Efficacy of Hemostatic Dressings in Prolonged Field Care

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DISCLAIMER

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The experiments reported herein were conducted in compliance with the Animal Welfare Act and Regulations and per the principles of the 'Guide for the Care and Use of Laboratory Animals,' Institute of Laboratory Animals Resources, National Research Council, National Academy Press, 1996.

ACTIVE / PROLONGED EVAC OF PATIENTS DISRUPTS WOUNDS

- Exsanguination = *leading* cause of preventable trauma deaths
- Prolonged evacuation times are reality
- Gauze products stop the bleed in *static* conditions
- Movement disrupts dressings → Preventable blood loss

No studies to date have investigated hemostatic dressings stressed by limb movement in prolonged casualty care

Does *movement* significantly impact *rebleed rates, blood loss, or clot formation* when comparing *four gauze products*?

Kerlix™ Plain Gauze

Woven Cotton

Non Impregnated

Absorbs Blood

Scaffold for platelets

Combat Gauze®

Nonwoven Gauze

Kaolin

Factor Concentrator

Factor XII

↓

XIIa

↓

Intrinsic coagulation cascade

NuStat Tactical™

Cellulose + Silica Weave

Non Impregnated

1) Cellulose
   - Hemoconcentrator
   - Binds erythrocytes
   - Scaffold for platelet adhesion

2) Silica
   - Platelet activation/ attachment
   - ↑ Intrinsic coagulation cascade

