 2 possible sites for IM injections in the Symptom Relief Program and identify their landmarks.

Oral Scenario Evaluation

You are called to attend a 27-year old male who was stung by a bee while on a picnic in the park. He has had one previous reaction to a bee sting 5 years ago. Upon arrival you find the patient to be covered with hives, face swollen, and sweating profusely.

LOC	responding to loud verbal commands
A	clear
B	respirations weak, rapid and wheezing
C	no radial pulse, carotid 150 plus and weak
Quick body exam	reddening and swelling to face and generalized hives

Vital Signs

GCS	13
Pulse	150
Respirations	30
Skin	red, covered in hives, diaphoretic
BP	not palpable
Pupils	dilated, slow to react

Describe your course of action and treatments:

Completed Critical Actions:

- BLS treatment
- airway management
- initiate Epinephrine protocol
- decision for rapid transport

Pass Repeat

Evaluator's Signature: _____

Epinephrine in Severe Asthma Pre-Test

Scenario for Epinephrine in Severe Asthma

You and your partner, Bob, are called to the local hockey arena for a 45 year old male complaining of SOB. Upon your arrival you find your patient sitting, leaning forward in obvious respiratory distress. You immediately position the patient on your stretcher. Your partner administers oxygen, attaches the cardiac monitor and obtains a set of vital signs while you assess the patient. When you ask what happened he states that he has a history of asthma and that he became very SOB while playing hockey, he has no complaints of chest discomfort.

Vitals

Pulse	120 matches sinus tachycardia on the monitor
Respirations	36 reg shallow (speaking 3 word sentences)
BP	140 by palpation
Skin	pale, diaphoretic and warm

Breath Sounds equal bilaterally to the bases with expiratory wheezing in all lobes

Following your assessment you determine the patient meets SOB/Respiratory Distress Protocol so treatment is initiated. As you are transporting your patient out of the arena doors you notice the patient to have a further increase in SOB, he is now only able to speak in one word sentences stating he can't catch his breath and he is feeling tired. You immediately have your partner initiate positive pressure ventilation with the BVM while you auscultate your patient's chest. Upon auscultation you notice your patient's breath sounds are diminished throughout, equal with very fine wheezes in the apices. You quickly remember that this is the way a patient presents who suffers from severe asthma and that he meets the protocol for treatment with subcutaneous epinephrine. Approximately 7 minutes after your 0.3mg dose of epinephrine your patient's breathing improves to the point where he is speaking full sentences with little difficulty. Due to his improvement you discontinue ventilation and assess the patient for continuation of the SOB/Respiratory Distress Protocol.

1. Describe the presentation of a patient who is suffering from a severe asthma attack.

2. Describe the reason for positive pressure ventilation in a patient suffering a severe asthma attack.

3. List some common causes of an asthmatic reaction.

4. Describe your treatment for a patient suffering a severe asthma attack.

5. Briefly describe the action of epinephrine in the treatment of severe asthma.

6. Draw protocol chart for a patient suffering a severe asthma reaction.

ORAL SCENARIO EVALUATION

You are called to attend a 27-year-old patient suffering from severe SOB. Upon your arrival you find a patient lying on the couch with a salbutamol puffer by his side, in obvious respiratory distress.

LOC responding to loud verbal commands
A clear
B respirations rapid with minimal air movement
C radial pulse 120

Vital Signs

GCS 13
Pulse 120
Respirations 36 regular, decreased volume
Skin pale, moist, diaphoretic
BP 130 by palpation
Pupils dilated, reactive
Breath Sounds equal, diminished all lobes to bases, fine wheezes in
the apices

Describe your course of action and treatments:

- Completed Critical Actions:**
- BLS treatment
 - airway management/positive pressure ventilation
 - initiate Epinephrine protocol
 - decision for rapid transport
- Pass Repeat

Evaluator's Signature: _____

Epinephrine In Croup Pre-Test

Inhalation of Epinephrine Skill Proficiency

Skill Proficiency Checklist:

Inhalation of Epinephrine 1:1000, 1mg/1ml; assuring that a primary exam, history and physical exam has been completed, the Paramedic will:

1. Obtain epinephrine ampoule, nebulizer/Oxygen mask.
2. Confirm no allergies to epinephrine.
3. Check expiry date, colour of epinephrine.
4. Draw up correct amounts epinephrine (normal saline if needed) and place into lower half.
5. Reassemble nebulizer.
6. Connect nebulizer to oxygen tubing and tubing to oxygen supply.
7. Place mask on patient and turn non-humidified oxygen on at 6-8 L/min.
8. Have patient take deep breaths through mouth.
9. When fog diminishes and nebulizer container is empty, take mask off.
10. Reassess for severe symptoms.
11. Replace high flow O2.
12. Re-evaluate patient and ABC's of life support.
13. Re-evaluate secondary assessment.
14. Rapid transportation.

Epinephrine in Severe Croup Scenario

You and your partner, Mary, are called to a local residence for a 2-year-old patient experiencing difficulty breathing. Upon your arrival you are met by the patient's mother who appears quite concerned stating her daughter has been sick for the past couple of days with a cough, but tonight is having a lot of trouble breathing. Upon assessment you find your patient to have a bark like cough, with continuous stridor during breathing. You immediately have your partner administer oxygen, attach the cardiac monitor and obtain a set of vitals while you continue with your assessment.

Vitals

Pulse	160 monitor rate, matches radial
Respirations	40 reg shallow volume
Skin	pale, warm, dry, slight cyanosis around lips

Breath Sounds equal, clear with good sounds to the bases

Following your assessment you determine the patient meets the Pediatric Croup protocol. Due to the patient weighing approximately 14 kg a dose of 5 mg (5ml) of 1:1000 epinephrine will be administered via nebulizer mask. While administering the treatment you explain to the patient's mother that since the patient is being treated with this drug she will have to be transported to the hospital, even if the symptoms are relieved.

1. Describe the cause of croup and symptoms that the patient will have experienced leading up to the onset.

2. Describe what part of the airway is affected by croup and the size difference between the pediatric and adult airway.

3. What signs are present in a patient suffering from severe croup?

4. Describe briefly the effect of nebulized epinephrine on a patient with croup.

5. List some side effects of nebulized epinephrine.

6. Why are all patients that are treated with nebulized epinephrine required to go to the hospital?

7. Indicate the appropriate dose of epinephrine for the patients with the following weights. (if necessary include the amount of Normal Saline required)

5 years old 20 kg _____

3 years old 16kg _____

1 year old 12kg _____

8 months 8kg _____

4 months 4kg _____

8. Describe fully the treatment for a patient suffering from severe croup (include flow chart in your answer)

**EPINEPHRINE PROTOCOL
ORAL SCENARIO EVALUATION**

You are called to attend a 2-year-old female patient suffering from severe SOB. Upon your arrival you find a patient in her mother’s arms experiencing obvious difficulty breathing. On assessment you notice the patient to have a bark like cough and continuous stridorous breathing. The patient’s mother states to you that her daughter has had a cough, sore throat and runny nose for 3 days but tonight her breathing has gotten considerably worse.

