CE 2.0 ANCC Contact Hours

Plotting Performance Improvement Progress Through the Development of a Trauma Dashboard

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ABSTRACT

Performance improvement processes are the core of a pediatric trauma program. The ability to identify, resolve, and trend specific indicators related to patient care and to show effective loop closure can be especially challenging. Using the hospital's overall quality process as a template, the trauma program built its own electronic dashboard. Our maturing trauma PI program now guides the overall trauma care. All departments own at least one performance indicator and must provide action plans for improvement. Utilization of an electronic dashboard for trauma performance improvement has provided a highly visible scorecard, which highlights successes and tracks areas needing improvement.

Key Words

Performance improvement, Trauma, Trauma outcomes, Trauma systems

Continuous performance improvement (PI) is a vital component of trauma care. All trauma centers that are verified by the American College of Surgeons (ACS) are mandated to have a multidisciplinary trauma PI program that continuously evaluates its processes and outcomes to ensure optimal and timely care.[1] The ACS Committee on Trauma in 1976 developed key elements of quality care, which included measures of structure, process, and outcome.[2] The last few revisions to the "Resources for Optimal Care of the Seriously Injured Patient" focused more on the multidisciplinary process developed at each institution that reviews care delivery and outcomes. Measuring and reporting quality of care is now recognized as a critical step to improving patient care. Limited research exists on exactly how trauma centers measure outcomes.[3] A 2012 study by Santana and Stelfox[4] surveyed trauma centers in 4 different countries and described the various quality indicators that trauma centers use for quality measurement and PI. Quality indicators are intended to compare actual trauma care against ideal criteria and to identify patients in who care was not optimal necessitating further review. They found that most trauma centers use indicators designed to examine safety, effectiveness, efficiency, and timeliness of prehospital and hospital processes and outcomes of care. There were a few indicators that were broadly utilized by the majority of centers. They concluded that opportunities exist to standardize existing quality indicators to allow for broader implementation.[4]

As traumatic injury is still a major pediatric health concern, it is imperative that pediatric trauma centers develop and implement best treatments and strategies. Variations in the treatment and outcomes of common injuries suggest that there is no broadly accepted body of evidence for best practices for the care of pediatric patients with traumatic injuries.[5] It is hoped that with ongoing research in this area, patient-centered pediatric-specific quality indicators are developed and adopted. Tracking PI progress is also varied, dependent on individual trauma centers.

PURPOSE

The PI process has been an essential component of the ACS verification process for trauma centers since its inception. Although the ACS requires each verified trauma center to have a multidisciplinary committee that examines trauma-related care operations, each trauma center can develop their own template to track performance through changeable quality indicators. The ability to identify, resolve, and trend specific indicators related to patient care and to show effective loop closure can be especially challenging. There is no universal template to follow, especially for pediatric trauma centers. An electronic dashboard can enhance tracking and compliance with specific process and outcome measures.[6] This article describes one pediatric trauma center's development of their PI program, utilizing a uniquely created electronic trauma dashboard.

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PROCESS IMPLEMENTATION

As this unique pediatric trauma center journeyed from level IV to level I status over the past 10 years, our PI processes matured. The ability to identify and then categorize problems so that they could be easily trended and acted on was a challenge. As a very young trauma center, our PI program focused on trauma registry statistics and minimal process indicators, as shown in Table 1. Such data points as types of activations, delays, response teams, documentation, and specific trauma indicators were trended and compared to the previous year. (Table 1) Most of these indicators were defined by the ACS or other trauma center national forums. These indicators were tracked manually, primarily by the trauma program staff. Specific departments were asked to work to improve results relating to them. Results were reported quarterly to the trauma operations committee.

As our program matured, the trauma program staff worked with all hospital departments that care for trauma patients. Together, we developed both process and outcome indicators that were identified as areas of concern, such as documentation related to time on a backboard or completion of history and physical by the trauma attending within 24 hours. We devised ways to measure

