

The lesson on bleeding is rather extensive. So, we have broken it up into 3 parts.

- Part A is about External Bleeding and Hemorrhage.
- Part B covers Bleeding Control, and
- Part C discusses Special Situations and Internal Bleeding.

As you go through the lesson, be very aware of the need to have personal protective equipment (PPE) on hand. Also, when you schedule your skills validation session, have bleeding control equipment available for practice.

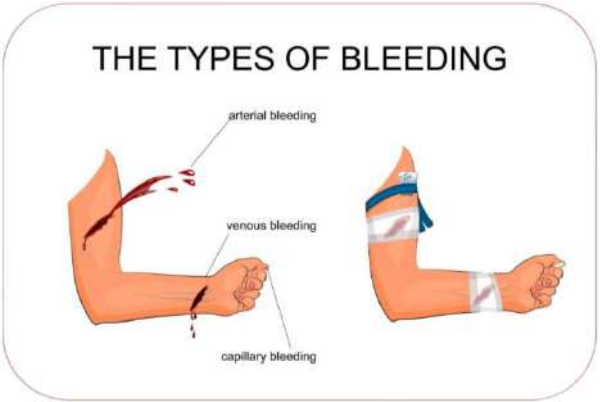
Unless it is exsanguinating, bleeding likely will be a lower priority than airway and breathing. However, bleeding is often distracting. We will review an appropriate progression through the primary assessment. Also, consider the consequences of internal bleeding which is impossible to estimate and is potentially deadly.

Also note the confusion that bleeding, and hemorrhaging mean the same thing. However, hemorrhaging has a connotation of severe bleeding. So be sure you understand the context.

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Types of Bleeding

- Hemorrhage is severe bleeding
  - ✓ Major cause of shock (hypoperfusion) in trauma
- External
- Internal



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Now, let us discuss the Types of Bleeding. We need to be aware of the location, severity, and source.
So, based on location, bleeding can be external or internal to the body.
External bleeding is when blood is leaving the body through some type of wound. Any incident in which you physically saw blood would be an external bleed.
Internal bleeding is a loss of blood from a blood vessel that collects inside the body. Internal bleeding is usually not visible from the outside. It is a serious medical emergency, but the extent of severity depends on the bleeding rate and location of the bleeding.
Hemorrhage is often referred to as severe bleeding. It could refer to internal or external bleeding. It is a major cause of shock or hypoperfusion in trauma. There is a hemorrhage severity scale like the hypovolemia classification we already reviewed, which we will discuss in a few slides.
And the third item to consider is the source of the bleeding. The source or type of blood vessel could be arterial, venous, or capillary.

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External Bleeding Characteristics

- Three types of external bleeding
  - ✓ Arterial
  - ✓ Venous
  - ✓ Capillary

Arterial bleeding	Venous bleeding	Capillary bleeding
		
• Spurting blood • Pulsating flow • Bright red color	• Steady, slow flow • Dark red color	• Slow, even flow

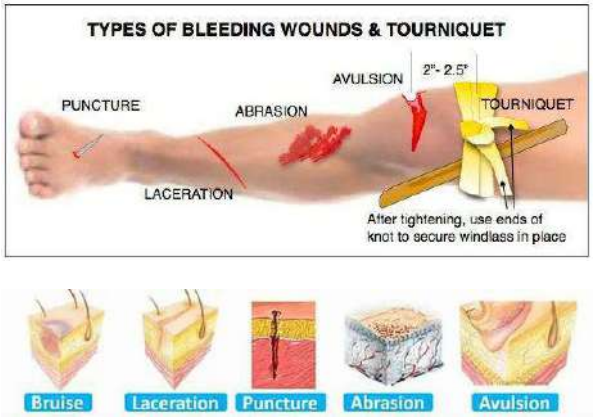
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We will now examine the characteristics of bleeding, based upon the different blood vessel types:
With Arterial bleeding, the blood is typically bright red, to yellowish in color, due to the high degree of oxygenation. A wound to a major artery could result in blood spurting and pulsating with each heartbeat.
Venous bleeding is darker red, sometimes almost blackish in color, due to the lack of oxygen it transports. And generally, venous bleeding flows in a steady manner.
Bleeding from capillaries occurs in all wounds. Although the flow may appear fast at first, blood loss is usually slight and is easily controlled. Bleeding from a capillary could be described as a slow even flow.
The key treatment for all of these types of bleeding is direct pressure over the wound.

