



## BRIEF REPORT

# The effect of the SARS-CoV-2 pandemic and civil unrest on massive transfusion protocol activations in Minneapolis 2020

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## Abstract

**Background:** The year 2020 presented the transfusion community with unprecedented events and challenges, including the ongoing SARS-CoV-2 (COVID-19) pandemic, and more recently by civil unrest, following the death of George Floyd in late May of 2020. As a level 1 trauma center located in Minneapolis, Minnesota, Hennepin Healthcare (HCMC) offers a unique perspective into the changes in massive transfusion protocol (MTP) activations and usage during this tumultuous period. This may provide insight for addressing similar future events.

**Study design and methods:** MTP logs from March 2020 to August 2020 were compared to logs from March to August 2019. The data were de-identified, and MTP activations and component usage were categorized by activation reason. These categories were compared across the 2-year period to examine the impact of COVID-19, including stay-at-home orders, and civil unrest.

**Results:** For the examined 6 months of the year 2020, there were a total of 140 MTP activations, compared to 143 in 2019. There were more activations for violent trauma (VT) in 2020 than 2019 (44 vs. 32). This increase in activations for VT was offset by a decrease in non-trauma activations (54 vs. 66). There was a significant increase in the number of components used in VT activations.

**Discussion:** During 2020, the initial mild decrease in MTP activations was followed by a dramatic increase in the number of activations and component usage for VT in June and July of that year.

## KEYWORDS

blood center operations, blood management, transfusion practices (surgical)

**Abbreviations:** HCMC, Hennepin Healthcare; MTP, massive transfusion protocol; VT, violent trauma; GSW, gunshot wounds; MVA, motor vehicle accidents; RBCs, red blood cells; NT, non-trauma events; OT, other trauma; SW, stabbing wounds.

## 1 | BACKGROUND

Hospital transfusion services must have the capacity to provide large amounts of blood in the setting of acute and severe blood loss.<sup>1</sup> Massive transfusion protocols

(MTPs) are pre-set algorithms intended to prevent a dilutional coagulopathy following critical blood loss which leads to worse outcomes.<sup>2</sup> Common situations triggering MTP activation are severe physical trauma (gunshot wounds [GSW], motor vehicle accidents [MVA], etc.), or medical complications of obstetrical patients, or those undergoing major procedures such as organ transplantation or cardiovascular surgery.<sup>3</sup> The number of MTP activations varies according to the hospital services provided. The SARS-CoV-2 (COVID-19) pandemic and the heightened civil unrest following the death of George Floyd in 2020 presented our community with a unique chance to gain insight into “environmental” factors affecting MTP activation and blood resource utilization to better understand and predict community blood product needs.

## 2 | METHODS

### 2.1 | Patient selection and data retrieval

The information for this study was abstracted from quality assurance data recorded for monitoring MTP activation and blood component usage. Worksheets generated by the hospital Transfusion Service at the time of each MTP activation documenting blood components transfused were reviewed. Data tracked include patient identification, diagnosis, and breakdown of usage by component: red blood cells (RBCs), plasma units (thawed plasma), apheresis platelets, and 5-pool units of cryoprecipitate (cryoprecipitate antihemophilic factor) concentrates.

Data were analyzed for March through August of 2020, compared to March through August of 2019. These dates included COVID-related closure of restaurants, bars, and other public places on March 17, 2020 and “stay-at-home” orders beginning March 27 (Executive Orders 20-04 and 20-20), expiring on May 18. This was followed by a period of violent civil unrest sparked by the death of George Floyd in Minneapolis on May 25, 2020.

MTPs were activated 140 times from March through August 2020, and 143 times for the same period in 2019. Patient information was de-identified and included all activations, even those that may not have used large volumes to maximize analyzable events. The activations were grouped into the following categories: non-trauma events (NT), MVA, violent trauma (VT), and other trauma (OT).

Examples of MTP activations included in NT events were obstetric procedures, cardiovascular procedures, gastrointestinal bleeds, and other surgical procedures. Activations for MVA included any event where a motor vehicle was involved (vehicle vs. vehicle, vehicle vs. pedestrian, vehicle vs. bicycle, etc.). VT consisted of

activations for GSW and stabbing wounds (SW). The OT category compromised traumatic events not conforming to the MVA category or VT categories, the majority of which were complications of falls.

