Trauma MedEd

Trauma Undertriage

Trauma centers look at over- and undertriage rates as part of their performance improvement programs. Both are undesirable for a number of reasons. I'll focus on undertriage first, why it happens and what can be done about it.

Undertriage in trauma care refers to the situation where a patient who meets criteria for trauma activation does not get one. **First, calculate your "magic number",** the number of patients who should have been trauma activations.

If you track the exact triage criteria met at your hospital, it is calculated as follows:

Magic Number = (Number of ED trauma patients who met activation criteria but were not trauma activations)

If you don't track the triage criteria, you can use ISS>15 as a surrogate to identify those patients who had severe enough injuries that should have triggered an activation. This is not as accurate, because you can't know the ISS when the patient comes in, but it will do in a pinch. In that case, the magic number is:

Magic Number = (Number of ED trauma patients with ISS>15 but were not trauma activations)

INSIDE THIS ISSUE

TRAUMA CALENDAR OF EVENTS

EASTERN ASSOCIATION FOR THE SURGERY OF TRAUMA
LOCATION: WALDORF ASTORIA NAPLES, NAPLES, FL
DATE: JANUARY 14-18, 2014

TRAUMA, CRITICAL CARE & ACUTE CARE SURGERY
LOCATION: CAESAR'S PALACE, LAS VEGAS, NV
DATE: MARCH 31-APRIL 2, 2014

Your undertriage rate is then calculated as follows:

$$\frac{\text{Magic Number}}{\text{(Total number of trauma activations)} + \text{Magic Number}} \times 100$$

Undertriage is bad because patients who have serious injuries are not met by the full trauma team, and would benefit from the extra manpower and speed possible with an activation.

The most common causes for undertriage are:

- Failure to apply activation criteria
- Criteria are too numerous or confusing
- Injuries or mechanism information is missed or underappreciated

Undertriage rates can range from 0% to infinity (a mathematical fluke if you never activate your trauma team). A general rule is to try to keep it below 5%.

If your overtriage rate is climbing past the 5% threshold, identify every patient who meets the ISS criterion and do a complete ED flow review as concurrently as possible. Look at their injuries/mechanism and your criteria. If the criteria are not on your activation list, consider adding them. If the criterion is there, then look at the process by which the activation gets called. Typically the ED physicians and nurses will be able to clarify the problem and help you get it solved.

Why Is Trauma <u>Undertriage</u> Bad?

Although undertriage seems bad from a theoretical standpoint, are there any objective negative consequences?

As you might imagine, there is little literature on this topic. The incidence is low, so it's tough to design a study with enough power to come to any solid conclusions. There are two studies that I can cite that shed as much light on the subject as possible.

The first looks at system undertriage at the EMS level. A Canadian study looked at patients with severe injuries (identified by ISS>15 after admission) who were taken to trauma centers (correct triage) vs non-trauma centers (undertriage). After solid statistical analysis of over 11,000 patients, they found that mortality in the undertriage group was 24% higher than the correctly triaged patients.

A second study looked at undertriage in one trauma center (1,424 patients) using their standard triage criteria, not ISS. The undertriage group had a significantly lower ISS (17 vs 25). The correctly triaged patients were more frequently intubated in the ED, more likely to be admitted to the ICU, and had longer ICU and hospital stays. Mortality was not significantly different. The problem with this study is that most of the undertriage group probably did not need a trauma activation, based on their lower ISS. The higher ISS patients (who met triage criteria) needed an airway earlier and required critical care more often. These data show that the institution probably needs to adjust its triage criteria!

Bottom line: The Canadian study shows the danger of undertriage prior to reaching definitive care. There is no good literature that illustrates its danger once the patient is at a trauma center. But there is support for the converse idea that appropriately triaged patients get definitive management sooner (airway, critical care). Any takers for designing the study to answer this question?

References:

1. *Survival of the fittest: the hidden cost of undertriage of major trauma. J Amer Col Surgeons, 211:804-811, Dec 2010.*
2. *Outcome assessment of blunt trauma patients who are undertriaged. Surgery 148(2): 239-245, Aug 2010.*

Why Is Trauma <u>Overtriage</u> Bad?

So we've determined that undertriage is very bad. Patients who are seriously injured are not evaluated by the full team that they need. What about the opposite problem, overtriage?