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External Bleeding

- Occurs outside of the body after force penetrates the skin and lacerates or destroys the underlying blood vessels
- Typically visible on the surface of the skin
- Bleeding determined by:
  - ✓ Size and severity of the wound
  - ✓ Size and pressure of the ruptured vessel
  - ✓ Individual's ability to clot



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So, External Bleeding occurs outside of the body, after a force penetrates the skin, and lacerates or destroys underlying blood vessels. It is typically visible on the surface of the skin.

As a result, How much a person bleeds is determined by:

- The Size and severity of the wound, and
- The Size and pressure of the ruptured vessel, plus
- The Individual's ability to clot.

Note that the three types of external bleeding are causally related to the amount of pressure within the ruptured vessel.

So, Arterial circulation is a high-pressure system inside thick, muscular walls making it most difficult to control. Compare that to Venous circulation, which is a low-pressure system that is often lower than atmospheric pressure, which may suck in debris or air bubbles through an open wound.

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MASSIVE HEMORRHAGE

- Arterial bleeding
- Bright red color
- Spurting with heartbeat
- Oxygen rich
- Most difficult to control
- Four classes: Based on volume of blood lose

Classification of Shock				
	Class I	Class II	Class III	Class IV
Blood loss (mL)	< 750	750-1500	1500-2000	> 2000
Blood loss (%body vol)	< 15%	15-30%	30-40%	> 40%
HR	< 100	> 100	> 120	> 140
BP	Normal	Normal	Decreased	Decreased
Pulse pressure	Normal/ Increased	Decreased	Decreased	Decreased
RR	14-20	20-30	30-40	> 35
Urine output (mL/ hr)	> 30	20-30	5-15	Negligible
CNS	Slightly anxious	Mildly anxious	Anxious and confused	Confused and lethargic
Fluid replacement	Crystalloid	Crystalloid	Crystalloid and Blood	Crystalloid and Blood

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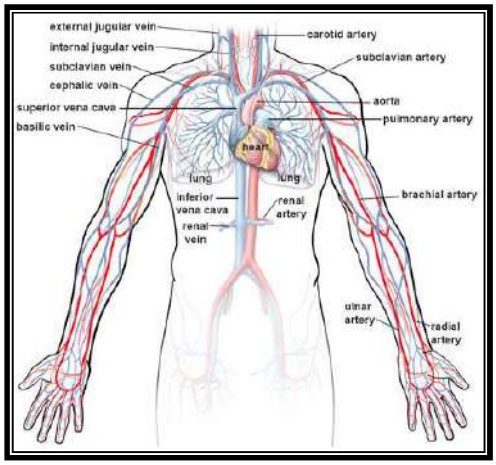
Here we refer to a Massive Hemorrhage due to severe Arterial bleeding. Characteristics include a Bright red color and Spurting with the heartbeat. It is the most difficult to control.
Hemorrhaging in the context of severe bleeding, is broken down into four classes by the American College of Surgeons' advanced trauma life support.
They are:
A Class 1 Hemorrhage involves up to 15% of blood volume. There is typically no change in vital signs and fluid resuscitation is not usually necessary.
A Class 2 Hemorrhage involves 15-30% of the total blood volume. A patient is often tachycardic with a reduction in the difference between the systolic and diastolic blood pressures. The body attempts to compensate with peripheral vasoconstriction. The Skin may start to look pale and be cool to the touch. The patient may exhibit slight changes in behavior.
Next, a Class 3 Hemorrhage involves loss of 30-40% of circulating blood volume. The patient's blood pressure drops, the heart rate increases, peripheral hypoperfusion with diminished capillary refill occurs, and the mental status worsens.
Finally, a Class 4 Hemorrhage involves the loss of more than 40% of the circulating blood volume. The limit of the body's compensation is reached, and aggressive resuscitation is required to prevent death.

Note that this system is basically the same as used in the staging of hypovolemic shock.

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MASSIVE HEMORRHAGE (CONT.)

