

WHITE PAPER

Measurement of Flow Rates for the GRIPPER® Micro Blunt Cannula, Non-coring Safety Needle and Other Selected Infusion Sets

Author: Kristina Vick, MPH, Regulatory and Clinical Research Institute, Minneapolis, MN and Bill Beling, Senior Design Engineer, Smiths Medical

OBJECTIVE

To determine and compare the flow rates of the GRIPPER® Micro safety needle and/or with five other infusion sets.

MATERIALS

Flow testing was performed on the following six infusion sets: SafeStep® Huber Needle Set, Huber Plus Safety Infusion Set, PowerLoc™ Safety Infusion Set, MiniLoc™ Safety Infusion Set, GRIPPER PLUS® Non-coring Safety Needle, and GRIPPER® Micro Blunt Cannula, Non-coring Safety Needle. All infusion sets employed a 20 gauge, 1 inch needle and were attached to the same standard titanium port. Flow was collected via a silicone catheter (inner diameter 0.05", outer diameter 0.11", length 15.5") with a container on a digital scale that provided readings in 1-gauge increments. For each infusion set, three trials were conducted on three needles of each device type under three different pressure conditions (gravity, 4 psi, and 10 psi). A deionized water solution at room temperature was used for each trial, and flow rates were recorded at 60-second intervals. Mean flow rate and standard deviation were calculated for each infusion set.

CONCLUSION

For all six infusion sets, mean flow rates increased as pressure increased. Of the devices tested, the GRIPPER® Micro Blunt Cannula, Non-coring Safety Needle demonstrated the greatest mean flow rate under all three pressure conditions. The device demonstrated approximately 40% greater flow than the other infusion sets.

The blunt cannula design of the GRIPPER® Micro Blunt Cannula, Non-coring Safety Needle contributes to the faster flow rate. While the outer diameter (O.D.) is identical to a huber needle of the same gauge, the blunt cannula has a larger inner diameter (I.D.) due to thinner wall thickness, allowing greater flow through the device (Table 2). The mechanical characteristics of the blunt cannula notably influence the flow rate of fluids through the device.

RESULTS

Table 1. Average flow rates under different pressure conditions

| Infusion Set | Mean ± Standard Deviation Flow Rate (mL/min) | | |
|---|--|--------------------|---------------------|
| | Gravity | 4 PSI ¹ | 10 PSI ¹ |
| SafeStep Huber Needle Set ² | 16.45 ± 0.25 | 34.58 ± 0.38 | 67.87 ± 0.87 |
| Huber Plus Safety Infusion Set ^{3,4} | 15.05 ± 0.4 | 32.21 ± 1.63 | 62.60 ± 0.46 |
| PowerLoc Safety Infusion Set ⁵ | 15.89 ± 0.27 | 32.68 ± 1.05 | 63.43 ± 0.76 |
| MiniLoc Safety Infusion Set ⁶ | 16.75 ± 0.30 | 34.84 ± 1.15 | 61.53 ± 9.47 |
| GRIPPER PLUS ⁷ Non-coring Safety Needle | 16.47 ± 0.20 | 34.03 ± 1.81 | 65.66 ± 1.26 |
| Average and Standard Deviation | 16.12 ± 0.68 | 33.67 ± 1.16 | 64.22 ± 2.54 |
| GRIPPER® Micro Blunt Cannula, Non-coring Safety Needle ⁸ | 23.05 ± 0.18 | 46.35 ± 0.80 | 89.12 ± 1.68 |
| Percent Increase in Flow | 43.0% | 37.7% | 38.8% |

1. Pound-force per square inch
2. The MedDesign Corporation, product LH003
3. Now Medical, product 01-2001Y
4. Testing performed on two samples
5. BARD Access Systems, product 0672010
6. Specialized Health Products, Inc. for BARD Access Systems, product 0632010
7. Smiths Medical ASD, Inc., product 21-2762-24
8. Smiths Medical ASD, Inc., product 21-3257-01

Table 2. Dimensions of GRIPPER® Needles^a

| Gauge | Inner Diameter (inches) | |
|-------|--|--|
| | GRIPPER® Micro Blunt Cannula, Non-coring Safety Needle | GRIPPER PLUS® Non-coring Safety Needle |
| 22 | 0.0190-0.0205 | 0.0154-0.0173 |
| 20 | 0.0255-0.0270 | 0.0220-0.0245 |

a. Needle length 1"

Note: Data on file with Smiths Medical and is available upon request. Bench testing results may not be indicative of clinical performance.

PRODUCT(S) DESCRIBED MAY NOT BE LICENSED OR AVAILABLE FOR SALE IN CANADA AND OTHER COUNTRIES

Smiths Medical ASD, Inc.
6000 Nathan Lane North
Minneapolis, MN 55442, USA
Phone: 1-614-210-7300
Toll-Free USA 1-800-258-5361
www.Smiths-Medical.com

Smiths Medical Canada Ltd.
Markham, Ontario, Canada, L3R 4Y8
Phone: 905-477-2000
Toll-Free: 1-800-387-4346

Customer and Clinical Services
U.S. 1-800-258-5361
Canada 1-800-387-4346
www.Smiths-Medical.com

MMSPCA-0535

**Rx
ONLY**

smiths medical

Find your local contact information at: www.smiths-medical.com/customer-support

Smiths Medical is part of the global technology business Smiths Group plc. Please see the Instructions for Use/Operator's Manual for a complete listing of the indications, contraindications, warnings and precautions. GRIPPER and the Smiths Medical design mark are trademarks of Smiths Medical. The symbol ® indicates the trademark is registered in the U.S. Patent and Trademark Office and certain other countries. All other names and marks mentioned are the trademarks or service marks of their respective owners. Product referenced is CE-marked. ©2019 Smiths Medical. All rights reserved. VA192510EN-022019