

Gunshot victims require much more blood and are more likely to die than other trauma patients

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The Johns Hopkins Hospital blood bank is always ready to activate a mass transfusion protocol for patients who need large amounts of blood. Credit: Johns Hopkins Medicine

In a new analysis of data submitted to Maryland's state trauma registry from 2005 to 2017, Johns Hopkins Medicine researchers found that gunshot victims are approximately five times more likely to require blood transfusions, they require 10 times more blood units and are 14 times more likely to die than people seriously injured by motor vehicles, non-gun assaults, falls or stabs.

A report of the findings of the study, designed to better understand demands for and shortages of blood transfusion products, was published Sept. 13 in *Transfusion*.

"Blood products cost a lot, come with a lot of risks for those transfused, and are scarce, so understanding what kinds of [trauma](#) are most likely to require more of them can help hospitals improve outcomes for trauma victims," says Steven Frank, M.D., professor of anesthesiology and critical care medicine at The Johns Hopkins University and the study's corresponding author.

To better understand the extent of blood use and associated costs for gunshot wound (GSW) victims, Frank and colleagues analyzed data from 23,422 Johns Hopkins Hospital trauma patients entered into the Maryland trauma registry from 2005 to 2017.

The average age for GSW patients was 27 and the average for non-GSW patients was 38. Males made up the majority of both types of patients—2,497 of 2,672 (93.45 percent) GSW patients and 13,954 of 20,750 (67.3 percent) of non-GSW patients were male.

Of all patients in the trauma registry, 2,672 (11.4 percent) had GSW injuries and 20,750 (88.6 percent) had non-GSW trauma injuries resulting from motor vehicle, nongun assaults, falls or stabs. GSW patients were five times more likely to require a blood transfusion (538 of 2,672, or 20.1 percent) compared to non-GSW patients (798 of

20,750, or 3.9 percent).



BLOOD TRANSFUSIONS

in gunshot and non-gunshot injuries



23,422

JOHNS HOPKINS TRAUMA
PATIENTS WHO ENTERED THE
MARYLAND STATE TRAUMA
REGISTRY
2005-2017



2,672

HAD GUNSHOT INJURIES



20,750

HAD NON-GUNSHOT TRAUMA INJURIES

GUNSHOT VICTIMS



5x

MORE LIKELY TO
NEED BLOOD
TRANSFUSION
THAN OTHER
PATIENTS

GUNSHOT VICTIMS



10x

MORE BLOOD REQUIRED
WHEN RECEIVING A
BLOOD TRANSFUSION

GUNSHOT VICTIMS



14x

OVERALL MORE
LIKELY TO DIE



JOHNS HOPKINS
MEDICINE

Credit: Johns Hopkins Medicine

When comparing all patients, the researchers found that GSW patients needed 10 times more units of blood than non-GSW patients (3.3 units versus 0.31 units for non-GSW patients).

Frank and colleagues also found that GSW patients were more likely to die in the emergency department (69 of 2,672, or 2.6 percent) than non-GSW patients (17 of 20,750, or 0.08 percent). Overall, GSW patients were about 14 times more likely to die (653 of 2,672, or 24.4 percent) than non-GSW patients (352 of 20,750, or 1.7 percent).

"The most likely explanation for these findings is the dramatic degree of injury severity in gunshot victims compared to all other types of trauma, including stab wounds," says Frank.

In their analysis of cost for blood transfusions, the research team compared two types of costs: acquisition costs, or the cost of the unit itself (\$200 per unit of red blood cells, \$500 per unit of platelets, \$50 per unit of plasma and \$250 per dose of cryoprecipitate), and activity based costs, which are acquisition costs plus a fourfold increase for overhead that includes storage, viral testing, transport, compatibility testing and the cost of giving the blood to the patient.

Although overall, only 11.4 percent of all trauma patients had GSW injuries, more money was spent on blood for these patients than for all non-GSW trauma patients combined: \$1,523,450 for GSW patients versus \$1,140,250 for non-GSW patients in acquisition costs, and \$6,093,800 versus \$4,561,000 for non-GSW activity [costs](#).

"For emergency preparedness purposes, hospitals that treat trauma need to have a sufficient amount of [blood](#) in the bank in order to treat [patients](#) coming in with gunshot wounds," says Frank.

In the United States each year, over 116,000 people are injured and over 38,000 people die from gun-related injuries.

More information: Vincent M. DeMario et al. Blood utilization and mortality in victims of gun violence, *Transfusion* (2018). [DOI: 10.1111/trf.14925](#)

Provided by Johns Hopkins University School of Medicine

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