Massive Transfusion and the Prehospital Setting

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Thank you

- Dr. Jeannie Callum
- Troy Thompson
- ORBCoN

Ontario Regional Blood Coordinating Network

- I have no conflicts to declare

Outline

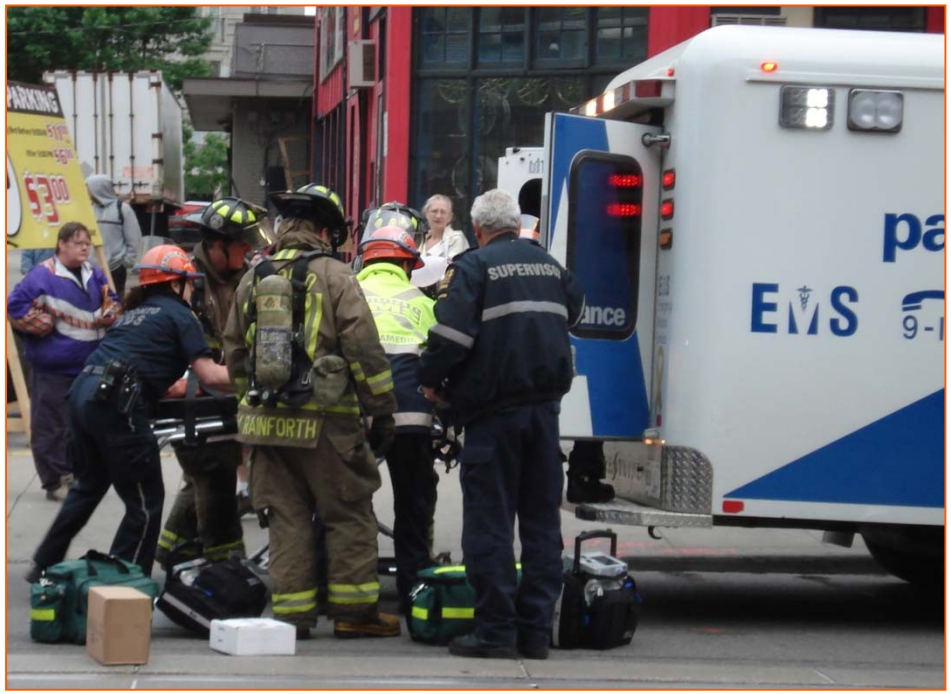
- learn what has been published on prehospital activation
- discuss how care may be improved with prehospital activation
- identify best practices for prehospital management of a massively hemorrhaging patient

Outline

- learn what has been published on prehospital blood products
- discuss how care may be improved with prehospital blood products
- identify best practices for prehospital management of a massively hemorrhaging patient

