

Introduction

Trauma centers and trauma systems have been around in a formalized way for more than 30 years. And some of the “grand-daddy” trauma centers in the US date back decades beyond that. One of the goals of all trauma centers has been to “put themselves out of business” by enlightening the public about injury through prevention programs.

Sadly, it hasn't worked as well as we would like. **Year after year, injury *actually is* the most common cause of death in the US from age 1 to 44.** Sure, you hear that statistic thrown around all the time. But look at the figure at the top of page 2, and you can see it for yourself. And for all age groups combined, it sits at #4, after heart disease, cancer, and COPD.

This issue will look at what is required of trauma professionals as it pertains to trauma, and what specific problems they are trying to address. It will also examine the state of research on those programs, and what can be done to improve them. Let's dig in!

Prevention And The American College of Surgeons

Since the earliest editions of the “Resources for the Optimal Care of the Injured Patient,” the American College of Surgeons (ACS) has mandated that trauma

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TRAUMA CALENDAR OF EVENTS

EASTERN ASSOCIATION FOR THE SURGERY OF TRAUMA
LOCATION: DIPLOMAT BEACH RESORT, HOLLYWOOD, FL
JANUARY 10-14, 2017

ENDOVASCULAR AND HYBRID TRAUMA AND BLEEDING MANAGEMENT SYMPOSIUM (REBOA WORKSHOP IS FULL!)
LOCATION: OREBRO, SWEDEN
FEBRUARY 2-4, 2017

centers of all levels engage in prevention activities. As with previous editions, the new “Orange Book” devotes an entire chapter to prevention. Unfortunately, this chapter is only five pages long, and one of them is the bibliography! Obviously, a lot is not being said there. And if not executed properly, **there are four possible deficiencies that your prevention program can be flagged with.**

The Orange Book requires that trauma centers of any level have an organized and effective approach to injury prevention. This is not new, but the ACS has now emphasized that these efforts **must be prioritized based on your trauma registry and epidemiologic data.**

In general, any time the word **must** is used in the Orange Book, a deficiency **will be levied** if that specific item is not met. And this certainly holds true if you review the deficiency list for prevention activities. Both items in the previous paragraph are included in deficiency 18-1. It is worded vaguely enough that if your prevention appears to be haphazard or the activities randomly chosen, it can and will fail.

All levels of trauma center **must** also have someone “in a leadership position” whose job description includes injury prevention (deficiency 18-2). In many Level II-IV centers, this becomes one of the duties of the trauma program manager (TPM). It can also be a part of the responsibilities for an overall hospital pre-