LOC responsive
A clear
B respirations rapid, stridor with normal breathing
C radial pulse 160/min

Vital Signs

GCS 15
Pulse 160 radial matches monitor
Respirations 36 regular
Skin pale, moist, diaphoretic
BP 84 by palpation
Pupils 3 reactive
Breath Sounds equal bilaterally to bases

Describe your course of action and treatments:

- Completed Critical Actions:**
- BLS treatment
 - airway management
 - initiate epinephrine protocol
 - decision for rapid transport
- Pass Repeat

Evaluator’s Signature: _____

NITROGLYCERIN

NITROGLYCERIN

For the treatment of Coronary Syndromes / Pulmonary Edema

Objectives

At the conclusion of studying the module and participating in a classroom lecture/demonstration, the learner will:

- a) Demonstrate the cause and pathophysiology of angina.
- b) List the clinical signs and symptoms of angina.
- c) State the difference(s) between stable and unstable angina.
- d) Demonstrate the appropriate history taking and physical assessment for the patient with angina.
- e) List the indications and contraindications for the use of nitroglycerin spray in angina.
- f) State the importance for checking blood pressure before and after nitroglycerin use.
- g) Describe the benefits, actions and risks of nitroglycerin use with angina.
- h) Demonstrate the causes and pathophysiology of pulmonary edema.
- i) List the clinical signs and symptoms of pulmonary edema.
- j) Demonstrate appropriate history taking and physical assessment for the patient in pulmonary edema.
- k) List indications and contraindications for the use of nitroglycerin spray in pulmonary edema.
- l) Describe the action of nitroglycerin on a patient in pulmonary edema.
- m) List the contraindications to nitroglycerin.
- n) Outline the treatment for the patient exhibiting signs of hypotension and bradycardia after nitroglycerin administration.
- o) Demonstrate the appropriate use of the chest pain, pulmonary edema protocol/algorithm.

Angina - What is it?

Angina is discomfort, squeezing or tightness in the chest, resulting from inadequate blood flow to portions of the heart muscle. The cause is gradual narrowing of coronary arteries with atherosclerotic plaque. The result is an imbalance between the supply and the demand of the myocardium for oxygen and glucose. Occasionally spasm or thrombosis (clot) may cause angina (or myocardial infarction). However, the cause is usually fixed narrowing of coronary arteries by plaque.

Clinical Presentation of Angina

Predictably, angina often occurs during exertion, after meals or during emotional stress when the heart works harder to pump blood. Often, the pain resolves spontaneously with rest and/or nitroglycerin (stable angina). Approximately 5% of patients with stable angina will go on to myocardial infarction per year.

Unstable angina describes pain that is increasing in severity, length or occurring at rest. It is difficult to differentiate from myocardial infarction.

Angina pain, like myocardial infarction pain, may be characterized by sudden onset of squeezing or crushing chest pain or ache behind the sternum or the epigastrium. Pain may radiate to the shoulders, arms, neck, jaw or back. Prolonged pain, sweating, vomiting, pallor, hypotension, syncope or arrhythmia should raise the spectre of a myocardial infarction.

How Nitroglycerin Works in Angina

Nitroglycerin relaxes smooth muscle in arteries and veins within 1 minute of a sublingual spray. The result is a reduction in the work of the heart, reducing the heart muscles' demand for oxygen and glucose. Often, nitroglycerin spray plus 100% O₂ plus reassurance and rest will completely relieve angina pain within 2 to 5 minutes.

Risk of Nitroglycerin Spray in Angina

The major risk of nitroglycerin spray is a sudden, profound drop in systolic blood pressure due to dilatation of veins and arteries. Nitroglycerin can also cause severe bradycardia on occasion.

Nitroglycerin vs ASA

Patients suffering from angina and myocardial infarction both present with similar signs and symptoms. To determine if the patient is truly suffering from an MI requires further diagnostic testing done in the hospital. This being the case it can be difficult to determine whether a patient should receive nitroglycerin, ASA, or both. The protocol for chest pain is set up to assist the Paramedic in choosing the appropriate medication(s). When you attend a patient with chest pain/discomfort it is **extremely important** that you initially determine if the patient does or does not meet nitroglycerin protocol. If the patient does not meet nitroglycerin protocol then the patient can be

assessed for the ASA protocol. Patients receiving Nitroglycerin should also receive ASA if no contraindications exist.

