Expert Q&A: Patient Positioning

Dan Allen received his BFA from Kent State University and in 1976 he began a career long commitment to the study of anatomy and physiology relating to surgical patient posturing and positioning. He is the inventor of the Allen Universal Stirrup and the retired founder of Allen Medical Systems and has been involved in the development, pioneering and marketing of innovative OR devices, posturing equipment, pressure management and pressure sore prevention products during his 30 year career in the medical device industry. Several of his patient positioning and posturing products have become the global standard of care and have been sited in more than 90 clinical articles and appear in a number of English and foreign language surgical textbooks.

Surgical Products: What are some important assessments/considerations when determining how to position a surgical patient? (age, weight, etc. –how do they factor in?)

Allen: It is important to be aware of the intrinsic (medical) and extrinsic (environmental) considerations that accompany each patient as they are representative of medical issues that put patients at higher risk of OR acquired injuries (ORAI). Awareness of intrinsic issues is important as a “heads up” to the staff however the surgical procedure has been planned and scheduled with full knowledge in spite of the issues. Intrinsic issues include:

- Alterations in nutrition and hydration
- Age
- Immobility
- Mental status
- Infection
- Incontinence
- Impaired sensation
- Diabetes
- Peripheral
- Vascular Disease
- Cardio-pulmonary disease states
- Tobacco abuse
- Obesity
- Low pre-op Hgb
- Low pre-op albumin
- Co-morbidities

Extrinsic factors have a major impact on patient outcomes and are under the control of the OR Staff. Extrinsic factors are the environmental issues that contribute directly to the formation of ORAI. Extrinsic Risk factors are easily

identified and are controllable by the OR staff. From the standpoint of patient positioning extrinsic factors include anything that comes into contact with the patient. Positioning patients requires a working knowledge of how the surgical posture and each of the positioning devices used to achieve the posture impacts the musculoskeletal, vascular, nervous, respiratory and integumentary systems. The staff is responsible with being familiar with and implementing proper usage of posturing / positioning devices that provide the highest level of risk reduction.

Predicting the development of ORAI under what might be considered as conventional clinical circumstances is difficult. It only gets worse on a surgical table during surgical procedures of short or lengthy duration.

Surgical Products: Can you discuss the injuries/complications that can occur in surgical patients due to faulty positioning? How do they occur and what are the consequences for the patient?

Allen: The Musculoskeletal System: Structures may be subjected to unusual and exaggerated stresses during operative procedures, when the normal defense mechanisms cannot guard against joint damage and muscle stretch and strain and the anesthetized patient cannot voice objections to discomfort and pain. Trauma results from excess pressure being placed on joints (hyper-rotation, hyper-extension). **The Circulatory System:** Anesthetic agents usually dilate peripheral blood vessels, resulting in a drop in blood pressure. Peripheral vascular damage may occur if the vessels are occluded by external pressure, such as a tight restraint strap or crossed legs or ankles. When an arm is extended, a radial pulse should be monitored to ensure that vessels are not being obstructed. **Nervous system:** Factors leading to peripheral nerve damage include weight from instruments, members of the surgical team leaning on the patient, and hyper extending the extremities, head and neck resulting in stretching injury. Frequent sites of positioning related injury are divisions of the brachial plexus, the ulnar, radial, peroneus, and facial nerves and the Sciatic nerve. Often, nerve injury is not discovered until the patients in the PACU or even days or weeks after the insult has occurred. Nerve injury ranges from a slight reversible loss of sensation to debilitating injury including the inability to lift an arm to eat (brachial plexus), the inability to walk without a brace (drop foot), excruciating back pain (sciatica), etc. **Muscle injuries**: Two stages of deep site injuries (aka stage III and stage IV pressure ulcers) are caused by the trauma of a boney prominence compressing vascular flow to the muscle. Compartment syndrome can occur due to trauma or direct pressure against muscle bundles. Compartment syndrome is debilitating and has long lasting physical implications. **The Respiratory system:** Improper positioning can affect the patient’s ability to ventilate. Certain positions can compromise respiration by mechanically restricting the rib cage and abdomen. Obese patients, pregnant women and patients with respiratory problems may have difficulty breathing in the supine position. **The Integumentary System:** It is important to seek out and utilize the very latest technology in pressure management to ensure the highest level of patient safety. Skin injury can develop as a consequence of a number of intrinsic (medical) and extrinsic (environmental) forces. Maceration (prune skin) occurs when the skin is in a constant state of moisture. This makes the skin fragile and susceptible to injury and infection.

Pressure injuries generally are most common in operations that last two hours or longer.