10 Leading Causes of Death by Age Group, United States - 2013

Rank	Age Groups										Total
	<1	1-4	5-9	10-14	15-24	25-34	35-44	45-54	55-64	65+	
1	Congenital Anomalies 4,758	Unintentional Injury 1,316	Unintentional Injury 746	Unintentional Injury 775	Unintentional Injury 11,619	Unintentional Injury 16,209	Unintentional Injury 15,354	Malignant Neoplasms 46,185	Malignant Neoplasms 113,324	Heart Disease 488,156	Heart Disease 611,105
2	Short Gestation 4,202	Congenital Anomalies 476	Malignant Neoplasms 447	Malignant Neoplasms 448	Suicide 4,878	Suicide 6,348	Malignant Neoplasms 11,349	Heart Disease 35,167	Heart Disease 72,568	Malignant Neoplasms 407,558	Malignant Neoplasms 584,881
3	Maternal Pregnancy Comp. 1,595	Homicide 337	Congenital Anomalies 179	Suicide 386	Homicide 4,329	Homicide 4,236	Heart Disease 10,341	Unintentional Injury 20,357	Unintentional Injury 17,057	Chronic Low. Respiratory Disease 127,194	Chronic Low. Respiratory Disease 149,205
4	SIDS 1,563	Malignant Neoplasms 328	Homicide 125	Congenital Anomalies 161	Malignant Neoplasms 1,496	Malignant Neoplasms 3,673	Suicide 6,551	Liver Disease 8,785	Chronic Low. Respiratory Disease 15,942	Cerebro-vascular 109,602	Unintentional Injury 130,557
5	Unintentional Injury 1,156	Heart Disease 169	Chronic Low. Respiratory Disease 75	Homicide 152	Heart Disease 941	Heart Disease 3,258	Homicide 2,581	Suicide 8,621	Diabetes Mellitus 13,061	Alzheimer's Disease 83,786	Cerebro-vascular 128,978
6	Placenta Cord. Membranes 953	Influenza & Pneumonia 102	Heart Disease 73	Heart Disease 100	Congenital Anomalies 362	Diabetes Mellitus 684	Liver Disease 2,491	Diabetes Mellitus 5,899	Liver Disease 11,951	Diabetes Mellitus 53,751	Alzheimer's Disease 84,767
7	Bacterial Sepsis 578	Chronic Low. Respiratory Disease 64	Influenza & Pneumonia 67	Chronic Low Respiratory Disease 80	Influenza & Pneumonia 197	Liver Disease 676	Diabetes Mellitus 1,952	Cerebro-vascular 5,425	Cerebro-vascular 11,364	Influenza & Pneumonia 48,031	Diabetes Mellitus 75,578
8	Respiratory Distress 522	Septicemia 53	Cerebro-vascular 41	Influenza & Pneumonia 61	Diabetes Mellitus 193	HIV 631	Cerebro-vascular 1,687	Chronic Low. Respiratory Disease 4,619	Suicide 7,135	Unintentional Injury 45,942	Influenza & Pneumonia 56,979
9	Circulatory System Disease 458	Benign Neoplasms 47	Septicemia 35	Cerebro-Vascular 48	Complicated Pregnancy 178	Cerebro-vascular 508	HIV 1,246	Septicemia 2,445	Septicemia 5,345	Nephritis 39,080	Nephritis 47,112
10	Neonatal Hemorrhage 389	Perinatal Period 45	Benign Neoplasms 34	Benign Neoplasms 31	Chronic Low. Respiratory Disease 155	Influenza & Pneumonia 449	Influenza & Pneumonia 881	HIV 2,378	Nephritis 4,947	Septicemia 28,815	Suicide 41,149

vention position, but a significant portion of their time should be devoted to trauma and injury prevention.

Level I centers are treated differently, and **must** have a separate prevention coordinator that is **not the TPM**. This person **must** also have a job description and specific salary support (deficiency 18-3). For programs that are both adult and pediatric centers, one prevention coordinator can service both programs.

The biggest change in the Orange Book is that it now **requires** Level I and II centers to have **at least two programs that address one of the major causes of injury in the community** (deficiency 18-5). This requirement is somewhat flexible; you can have two programs that both address one issue, or they can each address two separate issues. But you must be able to show that they will have a local impact. This may preclude some centers from just “buying in” to a national prevention program. The exception to this rule is to offer the Stop The Bleed program, introduced by the Hartford Consensus. More information can be obtained at BleedingControl.org. This meets one half the requirement of deficiency 18-5.

Finally, the ACS wants Level I and II trauma centers

to partner with community organizations to address local issues. Failure to do so results in deficiency 18-6.

The “Most Common” Causes Of Trauma Deaths In The US

Prevention program planning demands that we understand the incidence of both injuries *and* mortality so we can develop appropriate programs. Overall, the US has good statistics on this, courtesy of the CDC. Just look at the national mortality data above. The colored blocks are considered “trauma” and are a potential focus for prevention. Unfortunately, suicide (green) is a very significant cause of death, but I have only seen one trauma center address this with a prevention program.

The figure on the next page is very important because it breaks down the blue unintentional injury blocks in the figure above. **This allows us to identify the top contenders for prevention activities.** Of course, they vary by age, so pediatric and adult centers should focus on problems appropriate to their typical age range.

Motor vehicle injury and drowning are the top causes of unintentional injury deaths for ages 1-14. This includes pedestrian safety, car seats, and seat belt use.