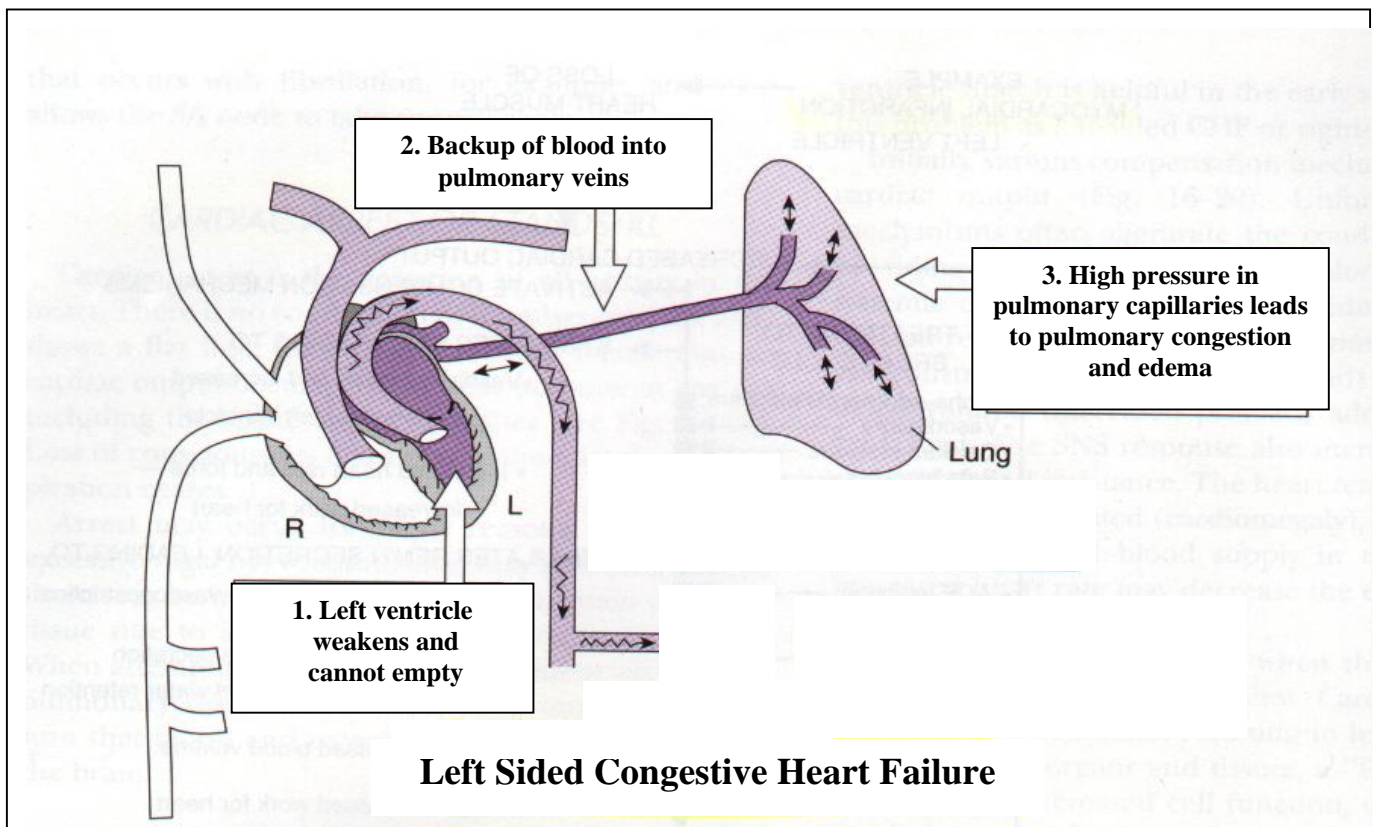
ASA will be covered in more depth in the ASA section of this book.

NOTE:

Should the patient's vital signs fall outside of the designated parameters listed above at any time during the call, Nitroglycerin will be discontinued and the patient will not receive any more nitroglycerin for the remainder of the call. This remains in effect even if the patient's vital signs return to a state that falls within the designated parameters.

Pulmonary Edema due to Congestive Heart Failure. What is it?

Pulmonary edema caused from congestive heart failure is due to left ventricular dysfunction. Left ventricular failure occurs when the left ventricle fails to function effectively as a pump. In left sided heart failure blood is delivered to the left ventricle but not effectively expelled. This leads to an increase in end diastolic volume and subsequent increase in end diastolic pressure. The increase in pressure (hydrostatic) is transmitted back through the left atrium, pulmonary veins and into the pulmonary capillary bed. As the pressure rises in the pulmonary capillary bed the plasma portion of the blood is pushed out into the alveoli, this fluid is known as pulmonary edema. Fluid accumulation in the alveoli interferes with gas exchange resulting in hypoxia; it also causes the lungs to be wet and heavy causing an increase in work of breathing. A wide range of heart disease including ischemia, hypertension and valvular heart disease can cause left sided heart failure.



Clinical Presentation of Pulmonary Edema

- SOB mild to severe (with or without chest discomfort)
- Bilateral crackles that accumulate from dependant area up and do not change with coughing
- Wheezes - interstitial edema irritating the smooth muscle of the bronchioles causing constriction.
- Usually an acute onset
- Paroxysmal Nocturnal Dyspnea (**PND**) - SOB that awakens a patient from sleep
- Increased workload of breathing (accessory muscle use)
- Orthopnea – SOB when supine
- Sitting up leaning forward, tripod position
- Tachycardia, possible arrhythmias
- Hypertension (can be hypotensive)
- Diaphoresis
- Signs of right sided heart failure (most common cause of right is left sided failure), JVD, peripheral pitting edema, ascites
- Altered LOA (agitated, anxious, obtunded)
- Cough with blood tinged sputum

Management of a Patient in Pulmonary Edema

Pulmonary edema is an acute critical emergency that can lead to death without rapid treatment; the patient literally drowns in his or her own fluid. Treatment at a Primary Care Paramedic level includes oxygenation, possible ventilation, positioning and pharmacology. Position the patient in the sitting position, to aid in decreasing workload of breathing and venous return to the heart. Provide high concentration oxygen and ventilate if necessary to increase tidal volume and decrease the patient's work of breathing.

How Nitroglycerin Works in Pulmonary Edema

Nitroglycerin is given to primarily decrease the venous return to the heart (preload) allowing the pump to relieve the congestion. It also reduces the force required to expel blood away from the left ventricle (afterload). Decreasing preload and afterload is accomplished by the vasodilatory effect of nitroglycerin.

NITROGLYCERIN (Nitro) - Pharmacology

CLASSIFICATION	Vascular smooth muscle relaxation agent
MECHANISM	Nitroglycerin reduces myocardial oxygen demand by dilating both arteries and veins in the body. As a result: <ul style="list-style-type: none">• less blood returns to the heart due to pooling of blood in veins (decreases preload)• the resistance of the arteries (afterload) drops, thus reducing heart work
INDICATIONS	Chest pain consistent with myocardial ischemia (angina) Pulmonary Edema
CONTRAINDICATIONS	Heart rate < 60 bpm Monitor rate >160 Systolic BP less than 100 mmHg (or < 140 for CHF) History of sensitivity or reaction to nitroglycerin Ingested erectile dysfunction medication in past 24 hrs.
DOSE	See Appendix I - Symptom Relief Protocols
ONSET, DURATION	Onset 1 to 4 minutes with elimination in 10 minutes
ELIMINATION	Rapid metabolism in liver
SIDE EFFECTS	Hypotension Headache Tachycardia

Special Considerations

Severe hypotension or severe symptomatic bradycardia are fairly common side effects of nitroglycerin, especially in the face of acute myocardial infarction, dehydration or advanced age.

Treatment included

- high concentration O₂
- lay flat in supine position

NITROGLYCERIN – PRE TEST

ADMINISTRATION OF NITROGLYCERIN IN TREATMENT OF ANGINA Skill Proficiency

You respond to a local park where you find a male patient, 62-years of age, experiencing chest pain. From your assessment you determine that the patient is a known nitroglycerin user and has an extensive cardiac history. Your partner Jean has already initiated oxygen at a high concentration, via non-rebreather, and attached the cardiac monitor. Following your assessment, which includes a full set of vitals, you determine the patient fits the Suspected Cardiac Ischemia Chest Pain Protocol. This is the procedure you would follow to administer nitroglycerin.

