

## WHITE PAPER

# PROCESS OPTIMIZATION AND ECONOMICAL ADVANTAGES BY USE OF INTRAFIX® SAFESET

### Background

Administering intravenous medication is one of the most common nursing interventions<sup>1,6,7,9</sup>. Gravity infusion, which is still one of the most widely used methods, has undergone various modifications and improvements in terms of safety and performance over the years<sup>1,7,9</sup>.

Nevertheless, two disadvantages of standard gravity infusion systems remain<sup>2,8</sup>:

- fluid loss during preparation or during air elimination
- influx of air into the infusion system

Additionally, the use of infusion systems carries a general risk of nosocomial infections, among them phlebitis<sup>3,4,5</sup>.

### Purpose

Several studies were conducted to evaluate the new Intrafix® SafeSet (B. Braun Melsungen AG, Melsungen, Germany) infusion system with PrimeStop and AirStop infusion devices for gravity infusion and to compare it against standard systems, with special attention given to handling, effectiveness, time, cost, as well as complications such as phlebitis<sup>1-9</sup>. The PrimeStop device included as part of the Intrafix® SafeSet prevents fluid loss, whereas the AirStop device prevents the influx of air<sup>2,8</sup>.

### Methods

Ramacciati et al. enrolled 100 nurses from 14 different specialty areas as part of a convenience study<sup>1,7,9</sup>. A comparative assessment against a standard infusion device was used to evaluate ease of use, safety, and reduction in associated care time<sup>1</sup>. The assessment covered factors regarding (table 1)<sup>1,9</sup>:

- perforation capacity
- filling of the drip chamber
- connection to the venous catheter
- regulation of the infusion speed
- the final infusion step (especially the PrimeStop and AirStop features).

A similar study was conducted by Venturi with 15 participating nurses in an Italian hospital<sup>6</sup>. Sala drew conclusions after one year of using the Intrafix® SafeSet system<sup>8</sup>.

Regarding cost, Frei evaluated the time saved by using the Intrafix® SafeSet system (self-filling due to PrimeStop, less patient calls due to AirStop)<sup>2</sup>: Nurses in a German teaching hospital were observed and timed during a 2-week period while using either the Intrafix® SafeSet system or a standard system<sup>2</sup>. Similarly, Alfonso et al. conducted a handling analysis of the Intrafix® SafeSet system compared to a standard system in 1,708 cases<sup>3,4</sup>. Liu et al. evaluated the onset of phlebitis while using the Intrafix® SafeSet system (709 patients) versus a standard system (836 patients)<sup>5</sup>.

## Results

In the Ramacciati et al. study, the comparison between the two infusion devices was primarily reported during routine practice<sup>1,9</sup>. The overall assessment of responses to the 10 questions regarding the Intrafix® SafeSet infusion device as compared to the standard system showed statistically significant differences (table 1)<sup>1,9</sup>. The study conducted by Venturi confirmed significant differences between the Intrafix® SafeSet system and a standard system (appreciation rate of 86/100 for the Intrafix® SafeSet system versus 42.3/100 for the standard system).

The study conducted by Frei revealed that the Intrafix® SafeSet system requires significantly less time for preparation, connection and disconnection (average of 25 seconds or 35%), leading to personnel cost reduction (€0.31 per infusion versus €0.48; table 2)<sup>2</sup>. Sala confirms a significant reduction in nursing labour in addition to the prevention of air influx and related infections, and conclusively an overall reduction in time and cost<sup>8</sup>.

Alfonso et al. observed a significant reduction in average time for preparation of 35 seconds (96 seconds versus 61 seconds) in addition to a significant reduction in phlebitis (4.8% versus 1.4%), demonstrating that the use of the Intrafix® SafeSet is a protective factor against phlebitis<sup>3,4</sup>. Liu et al. obtained confirmational results, with a significantly higher incidence of phlebitis in the control group (standard system) than in the study group (Intrafix® SafeSet system)<sup>5</sup>.

Alfonso et al. calculated the total cost reduction per hospitalized patient using the Intrafix® SafeSet system at €62.08, taking into account factors such as use and preparation of the infusion set as well as possible complications (table 3)<sup>3,4</sup>.

