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The cost comparison of infraclavicular brachial plexus block by nerve stimulator and ultrasound guidance

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Background: Ultrasound (US) guidance is a new modality for performing infraclavicular brachial plexus block.(1) The precise delivery of local anesthetic to individual nerves hastens onset and improves success rate. Most anesthesiologists are concerned about the cost of ultrasound equipment. We compared the calculated costs of infraclavicular block administered by nerve stimulator and US guided techniques.

Methods: The cost of equipment and supplies (ES) to our hospital is listed in Table 1 for both techniques. The cost of Sonosite™180 ultrasound device with C11 probe is \$17,000. If 5,000 blocks are performed with this device, the average cost is \$3.40 per block. The operating room time is calculated as \$8 per minute.

TABLE 1

Nerve stimulator technique		Ultrasound guided technique		Saving with US
	Cost		Cost	\$
Without catheter placement				
Insulated needle 22G (Stimuplex® 4”)	10.80	Tuohy needle 17 G 4”	4.80	
		Ultrasound gel	1.40	
		Average cost of Ultrasound device	3.40	
Total equipment cost	10.80	Total equipment cost	9.60	1.20
With Catheter placement				
Insulated Tuohy needle 18G and catheter set (Contiplex®, B Braun)	33.50	Epidural kit with Flexitip plus® catheter	15.80	
Betadine, Gauze, Drapes	1.00	Ultrasound gel	1.40	
		Average cost of Ultrasound device	3.40	
Total equipment cost	34.50	Total equipment cost	20.60	13.90
Cost of OR Time				
Time to identify landmarks, clean and drape [5 min]	40.00	Time to image, mark, clean and drape [5 min]	40.00	
Time from needle introduction to end of injection [average 7 min] (2)	56.00	Time from needle introduction to end of injection [average 2 minutes] (1)	16.00	40.00
Total cost of time to perform without catheter	96.00	Total cost of time to perform without catheter	56.00	40.00
Cost for latency of block				
Average onset 22 minutes (3)	176.00	Average onset 6 minutes (1)	48.00	128.00

Discussion: The drapes, betadine, gauze, marking pen lidocaine, initial sedation, and other supplies cost the same for both techniques. **Without Catheter technique:** The cost of ES for nerve stimulator technique (\$10.80) is nearly same as that of US guided technique (\$ 9.60). **Catheter technique:** The B Braun 18 G Contiplex® needle and catheter cost \$ 33.50, whereas the ES for ultrasound technique costs \$22.60, saving \$13.90 per case. The imaging and drug injections take 1-2 minutes to perform with US guidance, and the average onset of anesthesia is 6 minutes. With the nerve stimulator, obtaining appropriate twitches to a current of ≤ 0.5 mA and injection take 7 - 9 minutes, and the average onset of block is 22 minutes.(2,3) Resulting \$168 difference from the time saved by US, amounts to \$840,000 for 5,000 blocks. Performing blocks outside OR requires additional cost for space, personnel, and extra monitors. **Sedation:** Accurate drug delivery to individual nerves with ultrasound is likely to reduce the rate of incomplete or patchy block, that require propofol sedation or general anesthesia, with potential reduction in cost. The real-time observation of spread of local anesthetic around nerves by US imaging minimizes intravascular injection and nerve injuries, improving patient safety and decreasing costs of potential litigation. In addition, the US device can be used for central venous/arterial line placements.

Conclusion: The decreased OR time requirement for the ultrasound technique results in substantial cost reduction, with or without placement of catheter. The cost of ES is comparable for two techniques without catheter placement; however with catheter placement ultrasound guidance saves additional \$ 13.90 per case in ES.

References:

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3. Borgeat A, Ekatothramis G, Dumont C. *Anesth Analg* 2001; 93: 436-441.