
EDITORIAL

Think Like an Engineer!

I had an epiphany last month. I realized that all the teaching I've provided to residents and students the past three decades could be distilled into a single, germane suggestion: "**Think Like an Engineer!**"

Last month I found myself performing a robotic nephrectomy to remove a large, central Bosniak 4 cystic mass. As I lifted it to place it into an extraction bag, it broke open under its own weight, spilling its contents. I irrigated thoroughly and waited on pins and needles with an ice water pericardium for the better part of a week until the pathology returned cystic nephroma. Tragedy averted. Prayer answered. Better to be lucky than good. However, this engineer should have factored in gravity and tension. He should have remembered his mechanics of materials and fluid dynamics training. No real engineer would carelessly suspend hazardous material in a fragile container over sacred ground, let alone lift it at two points. The next week, I removed two large Bosniak 4 renal cysts through open incisions with the ipsilateral side of the table slanted downward. Don't be wooed by the siren song of earlier robotic room availability. **Think Like an Engineer!**

The week prior, our residents and faculty received a demonstration from an equipment service representative on how to appropriately coil flexible cystoscopes and ureteroscopes, as well their light cords. He also showed us how to handle and cover rigid cystoscopes to prevent their damage, particularly during cleaning. He reminded us that most surgical equipment is damaged by neglect . . . to the tune of hundreds of thousands of dollars each year for just our department's two OR endoscopic suite. Millions of dollars a year for our hospital. An engineer would remember the delicacy of tendon-driven deflection and mechanical actuators. She would remember the fragility of fiber optic bundles, rod lens systems, and digital chips. She wouldn't throw her tools around. **Think Like an Engineer!**

The week following, we attended a Zoom grand rounds lecture on sustainability. The west coast presenter taught us about the millions of tons of disposable waste created by hospitals worldwide each year. He reminded us that red biohazard bags should not be filled with general garbage, packaging, or gowns only minimally covered in blood and not saturated to the point of potentially dripping or releasing the blood if compressed. Minimally contaminated gowns should be disposed of in the regular trash. Red biohazard bags must be incinerated, making their disposal 10 to 15 times as expensive, 25 to 30 cents per pound rather than 1–3 cents per pound. An engineer wouldn't erroneously open sealed packaging, throw the wrong materials in a more expensive disposal receptacle or be clueless that this waste will require incineration and spew tons of ash and combustion gases into our atmosphere. **Think Like an Engineer!**

When I left for medical school, I told my mother that getting an engineering degree might have been a waste. She replied, "You will find a way to use it. No education is ever a waste, Jimmy."

Dear doctor, **when** you evaluate a renal mass, determine **which** surgery to perform (and **how** to approach it), **what** tools you will open, and **how** to dispose of the waste you generate, please **Think Like an Engineer! Why?** Because my mother said so!

James A. Brown, MD, MHA
University of Iowa, Iowa City, Iowa, USA