## Conclusion

The Intrafix® SafeSet system offers significant advantages concerning ease of use, operator safety and nursing care time. For example in the Ramacciati et al. study, the opinions expressed by the participating nurses showed a statistically significant positive assessment of the Intrafix® SafeSet infusion device compared to a standard infusion system for each of those primary endpoints – the Intrafix® SafeSet device received extremely high evaluation scores from most of the nurses/testers<sup>1,6,9</sup>. Moreover, the system is significantly more time and cost effective<sup>2,3</sup> and serves as a protective factor against phlebitis<sup>3,4</sup>.

	Intrafix® SafeSet		Standard set		Z	Effect size
	M (SD)	Me	M (SD)	Me		
Overall assessment	2.74 (.32)	2.80	1.91 (.32)	1.90	-7.65**	-0.60
How do you evaluate the perforation of the bag/bottle?	2.89 (.38)	3	2.16 (.51)	2	-6.87**	-0.54
How do you evaluate the shape of the spike (point) in facilitating perforation?	2.90 (.30)	3	2.00 (.47)	2	-7.67**	-0.60
How do you evaluate the seal of the solution in the drip chamber?	2.81 (.45)	3	1.95 (.60)	2	-6.56**	-0.52
Did you find drops in the terminal part of the set at the end of filling?	2.73 (.63)	3	1.62 (.63)	2	-6.65**	-0.53
Was it easy to remove the connection cap from the catheter?	2.63 (.60)	3	2.41 (.65)	2	-2.06*	-0.16
Was the connecting point to the catheter contaminated by the drug solution?	2.54 (.72)	3	1.75 (.64)	2	-5.39**	-0.42
How do you evaluate the infusion using the roller clamp (adjustment wheel)?	2.65 (.59)	3	2.04 (.53)	2	-5.08**	-0.40
Did the infusion rate remain constant throughout the infusion?	2.74 (.46)	3	2.05 (.66)	2	-5.79**	-0.46
How do you evaluate the perforation of the bag/bottle?	2.72 (.59)	3	1.55 (.57)	2	-6.70**	-0.54
How do you evaluate the shape of the spike (point) in facilitating perforation?	2.81 (.52)	3	1.56 (.71)	1	-6.396**	-0.51

M (SD) = Mean (Standard Deviation); Me = Median; \* p < 0.05; \*\* p < .001

**Table 1:** Comparison between the Intrafix® SafeSet and a standard infusion system showing *statistically significant differences (detailed results of the non-parametric Wilcoxon test)*<sup>1</sup>

	Intrafix® SafeSet system		Standard system	
	Time [seconds]	Cost [Euro]	Time [seconds]	Cost [Euro]
Short infusions	45.4	0.3	70.3	0.47
Continuous infusions (anaesthesiology)	43.8	0.29	69.9	0.47
Continuous infusions (surgery, internal medicine)	50.8	0.34	75.7	0.51
<b>Average</b>	<b>47.0</b>	<b>0.31</b>	<b>72.1</b>	<b>0.48</b>

**Table 2:** Time requirement and cost per infusion comparing the Intrafix® SafeSet system with a standard system<sup>2</sup>

	<i>Difference cost [Euro]</i>	<i>Percentage</i>
<i>Use of infusion set</i>	<i>0.071</i>	<i>0.11</i>
<i>Preparation of infusion</i>	<i>0.158</i>	<i>0.25</i>
<i>Phlebitis</i>	<i>0.544</i>	<i>0.88</i>
<i>Allergic an precipitation reactions</i>	<i>0.201</i>	<i>0.32</i>
<i>Infections</i>	<i>56.295</i>	<i>90.68</i>
<i>Fluid leakage</i>	<i>0.672</i>	<i>1.08</i>
<i>Drug reactions</i>	<i>4.142</i>	<i>6.67</i>
<b><i>Total</i></b>	<b><i>62.083</i></b>	<b><i>100</i></b>

**Table 3:** Summary of the cost difference per patient<sup>3,4</sup>

## References

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