10 Leading Causes of Injury Deaths by Age Group Highlighting Unintentional Injury Deaths, United States – 2014

Rank	Age Groups										Total
	<1	1-4	5-9	10-14	15-24	25-34	35-44	45-54	55-64	65+	
1	Unintentional Suffocation 991	Unintentional Drowning 388	Unintentional MV Traffic 345	Unintentional MV Traffic 384	Unintentional MV Traffic 6,531	Unintentional Poisoning 9,334	Unintentional Poisoning 9,116	Unintentional Poisoning 11,009	Unintentional Poisoning 7,013	Unintentional Fall 27,044	Unintentional Poisoning 42,032
2	Homicide Unspecified 119	Unintentional MV Traffic 293	Unintentional Drowning 125	Suicide Suffocation 225	Homicide Firearm 3,587	Unintentional MV Traffic 5,856	Unintentional MV Traffic 4,308	Unintentional MV Traffic 5,024	Unintentional MV Traffic 4,554	Unintentional MV Traffic 6,373	Unintentional MV Traffic 33,736
3	Homicide Other Spec., Classifiable 83	Homicide Unspecified 149	Unintentional Fire/Burn 68	Suicide Firearm 174	Unintentional Poisoning 3,492	Homicide Firearm 3,260	Suicide Firearm 2,830	Suicide Firearm 3,953	Suicide Firearm 3,910	Suicide Firearm 5,367	Unintentional Fall 31,959
4	Unintentional MV Traffic 61	Unintentional Suffocation 120	Homicide Firearm 58	Homicide Firearm 115	Suicide Firearm 2,270	Suicide Firearm 2,829	Suicide Suffocation 2,057	Suicide Suffocation 2,321	Unintentional Fall 2,558	Unintentional Unspecified 4,590	Suicide Firearm 21,334
5	Undetermined Suffocation 40	Unintentional Fire/Burn 117	Unintentional Other Land Transport 36	Unintentional Drowning 105	Suicide Suffocation 2,010	Suicide Suffocation 2,402	Homicide Firearm 1,835	Suicide Poisoning 1,795	Suicide Poisoning 1,529	Unintentional Suffocation 3,692	Suicide Suffocation 11,407
6	Unintentional Drowning 29	Unintentional Pedestrian, Other 107	Unintentional Suffocation 34	Unintentional Fire/Burn 49	Unintentional Drowning 507	Suicide Poisoning 800	Suicide Poisoning 1,274	Unintentional Fall 1,340	Suicide Suffocation 1,509	Unintentional Poisoning 1,993	Homicide Firearm 10,945
7	Homicide Suffocation 26	Homicide Other Spec., Classifiable 73	Unintentional Natural/Environment 22	Unintentional Other Land Transport 49	Suicide Poisoning 363	Undetermined Poisoning 575	Undetermined Poisoning 637	Homicide Firearm 1,132	Unintentional Suffocation 698	Adverse Effects 1,554	Suicide Poisoning 6,808
8	Unintentional Natural/Environment 17	Homicide Firearm 47	Unintentional Pedestrian, Other 18	Unintentional Suffocation 33	Homicide Cut/Pierce 314	Homicide Cut/Pierce 430	Unintentional Fall 504	Undetermined Poisoning 820	Undetermined Poisoning 539	Unintentional Fire/Burn 1,151	Unintentional Suffocation 6,580
9	Undetermined Unspecified 16	Unintentional Struck by or Against 38	Unintentional Struck by or Against 16	Unintentional Poisoning 22	Undetermined Poisoning 229	Unintentional Drowning 399	Unintentional Drowning 363	Unintentional Suffocation 452	Homicide Firearm 538	Suicide Poisoning 1,028	Unintentional Unspecified 5,848
10	Unintentional Fire/Burn 15	Unintentional Natural/Environment 35	Unintentional Firearm (Iied) 14	Homicide Cut/Pierce 19	Unintentional Other Land Transport 177	Unintentional Fall 285	Homicide Cut/Pierce 313	Unintentional Drowning 442	Unintentional Unspecified 530	Suicide Suffocation 880	Unintentional Drowning 3,406

Drowning, however, is a surprise. Unfortunately, very few trauma centers offer swimming safety prevention activities. Firearm deaths begin to creep in at age 5, and continue through old age.