ChitoGauze®

Polyester/Rayon Gauze

Chitosan

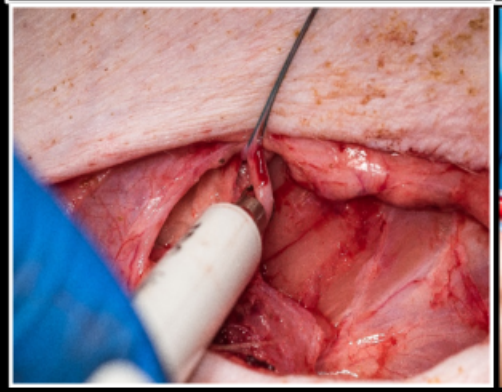
Mucoadhesive

- Absorbs plasma
- Binds erythrocytes/platelets

SWINE MODEL OF JUNCTIONAL HEMORRHAGE WITH LIMB MOBILIZATION

1. Anesthesia, Instrumentation Stabilization and TEG

2. 6mm Femoral Arteriotomy → 60 sec Hemorrhage



3. Hemostasis with selected gauze & pressure

4. Stabilization for 30 min & 10 limb mobilizations

5. Observe 240 min & Repeat mobilization

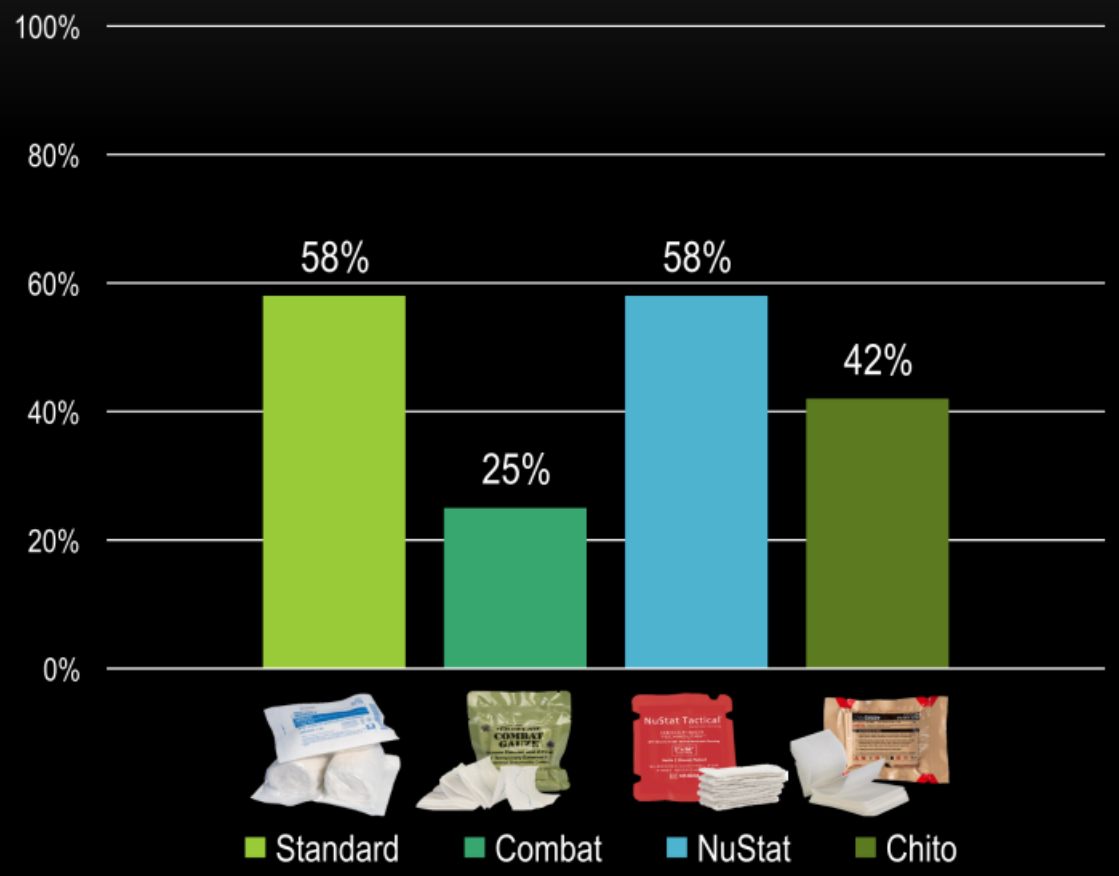
6. TEG, Analysis Euthanasia

10x each

- ❑ Flexion
- ❑ Extension
- ❑ Abduction
- ❑ Adduction

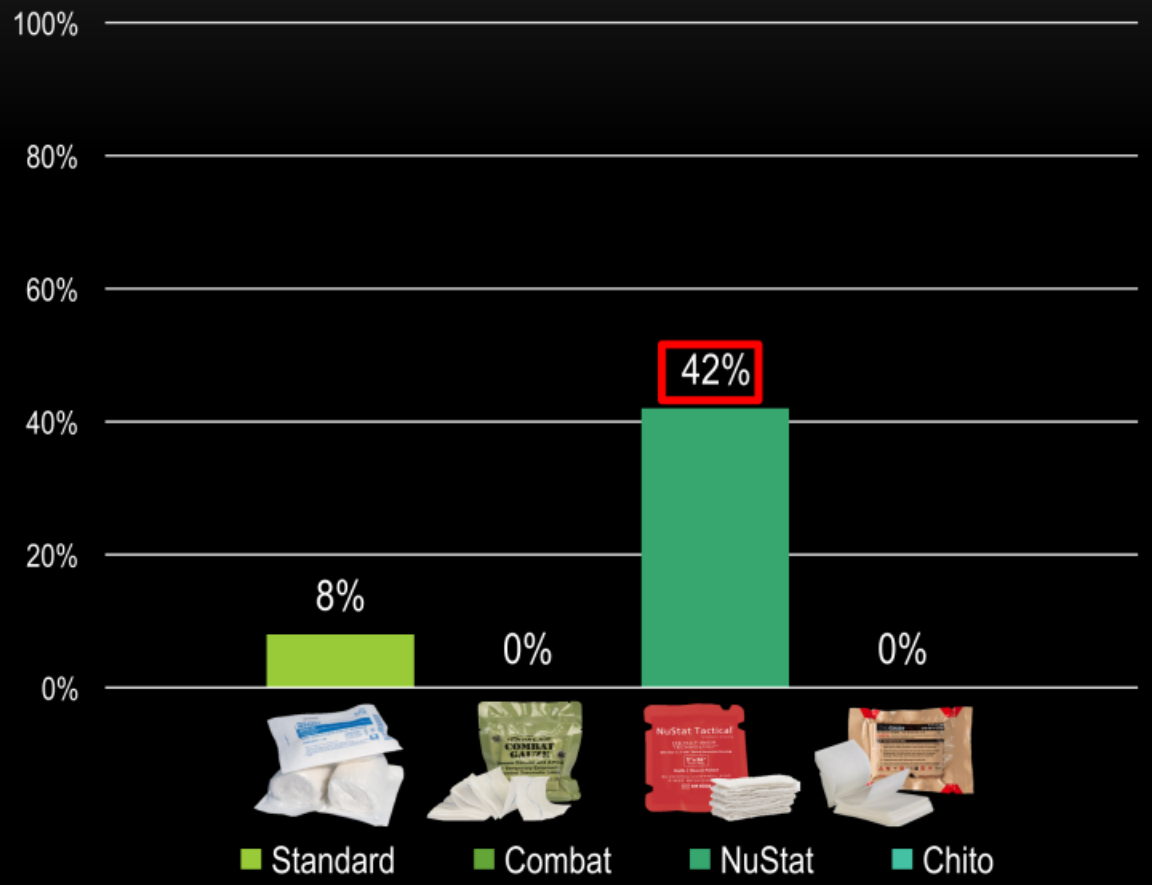
REBLEED RATES *DIFFERED* OVER TIME

Rebleed Rate @ 30min



No significant difference
(Chi square)