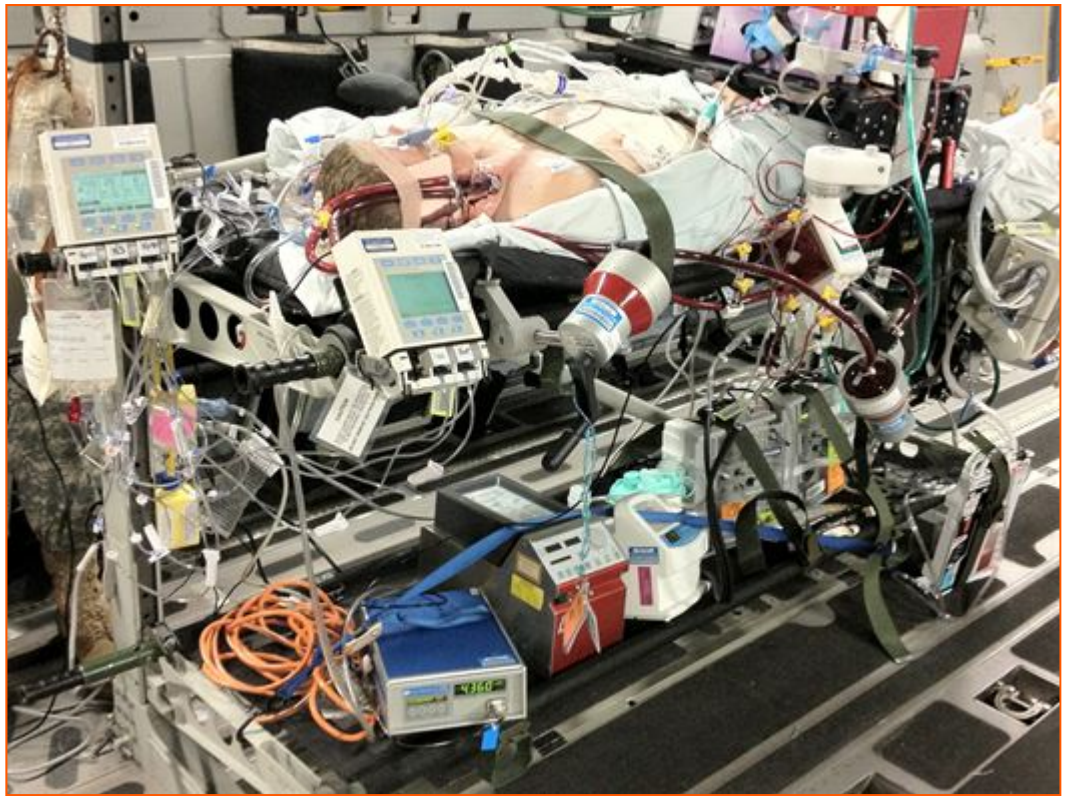
Please note

- not all ‘prehospital’ is the same
- this is ‘9-1-1’



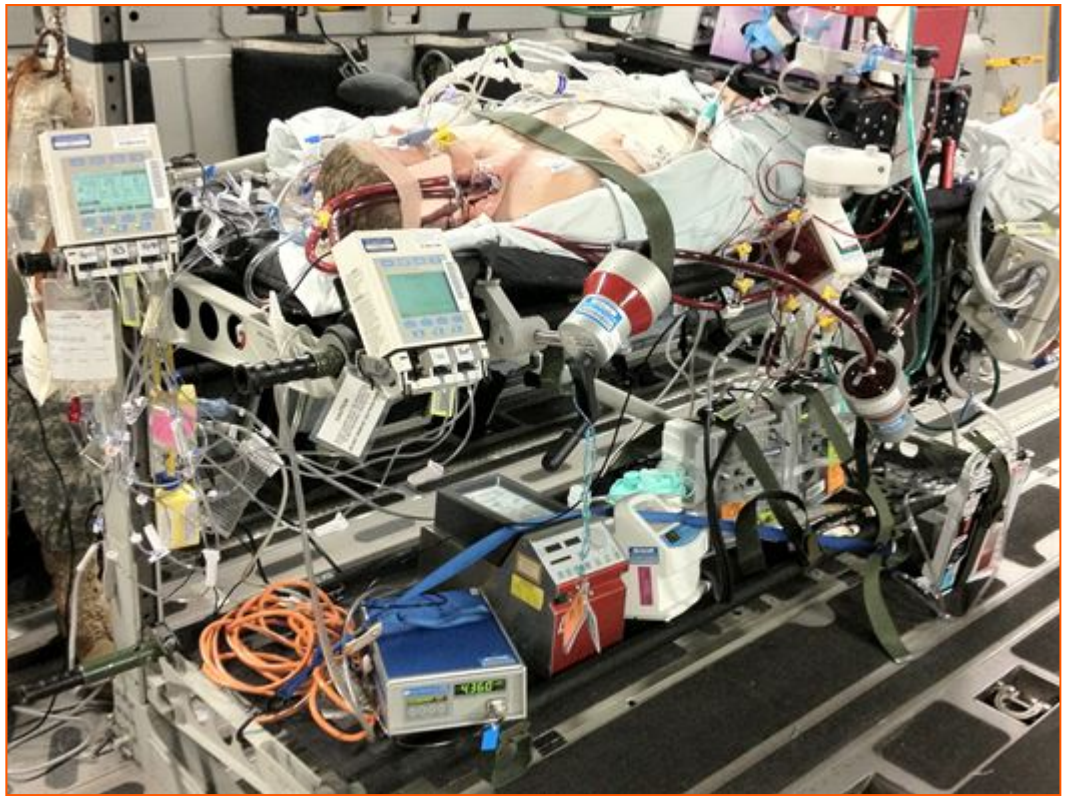
Please note

- not all ‘prehospital’ is the same
- this is critical care transport



Please note

- blood products not relevant to 9-1-1 but relevant to critical care transport



In-hospital MHP: the evidence

- my colleagues have presented the evidence for hospital-based MHP

- what about evidence in the pre-hospital setting?