First, how do you calculate your overtriage rate? It's pretty simple. Use your trauma registry to count how many patients arriving in the ED were trauma activations but didn't meet any criteria:

$$\frac{\text{(Number of ED trauma patients who were trauma activations but did not meet activation criteria)}}{\text{(Total number of trauma activations)}} \times 100$$

This can only be accurately determined if the activation criteria are recorded on each patient. If not, use the following equation:

$$\frac{\text{(Number of ED trauma patients who were trauma Activations with ISS} \leq 15)}{\text{(Total number of trauma activations)}} \times 100$$

Values can range from 0% to 100%. The usually acceptable overtriage rate is 50-80%. **What happens when the overtriage rate is too high?** You wear out your trauma team. They are being called for patients with injuries that don't warrant it.

The solution for overtriage? Change your activation criteria, or add a second level trauma response that doesn't require as many people to respond. This requires a thoughtful analysis of your existing criteria so you can decide which criteria need to be changed or discarded.

The danger? More undertriage. Over- and undertriage go hand in hand. As overtriage decreases, undertriage increases. You need to strike a balance so that the undertriage rate stays below 5%. This makes an excellent performance improvement (PI) program project!

Trauma PI – Chasing Rumors

Trauma performance improvement (PI) is part art and part science. I tend to segregate the process into 3 segments: inputs, processing, and outputs. There are lots of possible inputs, including violation of specific audit filters (too long to OR, open fracture delay, etc.), referrals from M&M discussions, incident reports and video reviews of trauma resuscitations, to name a few.

There is one PI input that has the potential to be a problem, though: word of mouth. You know, someone tells the trauma program manager that things just didn't go well during that last trauma resuscitation. This is a perfectly legitimate way to identify PI issues. However, "word of mouth" can be categorized by source into "identified" and "anonymous."

Word of mouth sources that are identified are not a problem. Anonymous ones are. All too often, these unsigned notes or suggestion box drops or phone messages are initiated by someone with an axe to grind. Much of the time, there is no basis for the incident that has been reported. The PI program can spend lots of time and energy trying to track down these perceived "problems", and nothing ever comes of it.

There are two major problems with unsourced word of mouth "tips":

- There is no way to get additional information about the event from the source
- It is not possible to thank the source for the information and let them know what was done to correct the issue

Bottom line: Performance improvement "tips" from anonymous sources are usually unfounded and a waste of time to investigate. Let it be known that your PI program is happy to receive written or verbal notices of potential problems that need to be pursued. However, every request must have a name and contact number and/or email included or it will be discarded.

PI Loop Closure

Trauma performance improvement (PI) is a rigorous system that ensures high quality care of trauma patients. First, let's review what loop closure really is. And remember, this process applies to all phases of care from prehospital to post-discharge.

Your trauma PI program basically **identifies problems** of any type, requires someone to **come up with potential solutions**, **applies these solutions**, then **monitors the result**. This process is a cycle, since the first solution may only partially solve the problem. The initial solution may need to be tweaked or totally changed. This loop continues until a reasonable result has been achieved.

Loop closure is really two things: achievement of the best possible **resolution** of the initial problem, and **documentation** of the process. One is not possible without the other. A common trauma PI problem I encounter is documentation of "loop closure" when the original problem is still recurring.

When most people talk about loop closure, they are usually referring to the documentation part. Each PI problem must have a discrete "folder" of documentation that details every step of the process, from recognition to closure. This folder may reside securely on a computer (remember to back up regularly), or it can be a good old-fashioned manila folder.

The documents that are saved vary depending on the specific problem that was addressed. However, typical materials may include meeting minutes, registry reports, personnel letters, email messages, and protocols. I will give specific examples of the documents that should be included tomorrow and Wednesday.

All related documents should be included in the folder for that specific issue. All PI issue folders should then be **kept in a single location**, not spread across several binders or locations. **Multiple people** in your trauma program **should be familiar with the PI folder organization**. Otherwise, what happens if your Trauma Program Manager, who has been with you for years and is the only one that really understands how PI is organized, decides to retire or move to another trauma program? Your entire program may be in jeopardy.

Peer-Related Loop Closure

Now let's review the specifics of peer-related performance improvement issues and how loop

closure works with them.

A peer-related issue typically involves a single trauma professional. In most cases, this is a physician, but may be a nurse, PA or other provider as well. These issues are most often related to care delivered to a single patient.

The trauma program can identify a peer-related issue in a number of ways, including (with examples):

- PI filter - delay to laparotomy by a surgeon

- Complication - intestinal anastomosis breakdown

- Resuscitation video review - nonsterile insertion of urinary catheter by a nurse or tech

- Word of mouth - "Geez, it took forever to get blood from the blood bank!"

- and many more!