## 3 | RESULTS

Overall, the total number of MTP activations for the examined months of 2020 and 2019 were similar at 140 vs. 143 MTP activations, respectively. Of the 140 activations in 2020, 54 were for NT, 31 were for MVA, 44 were for VT, and 11 were for OT. In comparison, for 2019 there were 66 activations for NT, 32 for MVA, 32 for VT, and 13 for OT (Table 1).

Examining the breakdown of MTP trauma activations (86 vs. 77, VT + MVA + OT), there was no notable decrease in total MTP activations for trauma in the first three examined months of 2020, despite the spread of COVID-19 and issuance of the governor's stay-at-home orders on March 27. MTP activations for June and July of 2020 increased compared to 2019; this was due to a sharp increase in VT, and was attended by a significant increase in the total number of components used for VT activations,  $X^2(1, N = 1745) = 20.2, p < .01$ , as compared to non-VT activations (Figure 1). This increase corresponds with the record number of homicides in Minneapolis for 2020.<sup>4</sup> There was no notable change in the number of total activations for MVA (31 vs. 32) or OT (11 vs. 13) during the 6-month observed period, nor significant change in the number of components used for MVA,  $X^2(1, N = 2402) = 0.2, p = .70$ , or OT,  $X^2(1, N = 1880) = 3.4, p = .06$ , as compared to total components used, excluding VT components.

