



## Diversity Trumps Ability

**Author:**

Lewis G. Zirkle Jr., M.D.; Jeanne Dillner

### Diversity at the SIGN International Orthopaedic Conference

The air was filled with enthusiasm and the interchange of ideas as 160 surgeons from 21 countries discussed fracture treatment from eight o'clock in the morning to five o'clock at night, with discussions extending into the evening. Engineers and surgeons from the Surgical Implant Generation Network (SIGN) gathered informally during breaks to discuss special interests. Engineers discussed the design features of the SIGN IM Nail system. Randy Haeberle, Joel Gillard and other volunteer engineers who have worked on SIGN projects throughout the year discussed newly-designed drill bits, optimum drilling speeds and use of donated external fixator system kits which they had prepared for each hospital represented.



Randy Haeberle explains the orthopaedic equipment recycle program to SIGN surgeons.

The engagement among surgeons from different countries, engineers and SIGN staff was infectious. Why? Scott Page has explained engagement and problem-solving from a mathematical viewpoint, stating that diversity trumps ability.<sup>1</sup>

The diagram in Exhibit 1 illustrates how ideas are developed. Surgeons in developing countries must be creative because they have limited equipment to treat the same injuries faced by surgeons in U.S. Having fewer available options provides a stimulus to better problem-solving and new ideas. The diversity of the surgeons attending the SIGN conference cannot be appreciated only visually, and is intrinsic to both individuals and groups. Emerson stated that "foolish consistency is hobgoblin of little minds." One result of the SIGN conference is the expansion of orthopaedic abilities for all attendees.

Exhibit 1: The Process of Innovation



Creative innovation emerges from communication exchange by surgeons with experiences from a variety of settings.

Diversity can be divided into three areas:

- **Perspective:** a way of looking at the world
- **Heuristics:** techniques and tools for making improvements
- **Interpretations:** different categories or rankings of ideas



*Diversity of ideas results in the success of the 2010 annual SIGN conference which was attended by 160 surgeons from 21 different countries.*

### Perspective

Many people who are stuck in one perspective believe in the conventional wisdom espoused by their teachers and the majority of orthopaedic surgeons. Surgeons in developing countries cannot afford to keep this attitude. The SIGN IM Nail System is often the only IM nail interlocking screw system available to them. Surgeons in developing countries have expanded the indications from our original intended use as a tibia nail to fixation of fractures in the femur and humerus. They suggested changes in technique rather than changes in the design of the nail.

### Heuristics

SIGN surgeons in developing countries have shown us that one cannot describe a fixation system to treat fractures without considering the surgeon who uses it. These contemplative surgeons have used our one basic SIGN fixation system to treat an array of fractures that are treated in U.S. by a variety of fixation systems.

Communication through the online SIGN surgical database is a tool for making improvements in fracture treatment. Communication in the database and by email enhances the emerging worldwide SIGN research department.

### Interpretations

Surgeons in developing countries rank their surgical results by patient function rather than the x-rays. Many patients cannot afford follow-up x-rays, so pictures of happy patients squatting after fracture fixation are frequently placed on the database.

### Application of Diversity

The SIGN engineering staff also demonstrates diversity. It took three years for the design team to coordinate and direct our efforts in a cohesive way. New designs must be evaluated continually from both engineering and user (orthopaedic surgeon) standpoints. SIGN's culture empowers us to work toward the common goal through tolerance, no blame and no individual credit for our innovations. We don't really think outside of the box; we arrange our thoughts differently inside the box. We begin a new project by looking at all possibilities and gradually narrow down to the most promising. We all have different lenses through which we look during design innovation. We treasure the contemplative surgeons and engineers who come to SIGN with open minds; they are eager to learn and eager to contribute. Each one of us has different analytical, creative and fracture goal abilities.

## Contemplation of Diversity

Four days in the Gobi Desert during a recent trip to our SIGN programs in Mongolia provided an opportunity to contemplate the evolving design of the SIGN system. Many of our early decisions were based on economics and available supply of stainless steel. We manufactured a solid nail because solid bar stock was more available than camulated bar stock. This allowed us to place slots in the nail which were useful for finding the interlock. These slots increased speed of healing as they allowed compression and distraction. Distal targeting was improved, because the solid stainless steel nail deviated less than a hollow titanium nail. As more discoveries about infection unfolded, we learned that a solid nail provides less adherence of biofilm which has been shown to be a major cause of chronic infection. Using stainless steel was economically driven, but stainless steel provides less adherence to this biofilm than does titanium alloy. We made a straight nail because our first nail was designed for the tibia, which accepts a straight nail. Within months of distributing the first SIGN IM Nail sets, SIGN surgeons expanded the indications and began using the SIGN nail first in a retrograde approach to the femur; then the antegrade approach. We considered changing the design to include a larger proximal end of the nail. It was 1999 and this design was the most common. We did not change the design, but rather the technique which resulted in the SIGN nail sliding down the helical part of the proximal femur better than a nail with a large proximal end. Many companies designed their proximal nails with curves in the nail to correspond with the helical in the proximal femur. We used surgical techniques to accomplish the same goals as changes in nail design. This technique was devised by surgeons who had no other option for fixation of the femur from the antegrade approach.

## Diversity Trumps Ability

SIGN has developed a global culture of diversity that has stimulated many innovations in fracture treatment. SIGN engineers and surgeons from around the world have used their diverse experiences and skills to develop modern orthopaedic technology and training for hospitals in nearly 50 developing countries, for the benefit of more than 70,000 patients. This diversity provides the path to healing.

*Jesse Dilner is Chief Executive Officer of SIGN, a nonprofit organization that designs, manufactures and donates potential, FDA-cleared orthopaedic implants to hospitals in developing countries. Ms. Dilner regularly travels to assist Dr. Zirkle with the training of surgeons on the SIGN IM Nail System. In September 2010, business leaders in Eastern Washington State honored SIGN with the Manufacture of the Year Award. Ms. Dilner attributes this honor to the 30 SIGN staff members whose commitment to excellence has enabled SIGN-trained surgeons to give more than 70,000 patients a chance for renewed mobility.*

*Louis G. Zirkle Jr., M.D., is a board certified orthopaedic surgeon in private practice in Richland, Washington. He graduated from Davidson College and Duke University Medical Center. He was selected to continue at Duke University Medical Center for surgical and orthopaedic surgery training, but was drafted into the U.S. Army and sent to Vietnam. He continued his training in the Army. Dr. Zirkle has traveled extensively in developing countries to teach orthopaedic surgery. In 1994, he realized that training is not sustainable unless surgical implants to stabilize fractures are donated along with education about fracture care. SIGN was formed on that premise.*

*Since SIGN was founded, Dr. Zirkle has spent increasing amounts of time engaged in development of new surgical implants that can be used in developing countries, developing curriculum applicable to the surgeons and teaching to teach surgery and modern orthopaedic care. He is passionate about SIGN's mission and vision. He can be reached at sign@psmi.org.*

## REFERENCES

1. Page, SE. *The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies*. Princeton: Princeton University Press, 2007.

## Flap Course Precedes Annual SIGN Conference



The enthusiasm of the 52 SIGN surgeons who had just attended a hands-on flap course at UCSF was contagious when they arrived for the 2010 SIGN Conference. They had learned by lecture and hands-on cadaver studies about flap coverage of open fractures. SIGN surgeons must serve as the entire trauma team when a severely injured patient presents in their hospitals. These surgeons are leaders in trauma surgery in their respective countries and will pass on the knowledge gained. At the end of the two-day course, they flew to Richland, Washington to join 100 other surgeons for the Annual SIGN Conference where they presented a summary of the flap course.