

# Regional Anesthesia at University of New Mexico: A Diffusion of Innovation

## Research Primer and Feasibility Assessment

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## Background

Improvement in health care outcomes has long been a meaningful focus of medical research, and the discipline of Anesthesiology shows no exception. When different anesthetic modalities are compared, many studies show that ambulatory surgery patients who receive peripheral nerve block have a shorter length of stay than those who undergo general anesthesia, and that peripheral nerve blocks less frequently result in pain, nausea, vomiting, and sore throat postoperatively.<sup>1-2</sup> With these benefits in mind, more outpatient surgery centers are transitioning to the routine use of peripheral nerve block anesthesia in those patients for whom it is an acceptable alternative to a general anesthetic.

Upper and lower extremity procedures, commonly performed by orthopaedic surgeons, lend themselves well to regional nerve block anesthetic techniques. Within the United States, the sole use of regional anesthetic techniques for procedures that previously utilized general anesthesia has increased substantially and we have seen similar growth at our institution, the University of New Mexico Hospital. Over the last 20 years, there has been a significant shift in the type of anesthesia performed for orthopaedic extremity procedures at our institution, and largely, there has been substantial increase in the proportion of cases performed via peripheral nerve block alone as opposed to general anesthesia.

## Our Institution

The story of the increase in utilization of regional anesthesia at our institution has followed an interesting path. One of our study authors, anesthesiologist Dr. Randy Rossett, joined a private practice in 1984, where he met and practiced with another anesthesiologist, Dr. Firoz Vagh, for over 17 years. Throughout this time, their shared interest in regional

anesthesia grew and they worked hard to implement it as the modality of choice when possible (mostly axillary and interscalene blocks for upper extremity surgery during this time). This desire was borne out of a strongly held belief that these techniques would revolutionize patient care. However, both Dr. Rossett and Dr. Vagh left the private practice hospital in 2001 when the facility closed its doors. Subsequently, Dr. Rossett was recruited to assist in the development of an ambulatory surgical center for the University of New Mexico Hospital. Dr. Rossett accepted and was able to convince Dr. Vagh to do the same and join him in 2003. This new center, "OSIS" (Outpatient Surgery and Imaging Services), was successfully founded in 2003.

With both Dr. Rossett and Dr. Vagh on board, they aimed to continue their practice of high utilization of regional anesthesia. However, this process would not be as easy as they had anticipated. Many surgeons initially were very resistant to the implementation of regional anesthetic techniques as a replacement for general anesthesia. Largely, they were hesitant because of previous experiences of high regional anesthesia failure rate, delays in surgery start times due to regional block administration and nerve injuries resulting from the regional anesthesia procedure.

Undeterred, Dr. Rossett and Dr. Vagh continued to advocate for the use of peripheral nerve block techniques and slowly developed momentum. Patient satisfaction surveys were conducted which showed excellent results, consistently in the 95th percentile range. Over time, the use of regional anesthesia increased and now peripheral nerve blocks are performed for the large majority of upper and lower extremity surgery, as well as chest wall and inguinal procedures. Many of the surgeons who initially resisted the change now strongly support the use of regional anesthesia, including the previous Chair of Orthopaedics, Dr. Moheb Moneim, who Dr. Rossett now characterizes as a strong advocate for the implementation of the change in practice.

The high level of success of regional anesthesia seen at OSIS has also assisted in the broad implementation of these practices at the other surgery centers within our institution. Furthermore, the techniques employed for the implementation of regional anesthesia at our institution have expanded and today nearly all of the peripheral nerve blocks are performed under ultrasound guidance. Our anesthesia residency now includes training in this field, and a fellowship in regional anesthesia is now offered and receives many competitive applicants yearly.

## Diffusion of Innovations

We hypothesize that the change at our institution has likely followed a pattern commonly seen in diffusion of innovation theory, as described by Everett Rogers in his authoritative text “Diffusion of Innovations”. Rogers defines diffusion as the process by which an innovation is communicated through certain channels over time among members of a social system. Important to this process are both the traits of the innovation and the traits of those who may come to adopt the innovation. Innovations that are perceived by individuals as having greater relative advantage, compatibility with their values and needs, trialability (the chance to test the innovation on a limited basis before widespread implementation), and observability (the opportunity to watch others adopt the innovation) will be adopted more rapidly than other innovations.<sup>3-4</sup> Furthermore, innovations with greater complexity may be adopted less rapidly.