Skill Proficiency Checklist:

Sublingual administration of Nitroglycerin for chest pain; assuring that a primary exam, history and physical exam has been completed, the Paramedic will:

1. Give oxygen.
2. Ensure systolic BP \geq 100 mmHg and pulse \geq 60 and monitor \leq 160
3. Confirm no allergies to nitroglycerin & no history of erectile dysfunction medication use in past 72 hrs.
4. Obtain nitroglycerin/nitro spray canister.
5. Check expiry date on canister.
6. Remove oxygen mask.
7. Instruct patient not to inhale.
8. Remove cap of canister, hold upright close to mouth, with finger in groove, spray one metered dose onto or under tongue.
9. Replace oxygen mask.
10. Check BP, reassess pain q 3-5 minutes, may repeat nitroglycerin q 5 minutes to a maximum of 6 doses.
11. Re-evaluate patient and ABC's.

SCENARIO FOR NITROGLYCERIN IN TREATMENT OF ANGINA PRE-TEST

You and your partner, Jean, are called to a residence for a patient experiencing chest pain. Upon your arrival you observe a male patient approximately 65 years of age. The patient is sitting in a chair; he is pale and mildly short of breath. As you approach the patient you introduce Jean and yourself. Your patient states his name is Al. Al tells you he was helping his friend move some furniture up the stairs when he became short of breath and began having chest pain. You instruct Jean to start Al on high concentration oxygen. Jean also attaches the cardiac monitor while you obtain a set of vitals.

Vitals

BP	160/90
Pulse	92 regular, full
Respirations	24 shallow, regular
Skin	pale, moist, and warm

Since the chief complaint is chest pain, you decide that Al probably needs Nitroglycerin, ASA, or both protocols. From your training you remember that you must first see if Al fits Suspected Cardiac Ischemia Chest Pain Protocol. Al tells you the pain is similar to his usual angina pain, but he left his nitroglycerin at home. He estimates the pain began twenty minutes ago. Following your assessment you determine that Al meets the indications for the Suspected Cardiac Ischemia Chest Pain Protocol. As you are getting the nitroglycerin out of your symptom relief kit Jean says, "Remember you don't shake the nitroglycerin spray container." You nod in agreement and administer one spray underneath Al's tongue. You then load Al on your cot and begin assessing him for ASA. On your way to the ambulance you assess to see if Al has any contraindications to ASA. By the time you are en route Al tells you he is pain free.

1. Describe angina in terms of what it means and what causes it.

2. State the principal action of nitroglycerin.

3. Describe the two primary actions of nitroglycerin on the cardiovascular system as it relates to the relief of chest pain.

4. State the normal forms of nitroglycerin as well as the routes of administration.

5. What are the two (2) primary side effects of nitroglycerin?

6. Describe two (2) primary contraindications to the administration of nitroglycerin.

7. From the scenario, explain why AI meets the indications for the Suspected Cardiac Ischemia Chest Pain Protocol.

8. How many doses of nitroglycerin spray could AI receive?

9. Describe fully the protocol for the administration of nitroglycerin to patients with chest pain. (Draw a flow chart)

NITROGLYCERIN PROTOCOL IN TREATMENT OF ANGINA ORAL SCENARIO EVALUATION

You arrive at a local secondary school to attend to the principal who is complaining of chest pain. She has had the pain for approximately fifteen minutes and has taken one of her 0.3mg nitroglycerin tablets with no relief. She describes the pain as a weight on her chest.

LOC	alert
A	clear
B	deep regular breaths
C	pulse approximately 92 regular, full
Quick body exam	unremarkable (chest clear)
Past History	angina
Meds	ASA, Adalat, Nitroglycerin
Allergies	none

Vital Signs

GCS	15
Pulse	88 regular
Respirations	20 deep, regular
Skin	pale, sweaty
BP	130/80
Pupils	PERL

Describe your course of action and treatments:

Completed Critical Actions:

- BLS treatment
- high concentration oxygen
- initiate chest pain protocol
- administer nitroglycerin
- administer ASA
- decision for rapid transport

Pass Repeat

Evaluator's Signature: _____

SCENARIO FOR NITROGLYCERIN IN TREATMENT OF PULMONARY EDEMA PRE-TEST

You and your partner, Bob, are called to a residence for a patient experiencing shortness of breath. Upon your arrival you observe a male patient approximately 70 years of age. The patient is sitting in a chair; he is pale, diaphoretic and severely short of breath. As you approach the patient you introduce Bob and yourself. Your patient states his name is Jim. Jim tells you he was awakened a half an hour before with shortness of breath without chest discomfort. You instruct Bob to start Jim on high concentration oxygen. Rob also attaches the cardiac monitor and obtains a set of vitals while you continue with your assessment.

Vitals

BP	80/90
Pulse	92 regular, full
Respirations	36 shallow, regular
Skin	pale, diaphoretic, and warm
Breath Sounds	Equal to the bases with bilateral inspiratory crackles to mid scapulas

Jim states to you that he went to bed without any discomfort and that he hasn't had any recent cough, cold or fever. Approximately two years before Jim states that he developed angina, which he takes nitroglycerin for quite regularly but he has not had any trouble breathing in the past. On your physical assessment you notice Jim's jugular veins distended and also has pitting edema to the mid calf which he states is new over the past couple of weeks. Based upon your history of current condition and physical exam you determine that Jim is in acute pulmonary edema and that he should be treated using the Acute Pulmonary Edema Protocol. While you are transporting the patient to the vehicle your partner asks if he should give ASA, you respond no that the patient doesn't meet protocol because he is not having chest discomfort.

1. List some of the causes of left ventricular dysfunction that can lead to pulmonary edema.

2. Explain the pathophysiology of pulmonary edema due to left ventricular dysfunction.

3. List the clinical signs and symptoms of a patient in pulmonary edema.

4. Describe the action of nitroglycerin on a patient experiencing pulmonary edema.

5. List the contraindications to administration of nitroglycerin in the setting of pulmonary edema.

6. What are some side effects of administering nitroglycerin?

7. Explain the rationale for assisted ventilations in a patient who is experiencing extreme SOB.

8. Describe the treatment of a patient who presents to you in pulmonary edema. (utilize Acute Cardiogenic Pulmonary Edema Protocol)

NITROGLYCERIN PROTOCOL IN TREATMENT OF PULMONARY EDEMA ORAL SCENARIO EVALUATION

You arrive at a residence at 5:30 in the morning to find a 75 year old female patient complaining of SOB without chest discomfort. She states that she awakened this way approx. 15 minutes before and that she was fine before she went to bed.

