**Model Parameters**

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| **Input Parameter** | **Description** |
| Gender[1] | Male: 65% Female: 35%  |
| Age1[1] | 15-29: 52.82%30-44: 23.32%45-59: 13.04%60-85: 10.82% |
| Blood Type[2] | US population distribution.  |
| Admission Type2 | Varied based on scenario.  |
| Priority Status3 | Massive Transfusion: 95% P1s, 5% P2s[3]Requires Blood products: 50% P1s, and 50% P2sNone: 20% P1s, 80% P2s |
| RBC requirement[4, 5] | Massive transfusion: Poisson distribution, mean 18, max 48, min 10Requires blood products: Poisson distribution mean 3, max 9, min 1None: 0  |
| Plasma requirement4  | Massive transfusion: Plasma requirement = RBC requirement Requires blood products: Poisson distribution mean 3, max 12 None: 0 |
| Platelet requirement4 | Massive transfusion: Platelets = RBC requirement/6, rounded down to the nearest whole number.Requires blood products: Platelets = RBC requirement/6, rounded down to the nearest whole number.None: 0 |
| Casualty arrival times[6] | Beta distribution: α 2.2, β 6, Min 5 mins, Max 115 mins |
| Triage time5 | 1 |
| Assessment and IV access6[7] | P1: Gamma distribution α 2.1, β 4, Min 5 mins, Max 45 minutesP2: Gamma distribution α 1.7 β 11, Min 5 mins, Max 70 minutes |
| Transfusion Time7[7] | P1 and MTP transfusion: α 1, β 3, Min 3 mins, Max 6 minsP2 transfusion: α .75, β 3, Min 3 mins, Max 25 mins |
| Blood lab work timeline8 | Transport ED to lab: 3 minutesBook and verify: 1 minuteProcess lab sample: 10 minutesUnload and verify: 1 minute |
| Delay in transfusion cooler arrival [8] | 8 minutes  |

Blood product hierarchy

|  |  |
| --- | --- |
| Known blood type (F<50) | RBCs they could receive  |
| O+ | O+, then O- |
| O- | O- |
| A+ | A+, then O+, then A-, then O- |
| A- | A-, then O- |
| B+ | B+, then O+, then B-, then O- |
| B- | B-, then O- |
| AB+ | AB+, then A+, then O+, then B+, then AB-, the A-, then B-, then O- |
| AB- | AB-, then A-, then B-, then O- |

|  |  |
| --- | --- |
| Known Blood type (Male or Female >50) | RBCs they could receive  |
| O+ | O+, then O- |
| O- | O-, then O+ |
| A+ | A+, then O+, then A-, then O- |
| A- | A-, then O+, then O- |
| B+ | B+, then O+, then B-, then O- |
| B- | B-, then O+, then O- |
| AB+ | AB+, then A+, then O+, then B+, then AB-, then A-, then B-, then O- |
| AB- | AB-, then A-, then B-, then O+, then O- |

|  |  |
| --- | --- |
| Known blood type | Plasma they could receive |
| O+ or O- | O, then B, then, A, then AB |
| A+ or A- | A, then AB |
| B+ or B- | B then A, then AB |

UCM blood products: Females <50 received O- RBCs. Everyone else O+ RBCs. Everyone receives low-titer A plasma.

1: Pediatric ages were redistributed amongst the other age groups.

2: The percent of patients requiring massive transfusion is a portion of the total percentage requiring blood products. For example, if the scenario specifies 40% of patients require blood products and 10% require massive transfusion, then 30% of patients will require blood products but not massive transfusion with the balance requiring massive transfusion.

3: Priority status of massive transfusion was based on sensitivity of ABC score. Priority status percentages of patients who require blood products and patients who do not require blood products was determine based on consultation with physician subject matter experts.

4: Plasma and platelet function in massive transfusion patients assumes a 6:6:1 ratio. There is limited data on plasma and platelet consumption in non-massive transfusion patients during MCEs.

5: Triage time discussed with emergency medicine physicians at large US trauma center.

6: Gamma distribution to mirror Glasgow et al 2016 model. Minimum and maximum times were implemented after consulting with emergency medicine physicians and trauma surgeons.

7: Gamma distributions were selected that mirrored Glasgow et all 2016 model as Johnson distributions were not compatible with Matlab. A minimum time of transfusion was based on infusers used in the emergency department. Minimum and maximum times were implemented after consulting with emergency medicine physicians and trauma surgeons.

8: Consulted emergency medicine physicians and blood banking staff at trauma center the model is based off of.

1. Kluger, Y., et al., *The special injury pattern in terrorist bombings.* J Am Coll Surg, 2004. **199**(6): p. 875-9.

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3. Cotton, B.A., et al., *Multicenter validation of a simplified score to predict massive transfusion in trauma.* J Trauma, 2010. **69 Suppl 1**: p. S33-9.

4. Propper, B.W., et al., *Surgical response to multiple casualty incidents following single explosive events.* Ann Surg, 2009. **250**(2): p. 311-5.

5. Beekley, A.C., et al., *Predicting resource needs for multiple and mass casualty events in combat: lessons learned from combat support hospital experience in Operation Iraqi Freedom.* J Trauma, 2009. **66**(4 Suppl): p. S129-37.

6. Raiter, Y., et al., *Mass casualty incident management, triage, injury distribution of casualties and rate of arrival of casualties at the hospitals: lessons from a suicide bomber attack in downtown Tel Aviv.* Emerg Med J, 2008. **25**(4): p. 225-9.

7. Glasgow, S., et al., *Managing the surge in demand for blood following mass casualty events: Early automatic restocking may preserve red cell supply.* J Trauma Acute Care Surg, 2016. **81**(1): p. 50-7.

8. Meyer, D.E., et al., *Every minute counts: Time to delivery of initial massive transfusion cooler and its impact on mortality.* J Trauma Acute Care Surg, 2017. **83**(1): p. 19-24.