Those who adopt an innovation are stratified into five groups based upon how quickly they adopt the idea or technology (Figure 1). “Innovators” actively seek new ideas. They are at least two standard deviations ahead of the mean with regards to how quickly they adopt a new innovation and represent 2.5% of individuals. “Early adopters” are greater than one standard deviation ahead of the mean with regards to how quickly they adopt an innovation and represent 13.5% of individuals. These individuals often communicate closely with innovators, and though they may not actively seek new ideas, they do have the resources and the risk tolerance to trial an innovation they learn about before others do. The “Early Majority” is within one standard deviation ahead of the mean time of adoption (34% of individuals), and the “Late Majority” adopts the innovation within one standard deviation after the mean time of adoption (34% of individuals). Each of these two groups is less likely to assume risk than the previously mentioned groups, but rely on the other groups to learn about their experiences with the innovation in question. Finally, “Laggards” are those who are greater than one standard deviation behind the mean with regards to how

quickly they adopt an innovation, comprising 16% of individuals. For these individuals, a system’s norms are often a barrier to change, and in some cases they will never adopt the innovation available to them.<sup>3-4</sup>

When the number of individuals who have adopted an innovation (y-axis) is plotted against time (x-axis), most innovations demonstrate an ‘S’ shaped pattern of adoption (Figure 2). That is, the cumulative number of individuals who has adopted an innovation starts off at a low level when only the innovators and the early adopters are involved, eventually grows at a rapid rate as the early majority and then the late majority adopt the innovation, and finally reaches a plateau (asymptote) at which point nearly no new individuals will adopt the innovation.

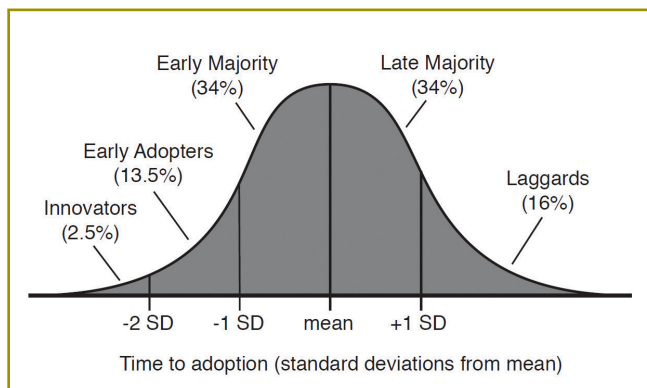


Figure 1

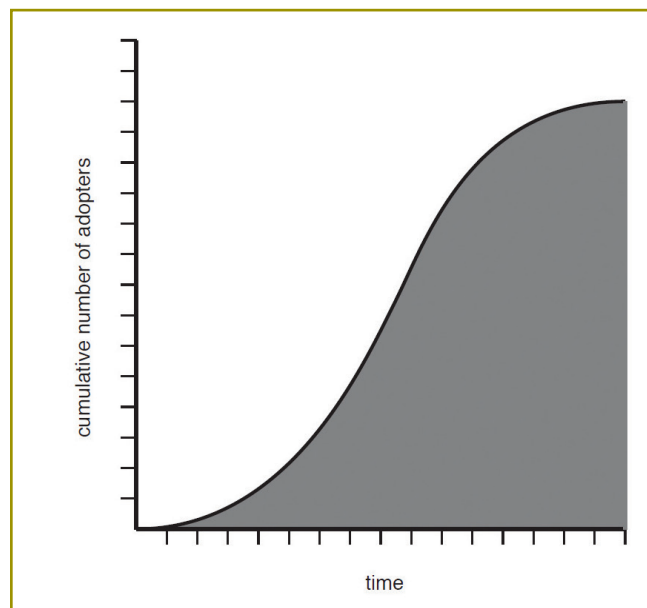


Figure 2

## Research Plans

Given the relative advantages of regional anesthesia and the changes at our institution, we plan to execute a dual armed study that investigates both the measurable quantitative

change in the frequency of this anesthetic modality, as well as the qualitative factors that affected this change.

For the quantitative arm, we aim to prove that the growth of regional anesthesia for use as the primary anesthetic modality in orthopaedic surgery at our institution has followed a diffusion of innovations pattern. This will be accomplished through a retrospective chart review, for which we plan to select specific pertinent CPT codes and then review all patient charts for which these CPT code procedures were performed over our duration of interest. Our hope is to use this data to illustrate the diffusion of innovations 'S' curve.

For the qualitative arm, we plan to explore the factors involved in the change process for pertinent personnel within our institution. This will be carried out through the use of standardized interviews of surgeons, anesthesiologists, administrators, and other pertinent individuals. These interviews generate transcripts that will undergo thematic analysis and qualitative evaluation.

Our hope is to not only fully characterize the changes that we have seen locally, but also evaluate the propelling elements and barriers to change that may be applicable to other institutions.

## References

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