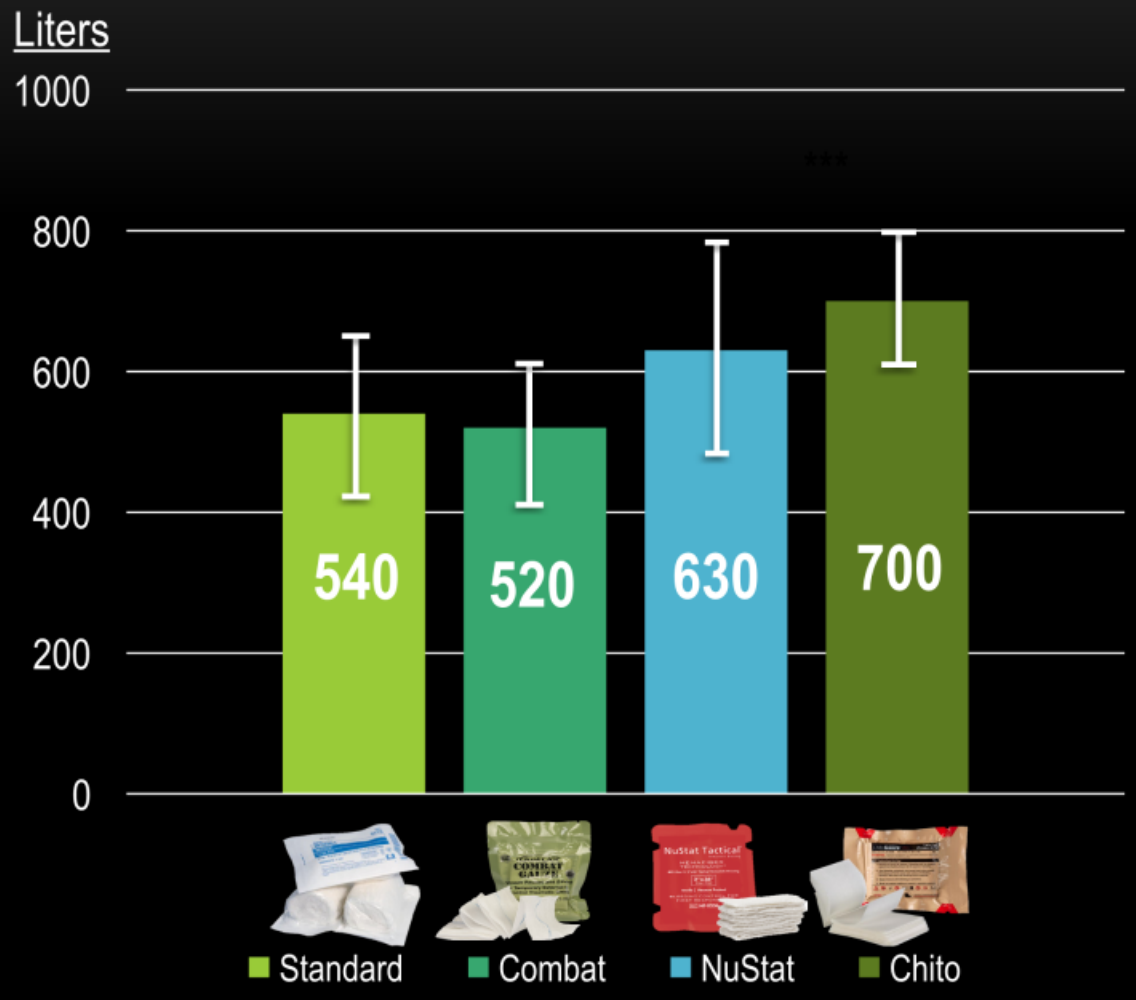
Rebleed Rate @ 270 min



*NuStat > Chito, Combat
(Chi square; $p < 0.05$)

