

Economic Impact of Pencil Point Spinal Needles Versus Conventional Cutting Needles on Postdural Puncture Headache: A Sample Case Study for Mexico

Telang S, Pavuluri S, Shen K
Becton Dickinson and Company, Franklin Lakes, NJ, USA

ISPOR US 2023
May 7-10, 2023
Poster Code: EE92
May 8, Session 1

Objectives

Postdural puncture headache (PDPH) is one of the most common complications of diagnostic, therapeutic, or inadvertent lumbar punctures. Compared to conventional cutting or beveled spinal needles, pencil point spinal needles have been proven to be associated with reduction in the incidence of PDPH,¹⁻⁵ but their potential economic benefit is not well-known. A customizable cost calculator was created to assess the impact of adopting pencil point spinal (atraumatic) needles over conventional cutting (traumatic) needles.

Methods

A decision-analytic model was developed using MS Excel based on the framework published by Tung et al.⁶ to estimate the impact of atraumatic needles versus traumatic needles on the incidence of PDPH as well as associated healthcare resource utilization and costs. The number and cost of PDPH cases, and utilization and costs of traumatic needles, atraumatic needles, and general anesthesia (post needle insertion failure), were considered from a single payer-provider perspective for Mexico.

Results

The base-case model assumed 1,000 spinal anesthesia procedures annually, with an increase in utilization of atraumatic needles from 10% to 70%. As per published references of clinical and economic inputs, 16 fewer cases of PDPH and 11 fewer procedures of general anesthesia were estimated. Considering the calculated 502 fewer traumatic needles and 600 additional atraumatic needles, the incremental cost of device mix was 22,134 MXN. Estimated cost savings were 23,592 MXN in general anesthesia and 71,543 MXN in PDPH management. Thus, the overall potential change in utilization was associated with a reduction of 73,001 MXN in total cost.

Conclusion

The higher adoption of pencil point needles may be associated with positive clinical and economic impact by potentially reducing the incidence of PDPH and the burden of its management. The use of the pencil point needle, despite its higher upfront investment, could lead to improved healthcare utilization based on its economic value story.

Use of pencil point spinal needles versus conventional cutting needles may support the reduction of both clinical and economic burden of Postdural Puncture Headache and its management.