Prehospital MHP: the landscape

- land EMS services don't carry blood

- many HEMS and critical care transport services
  - carry blood products
  - have a MHP activation protocol
  - coordinate care with and notify receiving hospital for MHP patient

Prehospital MHP: the evidence

- some potential benefit

- pre-hospital blood product administration leads to increased survival to hospital, but not overall survival
- note: these are 'scene' responses, not interfacility transfers

PREHOSPITAL TRANSFUSION OF PLASMA AND RED BLOOD CELLS IN TRAUMA PATIENTS

John B. Holcomb, MD, Daryn P. Donathan, BS, Bryan A. Cotton, MD, Deborah J. del Junco, PhD, Georgian Brown, RN, Toni von Wenckstern, RN, Jeanette M. Podbielski, RN, Elizabeth A. Camp, PhD, Rhonda Hobbs, Yu Bai, MD, PhD, Michelle Brito, BS, Elizabeth Hartwell, MD, James Red Duke, MD, Charles E. Wade, PhD

Point-of-injury use of reconstituted freeze dried plasma as a resuscitative fluid: A special report for prehospital trauma care

Elon Glassberg, MD, MHA, Roy Nadler, MD, Todd E. Rasmussen, MD, Amir Abramovich, MD, MPH, Tomer Erlich, MD, Lorne H. Blackbourne, MD, *and* Yitshak Kreiss, MD, MPA, MHA, *Ramat Gan, Israel*

Shock. 2018 Apr 16. doi: 10.1097/SHK.0000000000001166. [Epub ahead of print]

Effect of Pre-Hospital Red Blood Cell Transfusion on Mortality and Time of Death in Civilian Trauma Patients.

Rehn M[1,2,3], Weaver A[1,4], Brohi K[4,5], Eshelby S[1], Green L[4,5,6], Røislien J[2,3], Lockey DJ[1,3,4,5].

Environmental scan

- blood product availability in critical care transport services in Canada:
  - BC: blood at the base (fixed wing) or blood picked up en route (rotor) (BCEHS)
  - AB/SK/MB: 'blood on board' (STARS)
- blood product routinely available in most transport programs in USA and western Europe

Environmental scan

Northwest Texas Healthcare System's LIFESTAR Helicopter Now Carrying Blood and Plasma

Wales Air Ambulance has become one of the first air ambulance teams in Europe to have three types of blood products at the scene of an emergency.

STARS in Manitoba helicopters will fly with two units of O-negative blood for patient use on scene or during transport to a trauma center

Wings Air Rescue's four air medical helicopters now carrying blood, plasma

Recall the outline

- learn what has been published on prehospital blood products
- discuss how care may be improved with prehospital blood products
- identify best practices for prehospital management of a massively hemorrhaging patient

Recall the outline

- learn what has been published on prehospital blood products
- discuss how care may be improved with blood products in critical care transport
- identify best practices for prehospital management of a massively hemorrhaging patient

Case to make the point

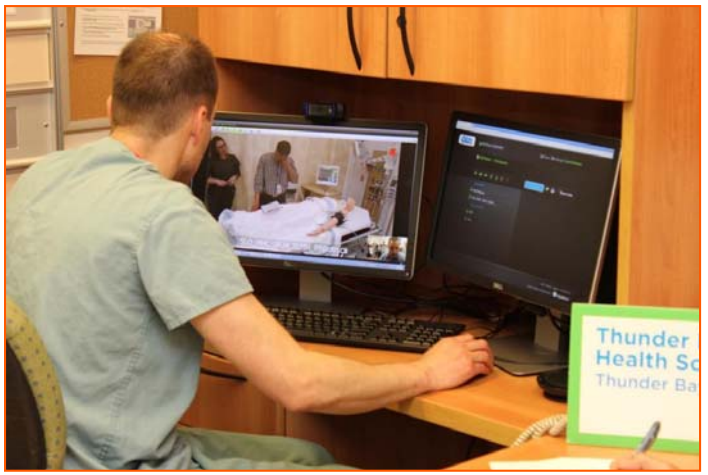
- 24 year old gravida 5 para 2
- dates uncertain: likely near term
- comes to nursing station in active labour
  - membranes ruptured
  - contractions strong and long
- ‘problems’ with last pregnancy
- no physician in the community