Total Blood Loss

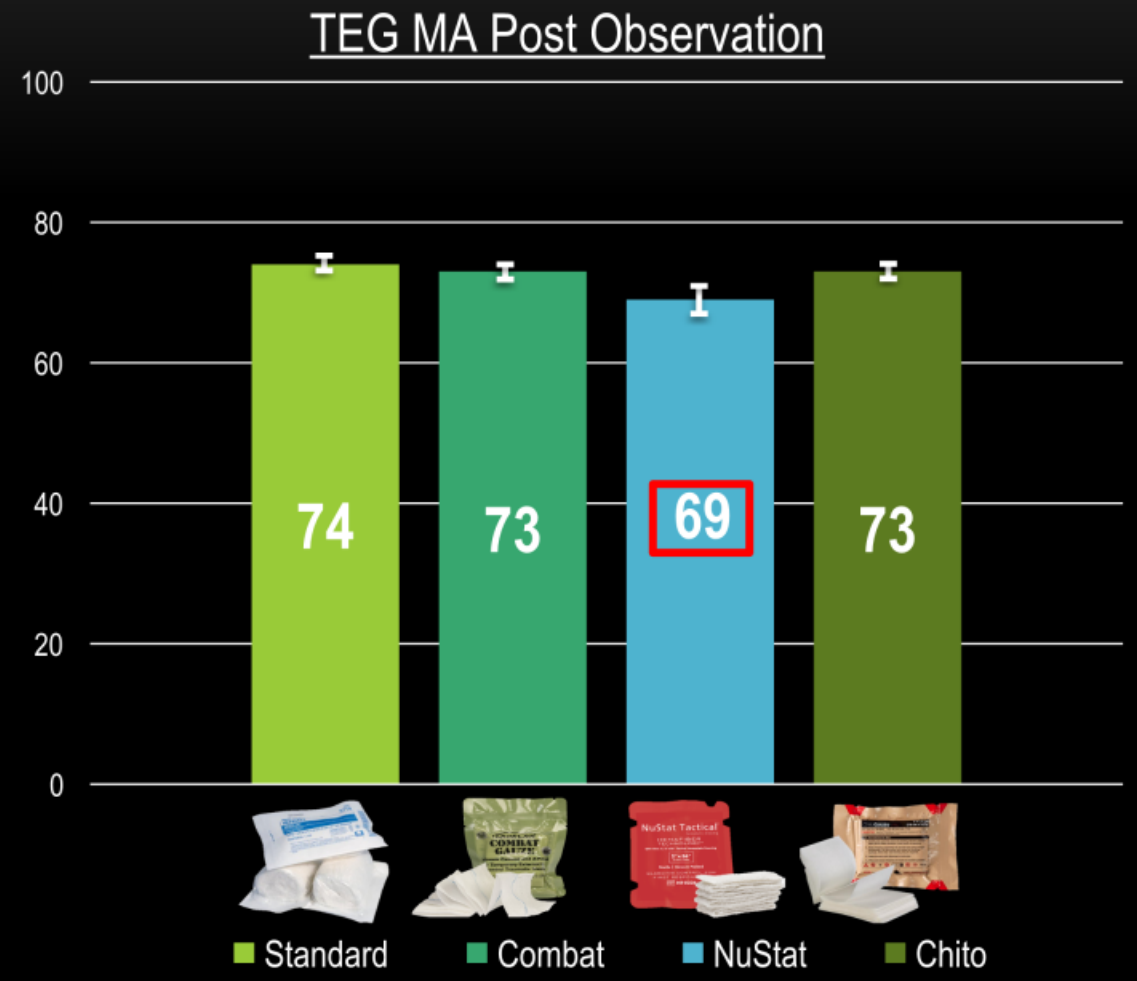
No Significant Differences



No significant difference
(ANOVA)

Clot Strength @ 270 Min

NuStat-Significantly Weaker



Nustat < Chito, Combat, Standard
(ANOVA; $p < 0.05$)

LIMITATIONS

- Swine in Lab Conditions
- Simplified Junctional Model
- Limited Movement Regimen

FUTURE RESEARCH

- More diverse physiologic models
- Time effects of hemostatic agents on clot integrity
- Simulated operational/ field environment

CONCLUSION

Movements Cause Rebleed in Junctional Wounds after Hemostasis

Combat Gauze Performed Best

Lowest Rate of Rebleed at 30 min / No Rebleeds at 270 min

NuStat Performed Worst

High Rate of Rebleed and Weaker Clot Strength

This Study Highlights the Importance of Appropriate Gauze Products when Treating Junctional Wounds In Prolonged Field Care

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