



# The Effects of QuikClot Combat Gauze® and Celox™ Rapid on Hemorrhage Control

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## Introduction

- Bleeding was a leading cause of death in Vietnam War, Operation Desert Storm, Operation Iraqi Freedom, and Operation Enduring Freedom.<sup>1,3</sup>
- Uncontrolled hemorrhage remains the leading cause of preventable death on the battlefield.<sup>2,4,5</sup> Over 90% of the potentially survivable injuries in war were associated with hemorrhage.<sup>4,5</sup>
- Death from hemorrhage represents 60,000 deaths per year in the United States and 1.9 million deaths worldwide.<sup>6</sup>

## Background

- Two agents that have been used by the military and civilian sectors are QuikClot Combat Gauze (QCG) and Celox Rapid (CR).
- One study has compared the effectiveness of QCG, CR, and a standard dressing. In that study, QCG and CR were applied without manual pressure, which is not in accordance with either product instructions for use (IFU) or the Committee on Tactical Combat Casualty Care (CoTCCC) guidelines.<sup>9</sup> There was no statistical difference in failure rates between the groups.<sup>10</sup>

## Research Questions

- What are the odds of hemostasis success between the QCG and CR groups?
- Is there a statistically significant difference in initial and one-hour hemostasis between the QCG and CR groups?
- Is there a significant difference in the amount of hemorrhage during the one-hour observation time?

## Methods

The protocol was approved by the Institutional Animal Care and Use Committee (IACUC), and the animals received care in compliance with the Animal Welfare Act.

- Prospective, experimental study
- 21 Yorkshire swine (*Sus scrofa domestica*)
- Random assignment to QCG (n=11) or CR (n=10) group
- 6-mm vascular punch arteriotomy in right femoral artery
- 45 second bleed
- QCG or CR applied with firm pressure for 3 minutes (per CoTCCC guidelines<sup>9</sup>)
- 10-pound weight simulating a pressure dressing applied
- Observed for one hour
- Blood loss calculated by weight
- Failure was bleeding > 2% of blood volume

## Results

- There were no significant differences between the QCG and CR groups relative to the baseline pretest data including the initial 45-second hemorrhage indicating that the two groups were equivalent ( $p > 0,05$ ).
- QCG had 15.9 times greater odds of achieving hemostasis compared to CR over one hour.

Parameter	Combat Gauze (QCG), n=11	Celox Rapid (CR), n=10	p-value
Initial Hemostasis	100%	70%	0.049*
Hemostasis at 1 hr	100%	60%	0.020*
Avg Blood Loss Over 1 hr	0 mL	162 +/- 48 mL	0.027*

\*Statistically significant

Figure 1: Percent Hemorrhage Control Achieved Initially and at 1 hr by Group

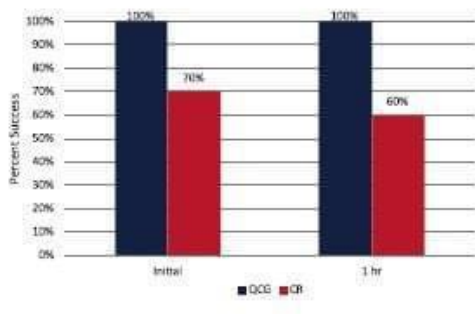
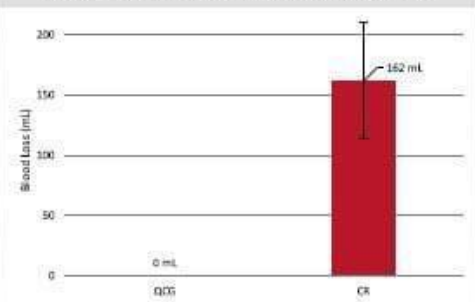


Figure 2: Average Blood Loss Over 1 hr by Group



## Discussion

Based on the results of this study, the QCG group was more effective than the CR group.

Five military medics who had experience with both agents in combat were asked which agent they preferred and why. They all preferred QCG because it:

- Is easier to use,
- Is more pliable, and
- Doesn't stick to their gloves, which makes it easier and faster to pack

## Limitations

- Small sample size; however, there was enough power to detect a difference between the groups.
- Application of either agent was not blinded. This was not possible: The CR was more rigid, and one could see and feel which agent was being used.
- No control group without the use of either agent. We believed that this was not necessary because the model used has demonstrated that it produces bleeding that cannot be controlled by standard gauze.<sup>4,11-13</sup>

## Conclusions

QCG was clinically and statistically superior to CR in achieving and maintaining hemostasis.

Additionally, the directions for CR call for one minute of pressure. The company states that the advantage of using the product is that less time is needed in applying pressure. However, despite applying pressure for three minutes, there was a 30% failure rate.

Over the one-hour observation time, 100% of the QCG group achieved hemostasis compared to 60% in the CR group.

The results of the study support the recommendation by the Committee on Tactical Combat Casualty Care as QCG as the hemostatic dressing of choice.

## Disclaimer

The views expressed in this poster are those of the authors and do not reflect the official policy or position of the Department of the Army, the Department of Defense, or the U.S. Army.

## Acknowledgments

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