Once identified, a "paper trail" must be started that documents the specific issue and the details of how it was found. This can be on a paper PI form, or an entry in your PI or trauma registry software package. The key is that you need to be able to track the progress as long as the issue is "open."

Next, a determination is needed as to how the particular issue needs to be resolved. For physician items, that may occur via a group meeting (e.g. M&M conference) or a one on one meeting with an appropriate department leader (e.g. trauma medical director). For nursing items, each hospital typically has its own procedure (e.g. meeting with nurse manager).

Once the specific provider has been "re-educated", final documentation of the process must be prepared. This may include a portion of the M&M meeting minutes or a letter or email message detailing the specifics of the discussion or retraining. All of the documentation collected, from opening of the PI issue to closure, must be preserved in a "folder" associated with this patient (remember, paper or electronic). Furthermore, an entry should be made in the credentialing file for the provider so that these items can be discussed in their annual review.

Here's a specific example: a surgeon admits a patient with a CT-proven Grade IV splenic laceration. Although hemodynamically stable at first, they have frequent

drops in blood pressure in the ICU that respond to crystalloid and several units of blood. After 6 hours of pressures dipping into the 70s and 3 units of blood, the blood pressure finally drops to 50 and won't come back up. The surgeon takes the patient to the OR and performs a splenectomy. The patient recoveries, but remains on the ventilator for 5 days because of the large volume resuscitation that was given.

The delay to laparotomy PI filters are triggered, and the TPM and TMD place the issue on the Trauma M&M conference agenda. After discussion with all the faculty, the determination is that the patient should have gone to the OR after the first pressure drop in the OR. It is believed that the number of ventilator days would have decreased significantly as well. The delay is deemed a preventable complication. The TMD dictates the meeting minutes, detailing the specifics of the discussion, and noting that the involved surgeon was present.

The final folder for the patient will contain documentation of the filter violation, a copy of the minutes from the M&M conference, and a copy of the short memo dictated by the trauma medical director that was placed in the surgeon's trauma credentialing file.

System Issue Loop Closure

Now let's delve into loop closure for system issues.

System issues are those that tend to involve multiple patients. They are **not as easy to identify**, because it may take a while for you to see a problem pattern emerging. And they are definitely **harder to fix** because they require a multi-faceted problem solving approach.

Here's an example: You are presenting a complication (pulmonary embolism) in your trauma morbidity and mortality (M&M) conference. One of your colleagues notes that this is the third such presentation this year, which seems to be higher than previously. And come to think of it, the number of deep venous thrombosis presentations seems to be higher as well.

You ask your trauma registrar to run some reports on these complications, and you find that the incidence of both in your trauma patients has increased 80% over the previous year! Time to put on your thinking cap, review the literature and critically look at your care and

what other centers are doing. You conclude that your trauma patient population hasn't changed, but that your DVT surveillance and prophylaxis are spotty and vary considerably by physician.

Your solution consists of a new protocol or practice guideline that 1) identifies the risk level for each trauma patient, 2) defines what prophylactic measures will be used based on the risk assessment, and 3) determines what kind of screening will be done and how often. This protocol is implemented by your trauma operations committee, with all trauma physicians instructed to use it. It is monitored by your trauma program staff, and regular scorecards are sent to each physician. Regular reports detailing physician compliance and patient complications are made at each M&M or Trauma PI Committee meeting as well.

Six months later, registry data is reviewed again and you find that the incidence of DVT has decreased (but not to baseline because you are screening better and finding more), and the number of pulmonary emboli has dropped nearly to zero. Problem solved? Maybe. Periodic monitoring and continuation of the scorecard system is probably needed to make sure that the protocols are maintained.

What do you need to close the loop? You need a "folder" to save your information as I discussed previously. Since this problem involves many patients, it doesn't fit as well into current registry packages that are oriented to single patient records. Whether your folder is paper or electronic, here are the items that need to be saved:

- Minutes from the first M&M meeting where the discussion reflects the recognition of the problem

- The registry reports that show the increasing incidence of the problem

- The new protocol and scorecard that were developed, along with any tracking tools

- The operations committee minutes showing approval of the protocol

- Completed scorecards for the physicians

- M&M minutes for meetings at which DVT/PE reports were given

- Registry reports that show the decreased incidence of DVT/PE. You can consider the item closed at this point.

- Any followup registry reports for monitoring done on a regular basis can be added to the folder later

As you can see, this is much more complicated than a peer issue. However, system issues show the value and strength of your trauma PI program. Trauma reviewers focus on how well you identify and address system problems because it is an indication of the maturity and power of your trauma program.