At age 15, motor vehicle trauma continues its run as the top trauma mechanism leading to death. But by this age, other factors also begin to creep in. These include drug and alcohol use, distracted driving, and failure to use restraints.

However, these mortality statistics only paint part of the picture. For every person who dies from trauma, many more survive their injuries. And this is why it is so critically important that each trauma center review how people in their catchment area are injured. Regular reports from the trauma registry can identify the most common causes of injury. And with a little more analysis, age and geographic information may surface that suggest potential prevention programs.

Common Trauma Center Prevention Activities

I've compiled a list of the most common prevention

activities based on a personal, informal survey. Many of these reflect the requirements of the previous Resource Document (Green Book), but I think they paint a good picture of current activities. They are arranged in decreasing order of frequency, and most are home-grown. The highlighted ones are extremely common, and are present 3 to 4 times more often than the others.

- **Fall prevention**
- **Driver safety**
- **Car seat clinics**
- Drinking & driving activities
- Distracted driving programs
- Helmet safety
- Bike safety
- Injury prevention fairs
- Swimming safety
- Concussion prevention
- Substance abuse programs

The most common national programs provided were:

- Safe Kids Coalition activities
- Think First
- Matter of Balance
- Step On
- Every 15 Minutes

In general, trauma centers are paying attention to the most common **killers**. But what about injuries that don't quite kill? National information is not as good. That's why the ACS is looking to trauma centers to identify injury patterns that are specific to the communities they serve.

Do Prevention Programs Work?

This is the real question. All trauma centers are required to provide prevention activities. But there is no requirement to prove the effectiveness of those programs. And, as usual, the quality of published research varies significantly. For example, one paper concluded that hands-on car seat educational intervention for parents made a significant difference in the proper use of the car seat. But if you read the details (always recommended!), you see that **overall proper seat installation was only 22%**! Broken down, parents who received training did it right 32% of the time compared to the untrained at 11%. I don't consider this a successful program at all.

As usual, the published literature is fragmented, and littered with small, poorly designed and underpowered studies. We do know a few things, though. Falls programs that address multiple factors are better than those that address only one or two. Vitamin D doesn't prevent falls. Exercise programs do.

Bottom line: Hit the literature before you embark on a brand new prevention program. Look for practice guidelines (EAST, Cochrane Collaboration). See if anyone has already figured out what works, and copy them. If no one has, consider including a research component in your program. If it works, you want to let everyone know about it!

Tips For Trauma Center-Based Prevention Programs

In my experience, the majority of injury prevention coordinators (IPC) at trauma centers around the country are very dedicated and hard working. However, they frequently don't have much prior experience with prevention activities, and are only rarely provided with education and resources to help them excel. Most of the time, they are flying by the seat of their pants, with insufficient

support from the hospital. But they really love what they are doing!

To help out, I've assembled a list of tips to help create meaningful prevention activities for your center:

- **Get some education!** There are very few courses for IPCs out there. The best known is produced by the American Trauma Society (amtrauma.org) and costs about \$500. This two-day course is very instructive, and I recommend it.
- **Pick your problems.** Use your trauma registry to identify local issues to work on. Remember, you must have two programs that address one or two issues that are significant to your center. Located near several nursing homes and/or skilled nursing facilities? Elderly falls is probably a good bet. In the inner city? Youth violence programs may be helpful.
- **Look at what others have done.** Don't reinvent the wheel! See what programs already exist, and what has already been published that is known to be effective. Reach out to centers that have similar demographics and geography to see what they are doing.
- **Engage.** Make sure your hospital and trauma program leadership are behind the program. It is likely that some community members, governmental agencies, and businesses will want to be involved. Secure their time and financial commitment. **Your trauma medical director is the perfect person to push for this.**
- **Show me the money!** It's difficult to run a good prevention program on a shoestring budget. Your hospital, charitable foundation, and/or local resources must contribute to your success.
- **Make it a research project.** If your program is novel, it's essential that you prove its effectiveness. Otherwise, why throw time and money at it? It's great feedback for your sponsors, good PR for your community, and helps satisfy your Level I research requirements.



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