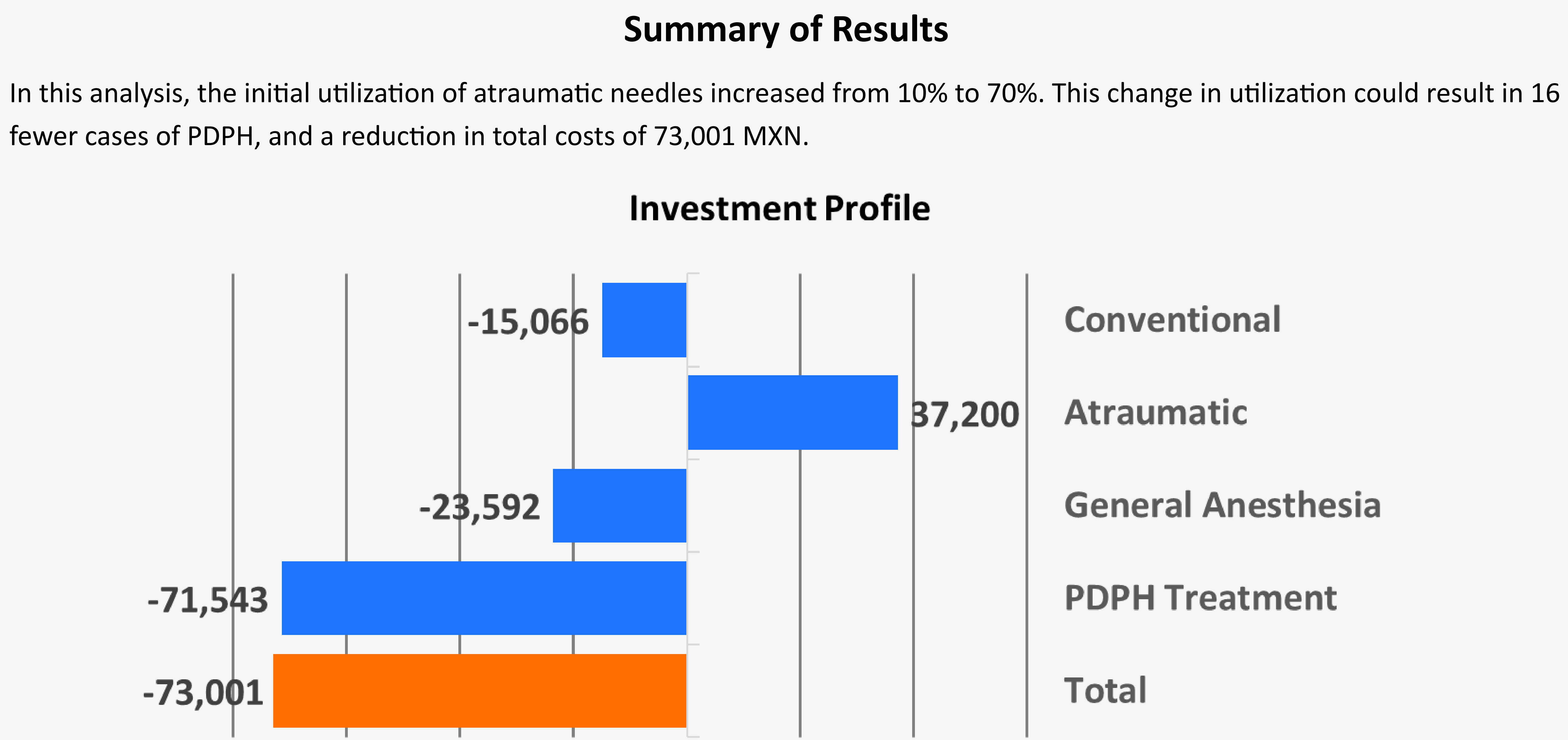


Figure 1: Annual net investment (savings) for adopting atraumatic needles

Overview of the Model Scenarios

- Two scenarios are considered using the same model structure outlined in Figure 2 below.
- The first scenario represents the "Current Scenario" in the institution and should best reflect the current utilization rate of conventional cutting point needles in the institution of interest.
- The second scenario is the "Future Scenario" and seeks to forecast how outcomes will change based on the uptake in the utilization of atraumatic needles.

Table 1: The key outputs of the decision-analytic model [future vs. current scenario]			
Annual number of procedures	1,000		
HEALTHCARE RESOURCES	CURRENT	FUTURE	DELTA
Conventional	916	414	-502
Atraumatic	100	700	600
General anesthesia	19	9	-11
Number of PDPH cases	60	43	-16
COSTS	CURRENT	FUTURE	DELTA N
Conventional	27,489 MXN	12,423 MXN	-15,066 MXN
Atraumatic	6,200 MXN	43,400 MXN	37,200 MXN
General anesthesia	43,045 MXN	19,453 MXN	-23,592 MXN
PDPH Treatment	260,629 MXN	189,086 MXN	-71,543 MXN
Total costs	337,363 MXN	264,362 MXN	-73,001 MXN