- Venous bleeding
- Darker in color than arterial bleeding
- Less pressure than arterial bleeding
- Volume of blood carried by some veins can immediately create life-threatening hemorrhage



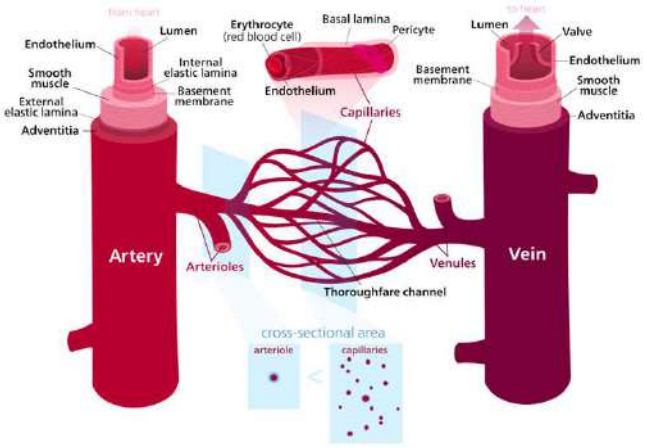
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Now we refer to a Massive Hemorrhage due to severe Venous bleeding. The blood is darker in color than arterial bleeding. And there is Less pressure. Note that the Volume of blood carried by some veins can create an immediately life-threatening hemorrhage.
Venous bleeding is more severe than capillary bleeding but is not under pressure like arterial bleeding.
The same hemorrhage classification model as we just discussed, applies to venous bleeding as well.

Other External Hemorrhage

- Capillary bleeding
- Caused by superficial wounds to surface of skin
- Slow and oozing
- Stops spontaneously



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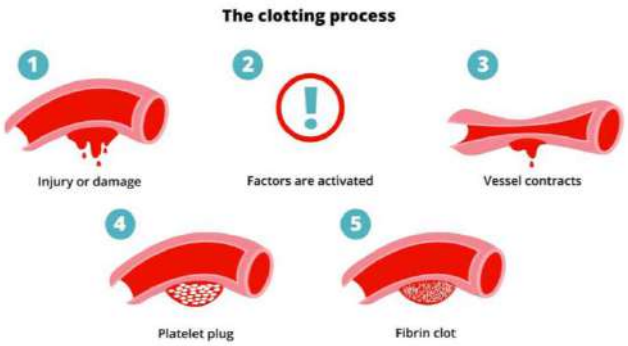
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So, Capillary bleeding is usually caused by superficial wounds and abrasions to the surface of the skin. It is slow and oozing, and stops spontaneously.
Capillary bleeding usually stops in a few minutes with little assistance. If necessary, bandage the wound, being careful not to apply adhesive to any part of the wound or abrasion.

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Other External Hemorrhage

- Bleeding can be accelerated by underlying conditions
- Prescription medications designed to limit body's natural ability to form blood clots
- Hypothermia affects body's ability to clot



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Bleeding can be accelerated by underlying conditions. An individual may be using prescription medications designed to limit the body's natural ability to form blood clots. Also, Hypothermia affects the body's ability to clot.
So, clotting is a three-part process shown in the image, as 5 steps:
Whether at the surface of the skin or deep within the body, clotting is a complex, highly orchestrated process. It can be broken down into three basic parts:

- Formation of a platelet plug. Platelets circulating in the blood are the first responders to an injury. They stick together and release chemicals that trigger the next phase.
- The clotting cascade. In a chemical chain reaction, the injury itself and platelet activity, switch various molecules from inactive to active states. This yields a netlike mesh made of fibrin, a protein that reinforces the platelet plug and snares passing red blood cells.
- Clot dissolution. When the danger has passed, a reverse cascade dissolves the clot. This process involves the friction of blood flow, the removal of pro-clotting chemicals by the liver, and the activation of chemicals that yield a clot-dissolving enzyme called plasmin.

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THINK ABOUT IT

- How severe is the bleeding?
- Is it exsanguinating hemorrhage?
- If so, how does that affect the priorities of treatment?



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Exsanguinating hemorrhage is rapidly life-threatening, so it must be the first priority. Exsanguination is the loss of blood to a degree sufficient to cause death. Depending upon the age, health, and fitness level of the individual, people can die from losing half to two-thirds of their blood. Refer back to the hemorrhage classification scale we discussed earlier.

Know that even a single deep cut can warrant suturing and hospitalization. Especially if trauma, a vein or artery, or another comorbidity is involved.

So, as you continue on to the next two parts of this lesson, think about:

- How severe is the bleeding?
- Is it exsanguinating hemorrhage?
- If so, how does that effect the priorities of the treatment?

That is the end of Bleeding Part A, External Bleeding & Hemorrhage. We will discuss bleeding control in Part B next. See you soon.