Our patient

- nurse calls Ornge: crew dispatched
  - ETA ~90 minutes
- nurses deliver baby with telemedicine assistance
  - newborn active, doing well
- placenta won't deliver: post-partum hemorrhage
- mom drops her BP

Our patient

- mom bleeding: oxytocin bolus and infusion; TXA not available
- physician at regional hospital ‘talks’ nurse through manual placenta removal via telemedicine
- estimated blood loss: >1 litre and counting
- crystalloid boluses: still hypotensive



Our patient

- air medical crew arrives
  - P 110 BP 90/50
  - poor peripheral perfusion
- TXA, oxytocin, crystalloid
- ‘packaged’ for transport
  - time to definitive care: 90 minutes
- continues to bleed: unstable in flight
  - blood loss total ~2 litres
  - operative procedure at receiving hospital

What cases illustrate

- air medical crews
  - respond to critically ill patients
  - scope of practice is extensive and comprehensive
- lack of access to blood products for massive hemorrhage in Ontario

Lifeline for the North

- for many, Ornge is the only access to emergency care or any hospital-based care in Ontario

Lifeline for the North

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Lifeline for the North

thestar.com

Air ambulances a lifeline for the North

Unlike southern Ontario, there are no land paramedics to assess and stabilize patients. Patients are brought to nursing stations in the back of pickup trucks, or transported out of the wilderness on boats, float planes or snowmobiles.

Lifeline for the North

thestar.com

Air ambulances a lifeline for the North

It is critical paramedics start to improve a patient's condition right away. Trauma experts often refer to the "golden hour," an optimal period of time to treat an injured patient before their condition deteriorates past a treatable point.

In northern Ontario, paramedics have a golden half day. Precious hours will already have passed by the time they see a patient, and there are likely hours more to go before they can get to hospital.

Ornge and MHP

- while evidence and indications for ‘in-hospital’ use are clear and well established, ‘prehospital’ evidence and use lack clarity

- what is clear: in Ontario, a concern is access to blood products for patients who meet indications

Ornge and MHP

- identified need at Ornge
  - blood administered to ~6 patients per week

- common indications:
  - hemorrhagic shock in trauma
  - post-partum hemorrhage
  - gastrointestinal bleeding
  - hematologic malignancy

Ornge and MHP

- identified need at Ornge
  - an additional ~1-2 patients per week meet indications for time-sensitive blood administration and/or MHP in locations where blood product availability is limited or not available
  - northern locations disproportionately represented in this need
  - even if emergency supply is available, resupply may take days if product is used

Ornge and MHP

- respond to and transport critically ill patients
  - note: this is interfacility critical care transport

- blood product and TXA administration within our paramedic scope of practice
  - Ornge carries and routinely uses TXA

- transfusion principles and practices adopted from Sunnybrook

Documenting the transfusion

Transport Medicine Physician Orders

2017-09-01 8:54:00

1. Take 4 U PRBC and aggressivelly transfuse
2. 100mcg Phenylephrine MAP>80 PRN
3. Ventilator: Ventilate normal perameters for raised ICP: ETCO2 33-38 and SpO2>95%
4. 1 gm TXA
5. 200cc 3% saline
6. Ketamine 50-150mg/hr infusion; 25-50mg IV bolus PRN
7. Head of bed elevated 30degrees

2017-09-01 09:10:00	Blood/Blood Product Administration - 360		250 ml	IV - Infusion (Complete Fluid Balance)	Infused over 15 minutes	Comments: PT not able to consent and no family present Product type: Packed Cells Consent for blood transfusion: Not Acquired (Please document reason) Product ID #: C055617328480	2 PZ
2017-09-01 09:10:09	96/60	72	71, <None>	21, <None>	92%	18mm Hg	
2017-09-01 09:15:44	93/62	72	66, <None>	21, <None>	92%	19mm Hg	
2017-09-01 09:20:37	97/60 NIBP	72	64, Present, Regular	23, Shallow, Regular	100%, Source: Mechanical ventilation	20mm Hg	E1 + V1 + M1 = 3