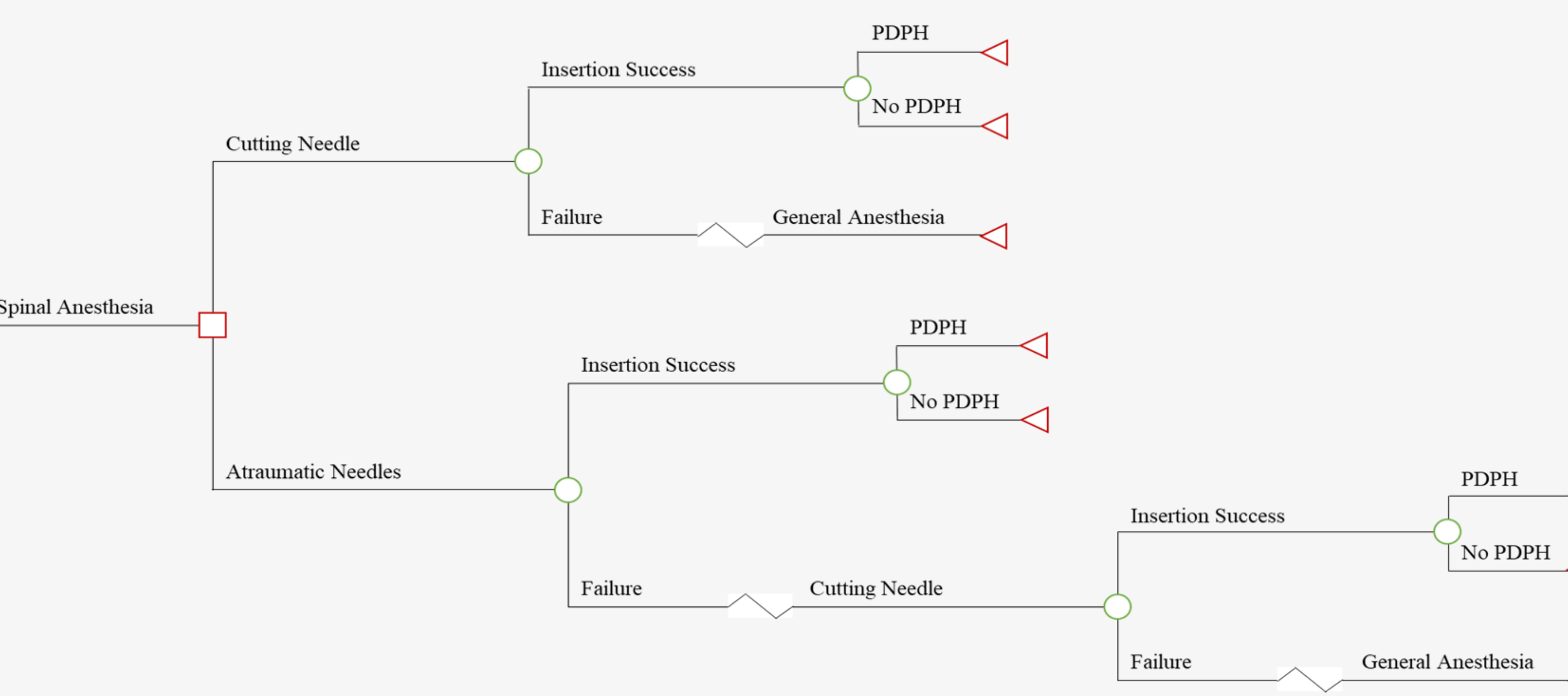


Figure 2: The decision-analytic model structure based on Tung et al.⁶

References

- Pal A, Acharya A, Pal ND, Dawn S, Biswas J. Do pencil-point spinal needles decrease the incidence of postdural puncture headache in reality? A comparative study between pencil-point 25G Whitacre and cutting-beveled 25G Quincke spinal needles in 320 obstetric patients. Anesth Essays Res. 2011;5(2):162-166. doi:10.4103/0259-1162.94757.
- Ahmad, Khaleel et al. Comparison of Frequency of PDPH in Obstetrical Patients after Caesarean Section under Spinal Anaesthesia with 25 G Quincke (cutting) needle 25 G pencil point needle (non cutting). Pakistan Journal of Medical & Health Sciences 2016.
- Xu, Hong MD; Liu, Yang MD; Song, WenYe MD; Kan, ShunLi MD; Liu, FeiFei MD; Zhang, Di MD; Ning, GuangZhi PhD; Feng, ShiQing PhD. Comparison of cutting and pencil-point spinal needle in spinal anesthesia regarding postdural puncture headache: A meta-analysis. Medicine 96(14):p e6527, April 2017. | DOI: 10.1097/MD.00000000000006527.
- Rochwerf B, Almenawer S A, Siemieniuk R A C, Vandvik P O, Agoritsas T, Lytvyn L et al. Atraumatic (pencil-point) versus conventional needles for lumbar puncture: a clinical practice guideline BMJ 2018; 361 :k1920 doi:10.1136/bmj.k1920.
- Weij, B.G., Obsa, M.S., Melese, K.G. et al. Incidence and risk factors of postdural puncture headache prospective cohort study design. Perioper Med 9, 32 (2020). httpsdoi.org10.1186s13741-020-00164-2.
- Tung, Christie E., Yuen T. So, and Maarten G. Lansberg. "Cost comparison between the atraumatic and cutting lumbar puncture needles." Neurology 78.2 (2012): 109-113

Disclosure: All authors are employees of Becton Dickinson and Company.