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Managing Hemorrhagic shock in rural hospitals

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C.C.F.P 1983

F.C.F.P.

C.C.F.P (FPA) 2016

D.T.M.T.H. (Liverpool) 1974

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INTRODUCTION

Significant improvement in outcome has been shown with the establishment of urban trauma centres in the management of hemorrhagic shock.

This is relative to densely populated areas. For the 18% of the Canadian population being managed by Canada's rural physicians, the buck stops in the rural Emergency Room, Obstetrical Suite, or Operating Room.

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Slide 1

DR1 Danielle Romain, 10/10/2018

The purpose of this presentation, is to present practical facts which will help in the management of the patient in hemorrhagic shock.

1. The recognition of hemorrhagic shock
2. The practical management including:
 - a) *The size of the IV*
 - b) *The location of the IV*
 - c) *IV access*
 - d) *The use of crystalloid, colloid and blood*
3. Examples from our 42 bed rural hospital
4. Controversies in fluid resuscitation
5. Closing comments and conclusion

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	CLASS 1	CLASS 2	CLASS 3	CLASS 4
Estimated blood loss %	15%	15-30%	30-40%	+ 40%
<u>Cardiovascular system:</u> PULSE	<100	>100	>120	>140
<u>Cardiovascular system:</u> B.P.	normal	normal	decreased	decreased
<u>Cardiovascular system:</u> PULSE PRESSURE	normal	decreased	decreased	decreased
<u>Cardiovascular system:</u> CAPILLARY REFILL	normal	Delayed	Delayed	Delayed
<u>RESPIRATORY system:</u> RESPIRATORY RATE	<20	20-30	30-40	>35
<u>G. U. SYSTEM:</u> URINE OUTPUT	>30	20-30	5-15	0
<u>CNS SYSTEM:</u> MENTAL STATUS	mildly anxious	mildly anxious	anxious & confused	confused & lethargic

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LIMITATIONS

1. **Pulse**
 - a. *Trauma; increased vagal tone with a decreased pulse*
 - b. *Exsanguination; decreased coronary perfusion may cause bradycardia*
 - c. *Head and spinal; may cause bradycardia*
 - d. *Drugs; Beta-blockers*
2. **Blood pressure:** accurate intra-arterial BP is unrealistic.
3. **Respiratory rate:** non-specific
4. **Urinary output:** adds little to evaluation initially
5. **Mental status:** altered by hypoxia, head injury or intoxication

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PRACTICAL MANAGEMENT

1. **Size of IV.** Remember the principles of Poiseuille's Law;
 - a. *Infusion pressure*
 - b. *The length of the catheter*
 - c. *The radius of the catheter*
1. **The location of the IV;** time is frequently lost in trying to access a central vein. The best vein is in the antecubital fossa.
2. **Vascular access** – Rapid infusion catheter (produced by Arrow) allows conversion of a small bore to a large bore using Selinger technique. Alternatively, there is a central line.

Q	Flow rate
P	Pressure
r	Radius
η	Fluid viscosity
l	Length of tubing

$$Q = \frac{\pi Pr^4}{8\eta l}$$

Hagen-Poiseuille's Law

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PRACTICAL MANAGEMENT (continued)

4. Choice of intravenous liquid

- *Dextrose*
- *Normal saline*
- *Ringers lactate*
- *Albumin or dextran*
- *Blood*

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CONTROVERSIES IN FLUID RESUSCITATION

■ BLOOD TRANSFUSION AND RISKS

Liberal transfusion practices have perhaps been replaced by excessive caution. Remember the risk is now extremely low for transmission of disease via blood.

H.I.V. - 1 in 1 500 000

Hepatitis C - 1 in 1 000 000

Hepatitis B - 1 in 300 000

The chance of haemolytic / anaphylactic reactions is 1 in 70 000.

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OTHER CONTROVERSIES

- RESTRAINED RESUSCITATION OF HEMORRHAGIC SHOCK: A study by Bickell has questioned immediate fluid resuscitation of the patient after penetrating trauma. It suggests that immediate resuscitation should be avoided as restoration may promote further hemorrhage. Conventional treatment states that delay in treatment increases the risk of multiple system organ failure.
- HYPERTONIC SALINE: the transfusion of hypertonic salt solutions such as 3% normal saline may result in fewer complications. It will more rapidly restore intravascular volume. However, it's effect on decreasing mortality remains to be seen.
- FRESH FROZEN PLASMA AND PLATELETS: The use of fresh frozen plasma in patients with massive transfusion remains controversial. However, it would be reasonable to transfuse fresh frozen plasma. Platelet concentrates may also be needed in the massively transfused patient. Platelet concentrates are usually not available in rural hospitals. Current recommendations, based on experience in the wars in Afghanistan and Iraq by the American Medical Military Service are : 1 unit blood/ 1 unit FFP/ 1 unit platelets

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EXAMPLES

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Patient A

- 54 yrs old
- Acute onset of abdominal pain
- Collapsed at home

O/E:

- Pale diaphoretic, clammy
- Unrecordable BP in ER, pulse 80/min

Rx:

- #16 gauge x 2
- Ringers lactate
- BP recordable within 20 mins
- Typed and x-matched for 5 units
- Transferred with ER physician to tertiary level centre 1 hour away
- Initial Hgb of 14

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Patient F

- 23 yr old female
- bleeding for 2 days
- worse x 4 hours

O/E:

- Acute distress
- Pale, waxy appearance
- BP <80 systolic
- Pulse >100/min
- Active vaginal bleeding
- Initial Hbg < 7.0
- 2 days previously had been 125

Rx:

- Received 6 units
- Still actively bleeding despite transfusion, ergotamine and evacuation of clots
- Transfer to tertiary centre

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Patient T

- 22 yr old
- crushed under a car
- chest and head injuries

O/E:

- Glasgow coma scale of 8
- Bleeding from laceration bridge of nose
- Extensive bleeding in oropharynx
- Pulse >110/min
- RR>30/min
- SaO₂ of 80

Rx:

- Intubated
- Ventilated

INVESTIGATIONS:

- Cx spine cleared
- CXR: bilateral pneumothorax
- Chest tube: large hemothorax (1.5L blood)
- Hgb 110: then 100, transfused 4 units

OGH:

- Repair of lacerated lung
- # R transverse process T1, T2
- R pneumothorax & R lung contusion
- L pneumothorax & L lung contusion
- CT brain N

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Resources in the Pontiac 2018

■ Blood and blood products:

- Blood: O^{neg}, 5 units; O^{pos}, 2 units

A^{neg}, 4 units; A^{pos}, 4 units

TOTAL 15 units

- Fresh Frozen Plasma: 12 units
- No platelets

■ The Laboratory

- Cascade when you announce "Implement a Massive Transfusion Protocol"

■ Colleagues

- Call Anesthetists, surgeons, colleagues
- Familiarize yourself with the RIC catheter.

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Conclusion

Management of acute hemorrhagic shock may arise in the Emergency Room, Case Room, Operating Room for the Rural Physician.

Our experience and the examples we have discussed show that those situations are not unique to tertiary centres.

A plan of action will help in managing these problems.

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REFERENCES

- I. Initial Management of Moderate to Severe Hemorrhage in the Adult Trauma Patient – August 2018, UpToDate
- II. ATLS Manual
- III. <https://www.youtube.com/watch?v=AprH6bKEGtg>

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