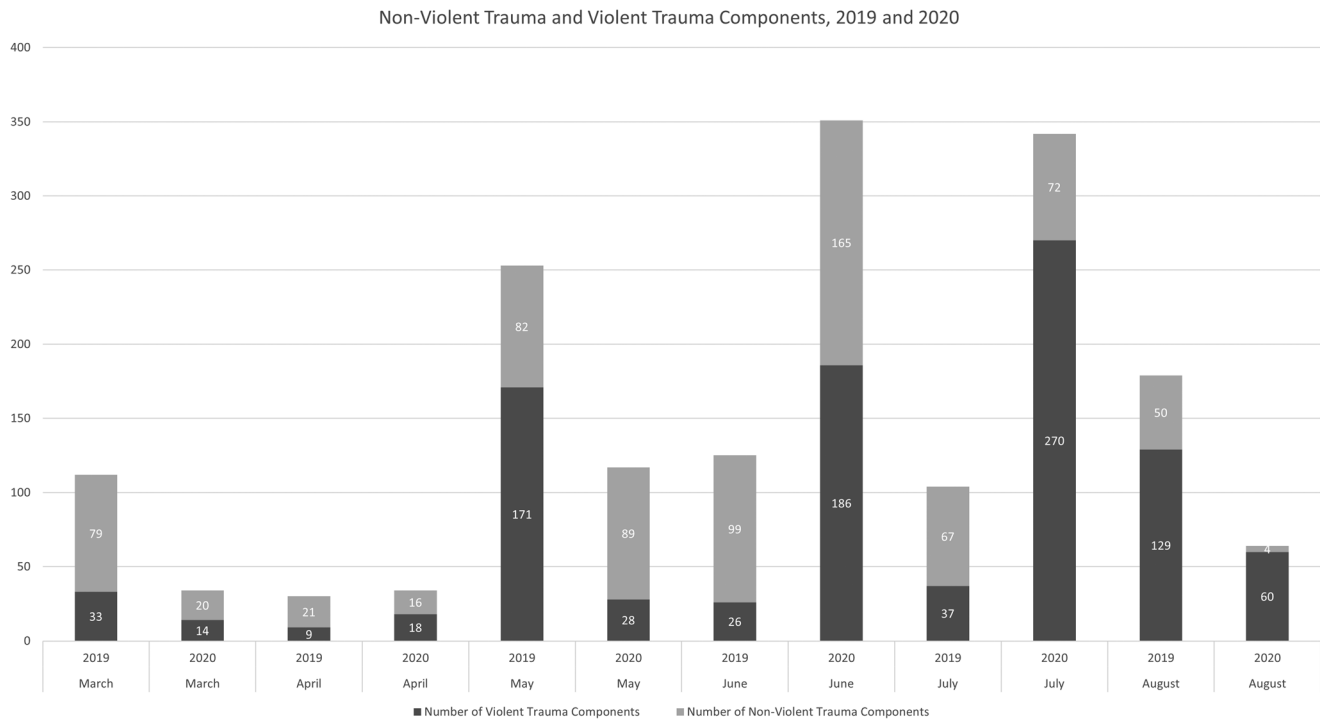
## 4 | DISCUSSION

2020 has witnessed uncertainty and shifts in routines of daily life and medical practice. The pandemic has resulted in many challenges, including effects on both the supply and demand sides of the national blood supply. While some geographic regions have noticed decreased donor attendance,<sup>5</sup> this has been alleviated in part by documented decreases in demand due to cancellation of elective surgeries and medical treatment.<sup>6-10</sup> This later phenomenon is reflected in our experience by the decrease of MTP activations for NT in 2020.

As stated by Perkis et al.,<sup>11</sup> in the period immediately preceding the pandemic, there were increased levels of both blunt and penetrating trauma, which lead them to the assessment that different crises may be associated with different patterns of injury. Waseem et al.,<sup>12</sup> observed that admissions for trauma worldwide decreased over a range

TABLE 1 Massive transfusion protocol activations and component usage for select months of 2019 and 2020

			Violent trauma		Motor vehicle accidents (MVA) trauma activations	MVA trauma components	Other trauma activations	Other trauma components
	Non-trauma activations	Non-trauma components	Violent trauma activations	Violent trauma components				
March	2019	15	3	33	2	75	1	4
	2020	15	3	14	1	20	0	0
April	2019	11	1	9	3	11	1	10
	2020	6	35	2	18	1	2	14
May	2019	12	8	171	5	42	4	40
	2020	11	129	4	28	6	1	4
June	2019	8	53	5	26	93	3	6
	2020	10	96	15	186	14	3	9
July	2019	9	44	5	37	58	2	9
	2020	8	80	12	270	8	5	23
August	2019	11	83	10	129	48	2	2
	2020	4	72	8	60	1	0	0



**FIGURE 1** Non-violent trauma and violent trauma components, 2019 and 2020

of 20.3–84.6% due to the COVID-19 pandemic. They also identified a relative increase in interpersonal (violent) trauma, an increase in trauma from falls from height, and a decrease in MVA trauma. This somewhat matches our experience, with a roughly 30% increase in VT events, and no notable change in the total number of MVA or OT activations. The latter is somewhat surprising, as a report was issued by the National Highway Traffic Safety Administration<sup>13</sup> that the number of people killed on the nation's highways rose 4.6% in the first nine months of 2020 despite coronavirus lockdowns that curtailed driving early in the year. This may be due to risky driving behavior that developed when there were fewer vehicles on the road during the pandemic. Locally, preliminary data from the Minnesota Department of Public Safety shows an increase in annual traffic fatalities from 364 in 2019 to 394 in 2020.<sup>14</sup>

Diving into subgroup analysis of VT component usage; there were 37 activations for VT in June and July of 2020 and 2019. Twenty-eight were for GSWs, and 9 were for SWs. The average number of components used for a GSW activation in this period was 15.9, with a SD of 27.3. The average number of components used in a SW case was 8.3 with a SD of 6.5. The implication of this, as supported by the significant increase in components used for 2020, is that a minor increase in the number of VT activations for GSW may result in an unpredictably large increase in the number of components used.

## 5 | CONCLUSION

The global COVID-19 pandemic and civil unrest in 2020 is associated with shifting patterns of MTP activations, with mildly reduced numbers of activations early in the year being offset by a dramatic increase in activations and component usage for VT in June and July. Trauma centers must adjust to unanticipated events impacting blood usage and work closely with their hospital transfusion services and blood suppliers to meet community needs, especially in situations where gun violence may play a strong role.

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### CONFLICT OF INTEREST

The authors have disclosed no conflicts of interest.

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