Skin Temp=Cool Skin Color=Pale Skin Moisure=Dry (Excessive) Cap. Refill=Delayed > 2 seconds

Pupil size: Left=2, Right=2 Pupil Reacts: Left=<None>, Right=<None>

ECG=Normal Sinus Rhythm (NSR) - 40

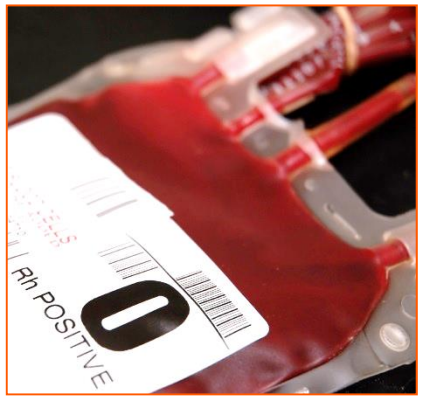
Ornge and MHP

- aircraft and crew do not carry blood
- depend on local hospital resources to get blood products

- challenges:
  - longest transports are in the north
  - volume is disproportionately northern
  - limited blood supplies in northern facilities
    - their supply chain is long
  - nursing stations have no blood

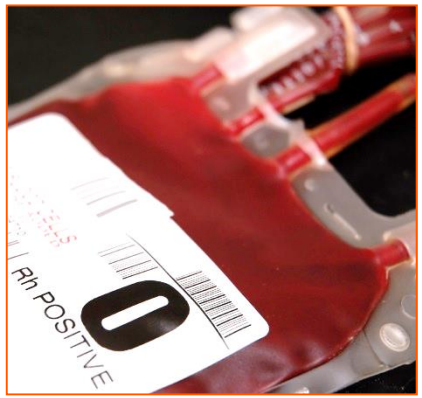
Ornge and MHP

- Ornge is working with ORBCoN to develop “blood at the base”
  - blood maintained at base in designated, sealed ‘box’
  - put on board when needed
    - in consultation with our physician
  - box opened at patient beside
    - on order of our physician



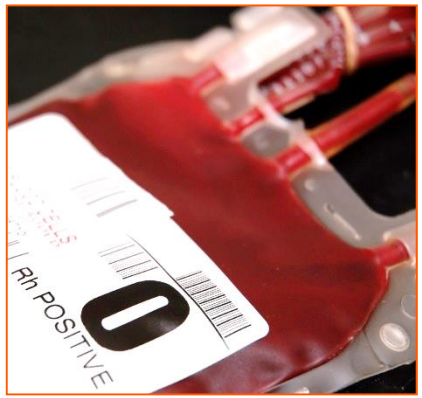
Ornge and MHP

- unmet need for emergent blood in resource-challenged settings
- air medical crews have skillset to do it safely
- Ornge follows provincially set policies and protocols for blood product use
- Ornge tracks individual units and patient receiving these
- ORBCoN has a tracking and supply chain need that is unmet – we can help!



Ornge and MHP

- key to MHP success in prehospital transport setting:
  - recognize need for MHP
  - activate local resources
  - recognize need to transfer out
  - call for transport <u>immediately</u>
  - equip transport service with blood products
  - notify receiving of arrival and anticipated hemorrhage control needs



Ornge and MHP

- key to MHP success in prehospital transport setting:

11. The transport services should be immediately notified to ensure rapid transport to the institution where definitive care is available.	The local transport service should be immediately notified for transfer to a tertiary care hospital, sometimes even before the patient arrives at the primary site in order to facilitate timely evacuation planning. This includes planning mode of transfer and personnel (helicopter, land, fixed-wing), resources required for transit (monitoring, ventilators, blood products, warming equipment) as well as necessary advanced planning at the receiving institution.[7]
44. The following Quality metrics shall be tracked on all activations of the protocol and the data reviewed quarterly at the hospital transfusion committee (or other multidisciplinary committee):	Regular review of all MHP activations is associated with quicker identification and optimization of performance gaps.[29]
c. The proportion of patients (of patients requiring transfer for definitive care) with initiation of call for transfer within 15 minutes of protocol activation.	Rapid communication with tertiary care centers improves transit time.

Discussion and Questions

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