LOC	alert
A	clear
B	deep regular breaths
C	pulse approximately 92 regular, full
Quick body exam	Jugular Vein Distension, bilateral crackles to mid scapulas
Past History	angina, hypertension
Meds	ASA, Adalat, nitroglycerin
Allergies	none

Vital Signs

GCS	15
Pulse	120 regular
Respirations	36 deep, regular
Skin	pale, sweaty
BP	180/80
Pupils	PERL

Describe your course of action and treatments:

- Completed Critical Actions:**
- BLS treatment
 - high concentration oxygen
 - initiate Acute Cardiogenic Pulmonary Edema Protocol
 - administer nitroglycerin/ ASA withheld
 - decision for rapid transport

Pass Repeat

Evaluator's Signature: _____

ASA

ASA

Suspected Cardiac Ischemia Chest Pain

Objectives

At the conclusion of studying the module and participating in a classroom lecture/demonstration, the learner will:

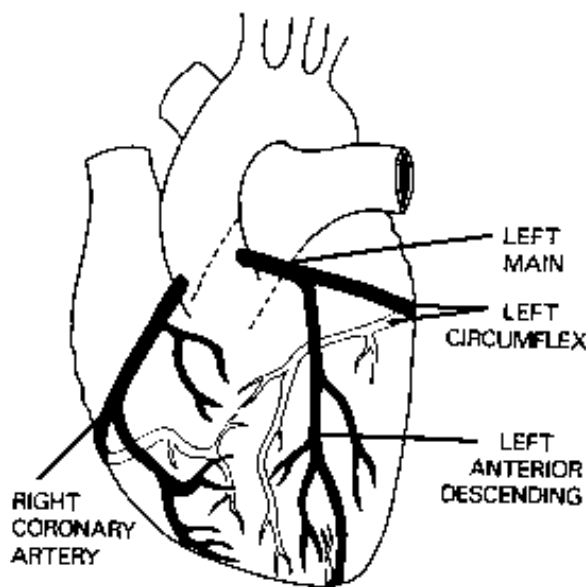
- a) Discuss the causes and pathophysiology of myocardial infarction.
- b) List the signs and symptoms of myocardial infarction.
- c) Demonstrate the appropriate history taking and physical assessment for the patient with suspected acute myocardial infarction.
- d) Explain the reason for early administration of ASA in myocardial infarction.
- e) Outline the benefits, risks and effects of ASA administration.
- f) List the indications and contraindications for administration of ASA for chest pain in the patient with a suspected myocardial infarction.
- g) What is the appropriate dosage and administration of ASA?
- h) Demonstrate the appropriate use of the Suspected Cardiac Ischemia Chest Pain Protocol.

Myocardial Infarction

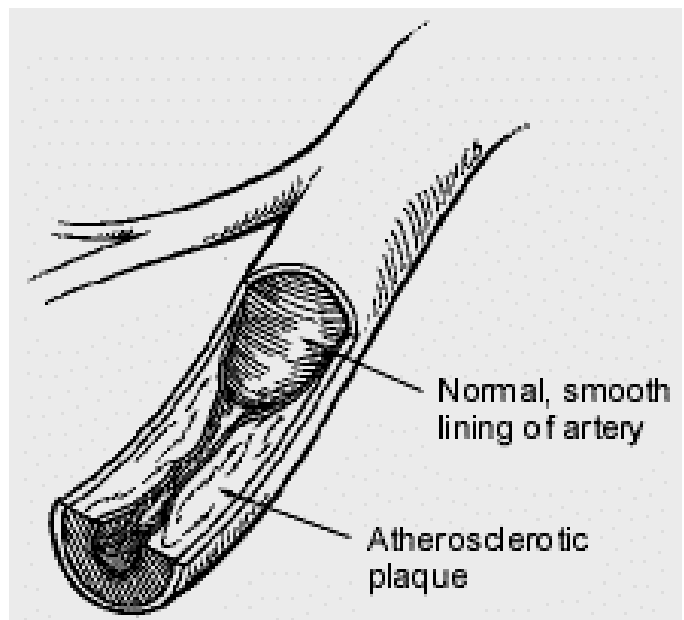
Heart disease is Canada's leading killer. 25% of patients with acute myocardial infarction will die; over half before reaching hospital. Death usually occurs within two hours of symptom onset.

Atherosclerosis: the process of plaque formation.

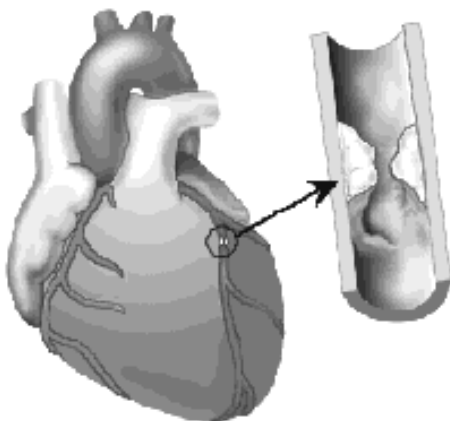
Myocardial infarction means death of a portion of heart muscle due to inadequate blood supply. Severe narrowing of coronary arteries due to plaque build-up causes atherosclerosis. When a clot (thrombosis) forms in the narrowed artery, the portion of heart muscle served by the blocked artery dies (infarcts) due to lack of blood (oxygen glucose deprivation).



CORONARY ARTERIES



COMPARISON OF AN AREA OF AN ARTERY WITH AND WITHOUT ATHEROSCLEROSIS



AREA BEYOND BLOCKAGE BECOMES DAMAGED

Signs and Symptoms of Acute Myocardial Infarction

- these may only be present in 60-70% of patients with classic MI
- sudden onset of persisting crushing chest pain behind the sternum or in the epigastrium
- radiation to the shoulders, arms, neck, jaw or back
- sweating
- shortness of breath
- a pattern of increasing chest pain (severity or frequency) in a patient with known angina
- prolonged severe "angina" pain and usually unrelieved by nitroglycerin
- Beware of any diabetic patient complaining of a vague feeling of "unwell". Silent MI is very common in these patients
- MI presentation may be "atypical". For instance your patient may tell you the only sign of their last heart attack was pain in their back teeth with some weakness, just like today.
- Women tend to present differently from men and studies show they may not have typical presentation in the majority of cases. Many complain of weakness, dizziness, mild SOB on exertion and deny CP.

