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· Surgical Treatment Review Improves Children's Healing Process

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Pediatric surgery is in general a very clinically oriented field, although there is an increasing emphasis on research in our division. Most of our division's research activity in the past has been oriented toward outcomes and what we do in the operating room and on the hospital ward. It is important to examine the way we practice surgery, and by either randomized prospective trial or by retrospective review, determine how we can make changes that will benefit our patients. These studies may involve a wide spectrum of both congenital defects and problems encountered in the older child. While retrospective clinical reviews may be useful, much of our current outcomes research is now driven by examination of large patient databases that cover large populations. We are using these databases in a rigorous academic manner to critically evaluate how various treatments affect an entire population rather than just the smaller number that we may have cared for. We are also looking at quality of life studies to better evaluate how what we do affects our patients in the long run. Studies of this sort have been sorely lacking in our field.

In addition to outcomes, we have several faculty members focusing on quality and patient safety. The methodology being used in this area derives from the Toyota Production System and its use of lean methodology. While it may seem odd that automobile manufacture and health care could use the same basic tools as a model for success, we have found this to be quite true. Lean methodology uses a plan/do/check/act cycle (PDCA) to make improvements to a system, whether it be the production of cars or how patients move through the hospital. This PDCA cycle is nothing more than the scientific method that was learned in medical school or the science laboratory, where a series of experiments are designed to evaluate, define and improve a process. In the business world of Toyota and in health care, these experiments are called rapid process improvement workshops (RPIW), and they are nothing more than experiments meant to define and refine a process. All of these RPIWs are data driven. Anecdote and conjecture have little place in them. Just as with any scientific experiment, data must be collected prior to performing the RPIW. These data are then used to help refine a process and make improvements, just the way one would in a science experiment. These improvements cover a broad range of issues, from moving a child expeditiously through the operating room, to improving patient flow through the clinic, or to making sure the child receives the correct medication. The goal is to cut out wasted time and effort in patient care, not just for the patient but for the providers as well. Each RPIW attempts to add standardization to a process. This cuts down on variability and thus should improve safety for the patient. When a process is standardized, it is more likely that one will recognize deviation from what is expected. Problems can then be caught before they reach the patient. In addition, by standardizing a process so that we do it the same way each time, we cut out wasted effort because we do not have to reinvent the wheel every time we do something. One of the critical points in the entire process is that it is not static, but rather, is a dynamic cycle. Each cycle of PDCA repeats itself so that if something does not work, there is the opportunity to keep refining the process as one would with any scientific experiment. At first blush, faculty members worried that standardization would stymie creativity, but because of the PDCA cycle and decisions based on data collection, this is actually the ultimate scientific means of delivering health care to our pediatric patients.

Minimally invasive surgery (MIS) continues to play an important role in pediatric surgery. Many MIS operations have become the standard procedure for many conditions. Laparoscopic and thoracoscopic surgery both have steep learning curves, especially for the more advanced cases. For some pediatric surgeons, it may take years to acquire these

The scope of research in the Division of Pediatric Surgery at Seattle Children's Hospital has significantly increased in the past several years. Quality, outcome and innovative techniques are the main areas of focus in our division.

skills because of the limited number of patients with a specific diagnosis, such as gallbladder disease, compared with adults. Several of our faculty are involved with pediatric robotic surgery and are international leaders in this field. While the exact place of the robot is still being defined in pediatrics, it has been put to innovative use by our faculty and has broadened the potential scope for MIS in children. Other researchers in our division are focusing on intestinal failure and the physiology of short bowel syndrome. The survival of infants and children with short bowel syndrome has markedly improved; with the addition of intestinal transplantation, many of these children now have the opportunity to live healthy lives.

Ongoing collaborative efforts with colleagues in other divisions such as Orthopedics have enabled us to expand the use of minimally invasive surgery for conditions such as pediatric scoliosis by doing thoracoscopic exposures as well as thoracoscopic anterior fusion and instrumentation. A joint effort with the Departments of Orthopedics and Pulmonary Medicine has allowed us to be part of a national collaborative study on the use of the vertical expandable prosthetic titanium rib (VEPTR), which has become a standard modality used to treat children suffering from thoracic insufficiency syndrome. Prior to the development of this device, no good method existed for the treatment of this condition. The use of the expandable rib allows us over time to expand the thorax of children with Jeune's syndrome or thoracic insufficiency from other congenital problems such as scoliosis, fused ribs or congenital diaphragmatic hernia. Outcomes for some of these children are promising and suggest that this technique can successfully improve or stabilize these children's pulmonary function. Seattle Children's Hospital was an FDA study center for the evaluation of this device, and we are continuing to take a leading role in determining the efficacy of this treatment. In addition, we have expanded the use of the VEPTR for chest wall reconstruction, a novel use of this device, to bridge large gaps in the rib cage due to tumor excision. We have made special modifications to the VEPTR to allow its use in small infants and children, as well as place the VEPTR in an intrathoracic position to treat children with a kyphotic component to their skeletal deformity.

Each of us in pediatric surgery does a high volume of clinical work, and it is important to step back on occasion to examine how well one is doing and to question whether something could be done better. All of the research in our division is directed toward bettering the quality, safety and outcome of our patient care, and improving the lives of our children.

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