1. There are two stages of superficial pressure ulcers (pressure sores) caused by friction, unrelieved skin sheer, temperature, localized pressure and duration of pressure.
2. There are two stages of deep site injuries that can cause severe and deep damage to the skin and underlying tissues typically caused by obsolete transient patient surfaces (OR table pads and stretcher pads).
3. Stage I and II pressure ulcers are inconvenient but typically resolve with appropriate treatment inside of 6 weeks. Deep site ulcers go to the bone and can be debilitation for a year or more. It is not uncommon for an elderly patient to decide that the ulcer is too much to bear to the extent that they will themselves to die. The costs of pressure ulcers to the healthcare system is in the $$Billions and in the tens of $$Billions in lost productivity.

Surgical Products: Are there consequences for the hospital if a patient is injured due to faulty positioning during surgery?

Allen: Even though ORAI are preventable many patients who require weeks or even months of physical therapy are told that the injuries are “normal” or part of the procedure yet typically the only consequence for the hospital when a patient is injured is litigation … and only if the patient bothers to get a lawyer.

“Serious” ORAI typically gets a serious legal response from the hospital and those patients who accept a settlement find that they are also agreeing that if they tell anyone they were injured that they agree to return the settlement. Sadly that acceptance keeps the public and the healthcare community from being aware that a problem exists. The maximum award for a patient positioning injury to date is over $100 million for a pressure ulcer.

Prior to October of 2008 hospitals actually benefited financially from hospital acquired pressure ulcers as MEDICARE and private insurance carriers paid for the very expensive therapy costs associated with treating the pressure sores. In October of 2008 MEDICARE instituted a rule whereby hospitals are now responsible for the costs of pressure sores that develop while a patient is under their care. Private carriers are adopting the MEDICARE model.

Surgical Products: Are you able to provide data about how often injury due to faulty positioning occurs in patients?

Allen: The literature (Aronovich, Rhodehever, Lang, etc.) shows that the percentage of patients suffering from ORAI ranges from 18% to >60% depending on the procedure type.

Would you be able to provide any anecdotes from your experiences in the OR about patient injuries or complications due to positioning?

Allen: There are virtually tens of thousands of injuries each and every year. Few are reported. I can share any number of stories from personal experience including those that follow.

- A surgeon informed me that he had a patient with vascular compromise at his hospital who had been placed in crutch style stirrups for a short procedure. Due to complications the procedure took over two hours. The pressure from the crutch stirrups (then the standard of care for the type of procedure) on the popliteal fossa cut off circulation to the lower leg. When they removed the drapes they found that the legs had turned black. The end result was a bilateral above the knee amputation.
- Candy cane stirrups are well know as being causal to a number of injuries including hyper-abduction, hyper-extension, nerve bundle stretching creating chronic sciatica and drop foot. A friend of mine went in to a local hospital for a laproscopically assisted vaginal hysterectomy. Prior to surgery she (being a type “A” personality) actually called the OR manager to ask if they used Allen Stirrups. She was told that they did in fact have a pair. When she was being wheeled into the OR she asked to see the Allen stirrups. She was informed that their pair were being used on another patient but that she didn’t have to worry and that she would be just fine. She was, but only after three months of physical therapy. The irony of this story is that she is a lawyer. She saw to it that the hospital would never provide different levels of care for that procedure ever again.
- Two piece restraints used for steep Trendelenburg are known to be causal of brachial plexus injury. It has been reported to me that one hospital, hoping to avoid the expense of purchasing a safe integral Trendelenburg patient restraint system placed patients on a flat gel pad “skin to skin” hoping to use skin friction to hold them while the table was in inclination. Reports indicate that several patients lost friction and slipped headfirst off the table to the floor. Several resultant cases of quadriplegia and one case of death were described.
- This story is more of a statement of fact. The literature tells us that in the neighborhood of 18% of hospital acquired pressure ulcers (HAPU) originate in the OR (ORAPU). Unfortunately ORAPU tend to be more severe and account for more than 45% of the cost of HAPU therapy. It’s simple. Eliminate ORAPU and reduce your therapy budget by 45%. With today’s available transient surface technology OR acquired pressure ulcers are virtually preventable. Having said that more than 30,000 ORAPU continue to present each and every month and that rate will not be lowered until hospitals invest in scientifically proven transient surfaces.

Surgical Products: What types of technologies/products are important in patient positioning?

Allen: There are a number of suppliers who, as a group, manufacture excellent products that meet the criteria required for safe patient positioning. This niche is typically populated by small companies with a single product solution. In most cases the products are the brainchildren of nurses, doctors and surgical products

representatives who recognized a need and shared it with a company capable of manufacturing and distributing it. The products are typically developed with three criteria in mind: Patient safety, ease of use and surgical site exposure. As a rule, the manufacturers of the capital equipment that make the new surgical procedures possible to perform often do not take patient positioning into account.