Care of the Patient with Suspected Acute MI

- ABC's
- high flow O₂
- supine or semi-sitting position (comfort)
- chest pain suggests cardiac ischemia (consider nitroglycerin)
- prepare to transport (unstable)
- vital signs, head to toe exam
- determine if patient has allergy to ASA or other contraindications
- obtain verbal consent for treatment with ASA
- administer 2 x 80 mg chewable ASA tablets if no ASA allergy
- monitor and 12-lead EKG (if possible)
- code 4 to Emergency Department

Benefits of ASA in Acute MI

ASA, given in the first few hours of an acute myocardial infarction, has been shown to reduce mortality 30%.

ASA is known to be an analgesic, an anti-inflammatory, an antipyretic (reduces fever) and a platelet aggregation inhibitor (reduces clotting). By preventing platelets from sticking together, ASA reduces the amount of clotting in the narrowed coronary artery of the MI victim.

Risks of ASA/Contraindications

RISKS	CONTRAINDICATION
Bleeding	<ul style="list-style-type: none">• i.e. active GI bleeding
Allergy	<ul style="list-style-type: none">• history of allergy to ASA or non-steroidal anti-inflammatory• recent head injury or CVA within 24 hours• Hx of asthma, without prior history of taking ASA

ASA vs. Nitroglycerin

ASA should be given to any patient experiencing discomfort consistent with cardiac origin, unless contraindicated.

ASA (Acetylsalicylic Acid, Aspirin) - Pharmacology

CLASSIFICATION	analgesic antipyretic platelet inhibitor
MECHANISM	reduces platelet stickiness prolongs bleeding time and reduces clots
INDICATIONS	acute myocardial infarction unstable Angina
CONTRAINDICATIONS	allergy to ASA asthma without history of taking ASA recent head injury or CVA within last 24 hours recent bleeding disorders
DOSE	See Appendix I – Symptom Relief Protocols
ONSET, DURATION	onset 30 minutes duration 24 - 48 hours
ELIMINATION	metabolized in liver and excreted in urine
SIDE EFFECTS	indigestion, epigastric distress nausea and vomiting gastric bleeding urticaria or anaphylaxis (allergy)

Nitroglycerin Reminders

- Always assess to see if patient meets nitroglycerin parameters before considering ASA.
- Patient must have history of previous nitroglycerin use.
- Prior to administration ensure vital signs are within parameters
- Do not administer further Nitroglycerin if the systolic blood pressure drops by 1/3.
- Should the patients vital signs fall outside of the designated parameters at any time during the call, nitroglycerin will be discontinued and the patient will not receive any more nitroglycerin for the remainder of the call. This remains in effect even if the patient's vital signs return to a state that falls within the designated parameters.
- Do not exceed maximum dosage listed in protocol.
- No time limit on chest pain.
- Following administration of the first nitroglycerin spray, initiate transport and assess the patient for ASA administration.

ASA Reminders

DOSAGE: as per Provincial Protocol

REMEMBER TO ASSESS FOR CONTRAINDICATIONS

- Allergy to ASA or NSAIDs.
- Current active bleeding (GI or other disorders).
- Hx. of asthma with no previous use of ASA
- Recent head injury or CVA in the past 24 hours
- No time limit on chest pain.
- Assess the patient for ASA administration following the first nitroglycerin spray or where the patient falls outside nitroglycerin parameters.

ASA - PRE TEST

ADMINISTRATION OF ASA

Skill Proficiency

You have been called to attend a 65 year old patient who has been experiencing chest pain and shortness of breath for the past two hours. Upon your arrival you note a male patient obviously short of breath, diaphoretic and holding his chest. The patient tells you he has no allergies and takes no medications. He indicates the pain feels like a heavy weight on his chest and radiates into his jaw and down his left arm. After initiating high concentration oxygen and attaching the cardiac monitor you obtain a set of vitals. Following your assessment you determine that this patient meets the indications for the administration of ASA. This is the procedure you would follow:

Skill Proficiency Checklist:

Oral administration of ASA for the management of myocardial infarction; assuring that a primary exam, history and physical exam have been completed, the Paramedic will:

1. Obtain 160 mg ASA (2 - 80 mg chewable tablets).
2. Remove Oxygen mask from patient.
3. Confirm no allergies to ASA or contraindications.
4. Give ASA to patient.
5. Instruct patient to chew ASA and swallow.
6. Replace oxygen mask.
7. Re-evaluate patient and ABC's of life support.
8. Transport high priority to hospital.

Scenario for ASA in MI PRE-TEST

You and your partner, Sam, are called to a remote area where two friends have been fishing. Upon your arrival, a gentleman by the name of Ben meets you and directs you to the cab of a truck. In the passenger seat you find Al, a 60-year old, who is holding his chest and sweating profusely. He is also pale and obviously short of breath. Sam initiates high concentration oxygen and attaches the cardiac monitor. You immediately begin your assessment of the patient.

Vitals

BP	110/60
Pulse	130 weak, irregular
Respirations	24 laboured
Skin	pale, diaphoretic, cool

On auscultation both lung fields are clear. Al tells you that he was helping Ben carry the canoe up the hill when he began experiencing chest pain and shortness of breath. The pain began approximately 45 minutes ago and has become increasingly worse. When you further assess Al's pain he tells you that it is a heavy feeling on his chest and radiates down his left arm. As this is a chest pain call you initially assess Al for indications/contraindications for the administration of nitroglycerin. When you assess that Al has never used nitroglycerin before, you realize that he does not meet the nitroglycerin protocol. You then assess Al for indications/contraindications for ASA. You decide that he does meet ASA protocol. As you are opening the bottle of baby ASA Sam says, "Hey, does he have a history of asthma?" Immediately you ask Al if he has asthma. Al says no to the asthma and the other contraindications to ASA so you proceed with giving him the ASA. Your travel time to hospital is thirty minutes and you note little improvement. Two days later you visit Al in the hospital and find out that he suffered an inferior MI.

1. Briefly describe the pathophysiology of myocardial infarction.

2. Describe fully the signs and symptoms that should lead a Paramedic to suspect myocardial infarction when assessing the patient with chest pain.

3. Describe the action of ASA in the body including positive and negative effects.

4. Describe fully the protocols for the administration of ASA to patients with suspected myocardial infarction. (Draw a flow chart)

**ASA PROTOCOL
ORAL SCENARIO EVALUATION**

You are called to the home of a 52-year old male who has been complaining of heaviness in his chest for the past two hours.

