

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

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Objective

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

Methods

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-g 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.

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 ± 0.40	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® 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%

¹Pound-force per square inch

²The MedDesign Corporation, product LH003

³Now Medical, product 01-2001Y

⁴Testing performed on two samples

⁵BARD Access Systems, product 0672010

⁶Specialized Health Products, Inc. for BARD Access Systems, product 0632010

⁷Smiths Medical ASD, Inc., product 21-2762-24

⁸Smiths Medical ASD, Inc., product 21-3257-01

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 safety needle contributes to its 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.

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

^aNeedle length 1"

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