Jo Fields: Hello and welcome to Trauma Loupes, the *Journal of Trauma and Acute Care Surgery*’s monthly podcast. This is Jo Fields. For the April 2014 issue, we hear from Dr. Ernest Moore, our editor-in-chief and Dr. Angela Sauaia, our biostatistician with their must reads. First, Dr. Moore...

Dr. Gene Moore: Thank you Jo and Angela. Welcome to the April issue of the *Journal.*

The lead article is by [Austin Porter from the Arkansas Department of Health and colleagues](#) from the University of Arkansas who describe the benefits of a statewide trauma call system. The Arkansas Trauma System was implemented in 2010 consists of a single Level I, five Level II, and 60 Level III and IV centers. The Arkansas Trauma Communication Center is a key component of this system, allowing physicians to make a single phone call to arrange patient transfer. The purpose of the current study was to determine the impact of this state communication center on the emergency department’s length of stay at referring institutions for patients requiring urgent care. During the initial 18 months of operation, there were 856 seriously injured patients requiring transfer. Seventy-four percent used the communication center. The study cohorts that used or did not use the center were similar with respect to injury severity. However, the group transferred via the state communication center had a 21-minute reduction in emergency department stay. This is an encouraging program report from a state that appears to have established an integrated, inclusive trauma system based on patient need rather than institutional greed. I hope states like Colorado and Florida can learn from this superb example.

Another noteworthy contribution is from [Robert Sise, currently a medical student at UCSF, in collaboration with surgeons at Scripps Mercy in San Diego and the Stanford University](#). This team employed multiple national databases to define the epidemiology of trauma related mortality in the US from 2002–2010. There is a wealth of useful public health data in this report that merits careful study. I believe the key findings are: 1) an encouraging 27% reduction in motor vehicle deaths associated with a 20% decrease in motor vehicle crashes, 2) an overall unchanged rate of firearm-related deaths, although a persistent trend of more suicide compensates for a reduction in homicide deaths over the last four years, and 3) an alarming 46% increase in fall-related mortality, particularly in those greater than 65 years of age.
The latter issue of rising mortality due to falls in the elderly has been a common theme in the Journal over the past year, but the solution is not straightforward, as the majority of these patients succumb to their pre-existing diseases. While there have been a number of centers suggesting falls in elderly warrants a trauma activation response, I remain unconvinced of this expensive addition to our health care crisis. Nevertheless, I do agree pre-geriatric experts should be added to the in-hospital trauma service for the unique needs of the frail elderly.

Another timely report is by Dr. Carole Villamaria, describing the successful collaboration of the University of Michigan and military in developing the endovascular skills for trauma and resuscitative surgery course, so-called ESTARS. While the precise role of resuscitative endovascular balloon occlusion of the aorta, that is, REBOA, remains to be established, this course provides the fundamentals for the acute care surgeon to be an integral part of this process. REBOA, of course is not a new concept, but is being revived at a time of endovascular control for bleeding, and this may serve as a platform for pelvic angioembolization and beyond for the acute care surgeon.

Finally, I would highlight the contribution of Dr. Mark Maxfield and colleagues from Yale to predict the failure of nonoperative management of perforated appendicitis from 2004-2011. Eighty-nine patients were initially admitted for nonoperative management of perforated appendicitis with a phlegmon or abscess. Nearly a quarter of these patients underwent operative care, an alarming 30% had an ileocecectomy, and 10% of these patients ultimately required SICU care. According to multivariate analyses, the factors associated with failure were smoking, tachycardia, generalized abdominal tenderness, and abscesses less than five cm. On the other hand, diabetes mellitus, febrile response, and magnitude of leukocytosis were not helpful. On follow-up CT scanning, patients in the failure group were more likely to have a persistent abscess and these collections increased in size. While this retrospective analysis may not provide a definitive answer for when to operate with complicated appendicitis, it suggests another opportunity for acute care surgeons to conduct a multicenter prospective study. As always, this month’s Journal contains an abundance of new information. Happy reading!

Jo Fields: Thank you, Dr. Moore. And now we hear from Dr. Sauaia.
Dr. Angela Sauaia: Thank you Jo and Gene.

I would like today to talk a little bit about a technique that is becoming progressively more popular not just in our journal but in many other publications. I am referring to propensity score matching analysis. In this issue of the Journal, we have the study authored by a large group of illustrious AAST members comparing surgical versus clinical management of severe traumatic brain injury that used this technique, and did a superb job at describing it.

Rosenbaum and Rubin proposed in 1983 the method of propensity score matching to reduce the bias in the estimation of treatment effects when using observational data sets. This is an alternative to randomized clinical trials, in which the random group assignment is assumed to take care of distribution of potential biases and confounders.

Basically, propensity score matching starts with the development of a propensity score, often done by running a multivariate regression model using our effect of interest as the outcome. In the AAST study I just mentioned, the effect of interest was the surgical decompressive craniectomy management of the severe TBI. The authors decided on a number of clinically relevant variables to be used as predictors for decompressive craniectomy in the model. This is the first thing readers should pay attention to. A propensity score model is only as good as the variables that are included.

The resulting model is then used to generate propensity scores, which are the likelihood that a patient is to receive the effect of interest, in this case decompressive craniectomy. Armed with this score, the matching procedure is conducted, through which patients who underwent surgical management are matched to patients with similar scores but who did not receive surgical management. Just as no RCT should be published that does not compare baseline characteristics between the arms of the trial, so every study using propensity-score matching should compare measured baseline characteristics between the study groups. The balance between the two groups is shown in Tables 2 and 3 of the AAST article.

The procedure for matching was well-described by the authors, and I encourage other authors to use their report as a guideline when writing their own propensity score matching studies. A 2008 review by Peter Austin, a professor in the Department of Health Policy, Management, and Evaluation at the University of Toronto, Canada, also offers excellent guidelines on the important elements that need to be included in these analyses. He reviewed 47 articles published between 1996 and 2003 in the medical literature and that employed propensity-score
matching and found that only two of the articles reported the balance of baseline characteristics between treated and untreated subjects and used correct statistical methods to assess the degree of imbalance. He made several other recommendations for the design, analysis, and reporting of studies that employ propensity-score matching. He stressed the importance of describing the strategy for creating matched pairs to allow other researchers to replicate the methods of the published study. This includes things such as whether matching was done with or without replacement and if replacement was used, then whether authors accounted for it in the analysis of the data. We should also report the caliper, which refers to the absolute difference in the propensity scores of the matched subjects and the controls.

One may ask, what is the advantage of using propensity score matching over just adjusting for the same confounders and effect modifiers in a multivariate model afterwards? The answer is: it depends. It depends on the study, the sample size, the size of the effect of interest, and many other factors. Some studies have shown no advantage of one method over the other when the number of events was much larger than the number of variables in the model. Others have argued that when effect modification exists, i.e., there is an interaction, propensity score matching is preferable. As always, it is important to involve your biostatistics colleague before designing these studies.

I will finish with a story about my father, a physician with a love for and a PhD in statistics. He used to say that when you want a delicious cake, you first go to your chef and ask which ingredients he or she would need to come up with the cake. He can then cook you a nice p-val—, er, I mean, a cake. The same is true for statistics. One should go and ask the statistician what he or she needs before the study, as opposed to giving them the ingredients you got from your pantry. One cannot expect a delicious p-value if you come up with less-than-ideal ingredients. Happy Easter!

Jo Fields:

Thank you Dr. Moore and Dr. Sauaia. And thank ya’ll for listening. We will be back in a month for the May issue. If you have any questions or requests, please send them to info@jtrauma.org.