LOC	alert
A	clear
B	regular and deep
C	pulse, approximately 100
Quick body exam	unremarkable
Skin	pale
Past History	high blood pressure
Allergies	none
Meds	Adalat

Vital Signs

GCS	15
Pulse	110 regular, full
Respirations	20 deep, regular
Skin	pale, moist, and warm
BP	156/96
Pupils	PERL

Describe your course of action and treatments:

- Completed Critical Actions:**
- BLS treatment
 - oxygen treatment
 - decision for rapid transport
 - does administer ASA protocol

Pass Repeat

Evaluator's Signature: _____

GLUCAGON

GLUCAGON

for the treatment of altered LOC – Suspected Hypoglycemia

Objectives

At the conclusion of studying the module and participating in a classroom lecture/demonstration, the learner will:

- a) Discuss the cause and pathophysiology of hypoglycemia.
- b) List the signs and symptoms of hypoglycemia.
- c) Demonstrate the appropriate history taking and physical assessment for the patient with hypoglycemia.
- d) List the indications and contraindications for the use of glucagon in hypoglycemia.
- e) Describe the effect of glucagon on blood sugar in hypoglycemia.
- f) State the side effects of glucagon.
- g) Demonstrate the safe administration and storage of glucagon.
- h) Demonstrate the appropriate use of the Altered LOC – Suspected Hypoglycemia Protocol.

What is Hypoglycemia?

Hypoglycemia is a group of signs and symptoms associated with abnormally low blood sugar (normal blood sugar is 4.0-6.0 mmol/l). Almost always, the patient has a history of diabetes treated with insulin or pills. Occasionally, other conditions such as alcoholism, can cause hypoglycemia.

Oxygen and glucose are the vital fuels for all body cells. Low glucose causes impaired brain function with decreasing level of consciousness. Tachycardia and dilated pupils result from the sympathetic nervous system's reaction to low blood sugar.

Signs and Symptoms of Hypoglycemia

- | | |
|---------------------------------|------------------------|
| 1. weakness/dizziness | 5. seizure |
| 2. confusion/abnormal behaviour | 6. coma |
| 3. lack of coordination | 7. dilated pupils |
| 4. slurred speech | 8. sweating, cool skin |

- Ask for a history of diabetes, hypoglycemia is rare in non-diabetics.
- Unless hypoglycemia is rapidly reversed, coma and possible brain damage result.

Treatment of Hypoglycemia

If the patient's history (diabetes) and clinical picture suggest Hypoglycemia, treat as follows:

- a) Prepare to transport unstable patient.
- b) Obtain complete set of vital signs including GCS.
- c) Determine blood glucose prior to administration of SC glucagon.
- e) If the patient is conscious, and exhibits minor symptoms, check the blood sugar
- f) If the patient exhibits serious signs and symptoms of Hypoglycemia:
 - protect and maintain **A**irway
 - ensure adequate **B**reathing
 - administer high flow O₂
 - suction as necessary
 - administer appropriate dose glucagon SC/IM
 - transport on left side (vomiting)
- g) Monitor patient with ECG enroute, if possible.

NOTE: If the patient's level of awareness improves while still at home the patient may refuse transport. This may leave the patient at risk and create a medical-legal risk for the paramedic.

In the setting of a patient requesting not to be transported to hospital:

- ensure responsible person is able to observe patient

- ensure patient eats a meal
- instruct patient/caregiver to call 911 if any change
- ensure the patient is aware of and understands the risks associated with the decision not to receive transport and care in the hospital (complete competency portion on reverse of ACR).
- ensure documentation of above instructions

How Glucagon Works

Glucagon is a natural body hormone produced by the pancreas. It causes stores of glycogen (long chains of glucose) in the liver and large muscle groups to be converted to glucose, which rapidly raises the blood glucose level.

- onset of action: 5 to 10 minutes (SC injection) ? to ? minutes (IM injection)
- duration of action: 30 to 90 minutes
- side effects: nausea, dry mouth, headache, rarely allergic reactions

Contraindications to Glucagon (rare)

- allergy to glucagon
- rare adrenal tumour (pheochromocytoma)

Administration: Special Considerations

- Obtain verbal consent from patient or family to treat. Unconscious with suspected hypoglycemia is implied consent.
- Prepare glucagon injection (covered in lecture/demonstration).
 - obtain vial of glucagon and preload of diluting solution, alcohol swabs, disposable gloves, and sharps container.
 - check expiry date and remove plastic caps on glucagon vial.
 - clean top of container with alcohol swab.
 - remove cap of needle, inject 1 ml diluting solution into vial of glucagon, shake to dissolve precipitate, and withdraw 1 mg of glucagon (total contents)
- Wipe deltoid site with alcohol swab.
- Penetrate skin using proper technique for SC or IM injection.
- After pulling back on plunger to rule out intravenous injection, inject bolus of glucagon SC/IM.
- Discard needle and syringe (don't recap) to sharp container.
- After glucagon administration if the patient is able to protect their airway, administer oral glucose.

Preparing Glucagon for Injection

Note: Glucagon should not be prepared for injection until the emergency arises.

1. Obtain vial of glucagon and pre loaded syringe containing diluting solution, 1 - 3cc syringe (with 25G 5/8" needle), alcohol swabs, disposable gloves, sharps container.
2. Check expiry date and remove plastic cap on glucagon vial.
3. Clean top of container with alcohol swab.
4. Remove cap from needle.
5. Inject contents of syringe into vial of powder.
6. Roll vial to mix medication.
7. Withdraw all glucagon. (Removing air bubbles from mixture).
8. Landmark injection site.
9. Prepare site with alcohol swab (and allow alcohol to dry).
10. Insert needle for IM/subcutaneous injection
11. Aspirate for blood.
12. Inject medication.
13. Dispose of needle in sharps container.
14. Re-evaluate patient and ABC's of life support.

GLUCAGON - Pharmacology

CLASSIFICATION	agent to elevate blood sugar (hyperglycemic agent)
MECHANISM	Glucagon converts liver glycogen (long chains of glucose) to blood glucose
INDICATIONS	symptomatic hypoglycemia
CONTRAINDICATIONS	allergy to glucagon pheochromocytoma - a rare tumour of the adrenal gland that can release huge amounts of epinephrine-like hormones (↑ BP, pulse) if stimulated by glucagon
DOSE	See Appendix I – Symptom Relief Protocols
ONSET, DURATION	onset 5 to 10 minutes duration under 1 hour
ELIMINATION	rapidly metabolized in liver
SIDE EFFECTS	nausea and vomiting occasional allergic reactions
SPECIAL CONSIDERATIONS	give oral glucose ASAP after the patient wakes up with glucagon

Glucagon Reminders

- Use 3 cc syringe (if not in preload)
- Glucometer reading must be ≤ 4.0 mmol / L
- Administer subcutaneously (SC) or intramuscularly (IM)

DOSAGE: **<20 kg. 0.5 mg.**
 ≥ 20 kg. 1.0 mg.