Hospitals should invest in continuing education for their staff.

- Positioning and posturing related risk factors for injury have grown over the last 10 years. While proper patient positioning is of interest to OR managers it is atypical that a hospital would offer a continuing education program on “Positioning Patients in Lithotomy” or Positioning Patients with Risk Factors.” To date there are no published recommendations, standards or comprehensive hand on continuing education programs related to the issues of posturing or positioning patients with morbid obesity or with an ever growing list of age related co-morbidities.

- There are only general guidelines available for positioning for the seven basic surgical postures and they are based on generic patients. Those “standards and guidelines” do not take into consideration that more procedures are being performed on more patients with more risk related co-morbidities than ever before. While the guidelines recommend precautions for positioning they are typically non-specific as to what to use (or not use) to safely position even the most generic of patients.

Communication, or most notably the lack thereof, also plays a large part in creating ORAI.

- The PACU is often just a few meters from the OR but it is atypical that there is a conduit for PACU to report patient complaints of pain unrelated to the surgical site to the OR. It is basically unheard of that a report that a patient had a neuropathy or required a course of physical therapy after a surgical procedure circulates to the OR manager. Without that kind of feedback there is no way that the OR nurses will ever know that they are doing something that might be creating risk for patients.

Knowing what not to use is important in the selection of positioning devices.

- Rolled up towels are hard as logs and are more expensive to use that may be thought. There are reusable positioners that conform to the patient yet hold the patient in the desired posture.
- Pressure maps show higher interface pressures with flat gel pads, proving that they reduce the efficacy of the pad they cover.
- Stop using two piece Trendelenburg restraints. Stop using patient friction against gel pads for Trendelenburg. People keep sliding off. There are

integrated Trendelenburg Patient Restraint systems that don't let the patient slide on the table and don't put the patient at risk for brachial plexus.
- Stop using candy cane and crutch style stirrups. Booted stirrups of a variety of configurations are available from several suppliers.
- Egg crate foam doesn't work and it's expensive to dispose of.
- Do research on transient patient surfaces for OR tables and patient transport. "It feels good" isn't a criteria for purchase. Require that manufacturers provide peak interface pressures (not mean pressures), vascular flow studies and a CT scan showing compression and distortion between bony prominences and tissue layers.

Surgical Products: Finally, if you had to choose a few key takeaway points related to patient positioning our readers should always remember, what would they be?

Allen: Patient positioning is a VERY serious business. Proper Positioning is a vital first step in having everything right for the entire procedure. Safe and effective patient positioning may seem like a simple task but it requires a broad range of knowledge and practiced diligence on the part of the entire team.

Providing unobstructed access to the operative site, maintaining proper body alignment, ensuring continuous respiration and circulation and preventing skin and nerve damage are all critically important intra-operative considerations that can be affected by the patient's position on the operating room table.

If the patient is positioned incorrectly, every step of the patient's care and procedure can be compromised. The key to safe positioning is knowledge of individual patient and procedural needs. It is important that you have a variety of skills, a strong patient positioning knowledge base, and effective problem-solving abilities to meet the posture demands of a broad range of procedures and surgical techniques.

Anything you would like to add?

Allen: Patient positioning injuries are avoidable tragedies. Thousands of dollars investment in prevention will reap tens of thousands of dollars in operating costs. Replace obsolete positioning devices as industry creates newer and safer devices that meet the needs of the new procedures and high risk patients. Keeping up to date with the latest posturing techniques through continuing education and hands on practicum that allows the OR staff to encounter the level of comfort or discomfort experienced by the patient.

Dan Allen offers CE accredited presentations for institutions, local and regional seminars on the topics of:

- *Patient Positioning in the Operating Room*
- *Preventing Pressure Ulcers in the Operating Room*

- *Researching and choosing pressure ulcer prevention surfaces for transient surfaces*
- *Hands on positioning practicum for Supine, Lithotomy, Lateral, Trendelenburg, Reverse Trendelenburg and seated postures.*

Allen is recognized as a global authority on patient positioning, posturing and pressure management in the operating room. He has addressed a number of groups of OR nurses, surgeons and hospital staff in North America, Europe, Australia, Japan, Brazil and South Africa on those topics. He was an invited educational speaker at the 2006 AORN Congress and has addressed local and regional AORN chapters with his programs. During the last ten years he has performed business development consulting with every major surgical table company and table accessory manufacturer in the world in an effort to research, develop and commercialize innovative pressure management and patient posturing devices. You may reach Dan Allen at DanAllen@AOL.COM *[1] or call 440-289-9788*

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