- Patient must have diabetic Hx and be on insulin or diabetic pills.

OR

- If they are showing signs of hypoglycemia and the paramedic is unable to confirm the patient is a diabetic, they may check the blood sugar and if it is ≤ 4.0 mmol / L then they can proceed with the hypoglycemia protocol.
- ie. You find an unresponsive patient in the park. He has no Medic Alert tag and no one knows him. You can check his blood sugar and if it is ≤ 4.0 mmol / L then the patient qualifies for Glucagon.

Glucagon – Pre Test

Administration of Glucagon

Skill Proficiency

You have been called to a residence where a patient is unconscious. Upon arrival you learn that this patient is a known diabetic. He took his insulin two hours ago but has not eaten today. After placing the patient on high concentration oxygen, attaching the cardiac monitor, assessment, getting a full set of vitals, and obtaining a blood glucose sample which read 0.9 mmol, you decide this patient meets the Altered LOC – Hypoglycemia Protocol. This is the procedure you would follow for administering glucagon.

Skill Proficiency Checklist:

Subcutaneous injection of glucagon in a simulated situation; assuring that a primary exam, history and physical exam have been completed, the Paramedic will:

- 1. Give oxygen.
- 2. Confirm no allergies to glucagon.
- 3. Obtain vial of glucagon and pre loaded syringe containing diluting solution,
1 - 3cc syringe (with 25G 5/8" needle), alcohol swabs, disposable gloves, sharps container.
- 4. Check expiry date and remove plastic cap on glucagon vial.
- 5. Clean top of container with alcohol swab.
- 6. Remove cap of needle.
- 7. Inject contents of syringe into vial of powder.
- 8. Roll vial to mix medication.
- 9. Withdraw correct dose of glucagon, removing air bubbles from mixture.
- 10. Landmark injection site.
- 11. Prepare site with alcohol swab (and allow alcohol to dry).
- 12. Insert needle for SC/IM injection
- 14. Aspirate for blood.
- 15. Inject medication.
- 16. Dispose of needle in sharps container.
- 17. Re-evaluate patient and ABC's of life support.

**GLUCOSE SAMPLING (Chemstrip)
Skill Proficiency Checklist**

- 1. Obtain test strips/electrodes, alcohol swabs, 2 x 2 gauze pads, lancet, and gloves.
- 2. Check expiry date on test strips/electrodes.
- 3. Place test strip in glucometer.
- 4. Wipe fingertips with alcohol swab (let alcohol dry), glove.
- 5. Using the lancet, prick the fingertip.
- 6. Gently squeeze finger to extract sufficient size blood sample if necessary.
- 7. Place sufficient amount of blood on test strip/electrode.
- 8. Using a 2 x 2 gauze pad, put pressure on fingertip.
- 9. Take and record glucometer reading
- 10. Check for continued bleeding.

Scenario for Glucagon in the diabetic hypoglycaemia patient

PRE-TEST

You and your partner, Lee, are called to a local motel for a possible seizure patient. When you arrive, you observe a male attempting to get his combative wife to drink some ginger ale. As you approach the patient her husband, Dennis says, "She took her insulin this morning but went back to bed and never did eat breakfast. When I was able to wake her she was very combative and refuses to drink or eat anything." As you get closer to the patient you see she is sweating profusely and her skin is very pale. Being that your communication skills are very good, you are able to calm the patient and get her to sit on the edge of the bed. The patient tells you her name is Evelyn.

Evelyn is still very agitated but she accepts high concentration oxygen mask. Her skin is very diaphoretic and the monitoring electrodes will not stick. You are, however, able to obtain a blood sample, which indicates a blood glucose level of 1.2 mmol. Lee has obtained the following vitals.

Vitals

BP	130/80
Pulse	110 regular
Respirations	20 regular
Skin	sweating profusely, pale, cool
Pupils	dilated and reacting

Following your assessment you decide Evelyn meets the Altered LOC – Suspected Hypoglycemia Protocol. As you are mixing and drawing up the Glucagon, Lee says, "Did you make sure she isn't allergic to Glucagon or have a pheochromocytoma?" You respond, "Oh ya, thanks," and immediately ask Dennis the appropriate questions. When he tells you she does not have these problems, you proceed with the injection. You wipe the area of the deltoid with an alcohol wipe and give it time to dry. You then inject Evelyn with 1mg of Glucagon. Following proper disposal of the sharp, you assist Evelyn on to your cot. Shortly after leaving the scene Evelyn becomes fully alert and oriented. She now doesn't want to go to the hospital, but you convince her it would be best if a physician saw her before returning home. En route a second set of vitals are obtained.

Vitals

BP	120/80
Pulse	88 regular and full
Respirations	16 regular
Skin	pale, dry, warm
Pupils	2 mm, reactive

A week later, your service manager receives a card from Evelyn thanking you and Lee for giving her such good care.

**GLUCAGON
PRE-TEST**

1. List three (3) common causes of hypoglycemia.

2. Describe the importance of the rapid identification and reversal of Evelyn's hypoglycemia.

3. List the signs and symptoms of hypoglycemia exhibited by Evelyn.

4. Why did Evelyn become hypoglycemic?

5. Describe the basic life support for Evelyn's hypoglycemia.

6. Describe the action of glucagon in the reversal of hypoglycemia.

7. Describe the action of subcutaneously administered glucagon in terms of onset of action in minutes and side effects.

8. List the indications exhibited by Evelyn for the prehospital administration of glucagon.

9. Describe the protocols for hypoglycemia, including the administration of glucagon. (Draw a flow chart)

Glucagon - Oral Scenario Evaluation

You are called to a residence for a possible unconscious male diabetic. Upon your arrival you note a male patient approximately 40 years of age, sitting slumped in a chair, pale, and diaphoretic. He took his insulin approximately two hours ago.

LOC	responding only to painful stimuli
A	clear
B	slow and deep
C	regular and full
Quick body exam	pale and diaphoretic

Vital Signs

GCS	10
Pulse	92
Respirations	8
Skin	pale, diaphoretic, cool
BP	130/84
Pupils	dilated, reacting

Describe your course of action and treatments:

- Completed Critical Actions:**
- BLS treatment
 - airway management
 - oxygen treatment
 - assist ventilation
 - initiate Altered LOC – Suspected Hypoglycemia Protocol
 - decision for rapid transport

Pass Repeat

Evaluator's Signature: _____