TABLE 1 2005 Process Indicators

	1Q05	2Q05	3Q05	4Q05	YTD
	45 patients	105 patients	141 patients	106 patients	397 patients
Process—trauma	0 patients	1 patient	1 patient	1 patient	3 patients
Delay >10 min calling Stat	0/0	0/0	0	N/A	0
Delay >10 min calling Code (Begins August 1, 2005)	NA	NA	0	0	0
Delay >10 min calling Alert (Begins August 1, 2005)	NA	NA	0	0	0
Delay in trauma attending response	0/0	0/0	0	0	0
>30 min from patient arrival	NA	NA			
Delay in neurosurgeon response	0/0	0/0	0	0	0
> 30 min from call	NA	NA			
Process—other					
Delay in CT >2 hr	11/1	31/0	NA	NA	42/1
	9%	0%			2%
Delay in CT >1 hr (Begins July 1, 2005)	NA	NA	40/0	15/0	55/0
			0%	0%	0%
Delay with transfer process	21/1	65/2	74/2	57/1	217/6
> 6 hr from outside hospital	4%	3%	2%	1%	2%
Prehospital					
Reports/received	3/0	10/2	9/1	7/2	29/5
	0%	20%	11%	28%	17%
Intubations	0/0	0/0	0/0	0/0	0/0
	NA	NA	NA	NA	NA
Patient care					
Temp documented	45/41	105/93	141/133	106/95	397/362
	91%	88%	94%	89%	91%
Weight documented	45/40	105/95	141/133	106/89	397/357
	88%	90%	94%	83%	89%

(*continues*)

TABLE 1 2005 Process Indicators (*Continued*)

	1Q05	2Q05	3Q05	4Q05	YTD
	45 patients	105 patients	141 patients	106 patients	397 patients
GCS documented	45/45	105/102	141/140	106/105	397/392
	100%	97%	99%	99%	98%
Hourly vital signs (Will change to below August 1, 2005)	45/19	105/60	43/17	NA	193/96
	42%	57%	39%		49%
Hourly vital signs on Codes/Alerts (Blood pressure, pulse, respirations)	NA	NA	1/1	1/1	2/2
			100%	100%	100%
JCAHO filter questions					
Unplanned return to OR	28/0	71/2	89/1	59/4	247/7
	0%	2%	1%	6%	2%
Unplanned return to ED<72 hr	45/0	105/1	141/2	106/3	397/6
	0%	<1%	1%	2%	1%
Unplanned re-intubations <48 hr	0/0	0/0	0/0	0/0	0/0
	NA	NA	NA	NA	NA
Admitted to nonsurgical service	45/2	103/6	125/11	97/4	370/23
	4%	5%	8%	4%	6%
Delay >8 hr for debridement of open tibial fracture	0/0	0/0	0/0	0/0	0/0
	NA	NA	NA	NA	NA

Abbreviations: BP, blood pressure; CT, computed tomography; ED, emergency department; GCS, Glasgow Coma Scale; JCAHO, Joint Commission on Accreditation of Healthcare Organizations; NA, not available; OR, operating room.

and track improvement. Using the hospital's overall quality process tool as a template, the trauma program built its own electronic dashboard, which is an Excel spreadsheet that allows tracking of specific trauma indicators related to both departmental and interdepartmental care factors. Each department tracks their individual data and provides that data to the trauma program staff on a monthly basis. Information is then manually entered into the dashboard by the trauma analyst and trauma program manager. Thresholds are defined and progress is tracked monthly to be shared quarterly with the trauma operations committee. As thresholds are met and sustained, those indicators are dropped for the next year. Red, yellow, and green colors highlighted areas of either concern or accomplishment (Table 2).

Loop Closure and Action Plans

Performance improvement not only includes monitoring of department-specific indicators but also involves improving the overall performance of a trauma program. Indicators, which do not meet benchmarks, are identified as needing corrective action. If a specific department indicator is deemed "in the red," that department is asked to devise an action plan, in conjunction with the trauma program, to positively impact that performance indicator (Table 3). As shown in Table 2, the blood bank did not meet their goal for receiving type and screen samples for 3 quarters; their action plan is shown in Table 3. Action plans are documented in the dashboard and discussed quarterly at the multidisciplinary trauma committee. These action plans are designed on the basis of the plan, do, check, and act methodology.[7] Constant reevaluation of the action plan is completed to ensure that progress is being made. Figure 1 shows the updated process map for the newly revised blood bank policy.

Effective PI programs demonstrate that identified opportunities for improvement lead to specific interventions.[3] Dashboard results continue to be trended and reported to the trauma multidisciplinary

TABLE 2 Sample of 2013 Trauma Dashboard (Not All Indicators Included)

Indicators	Actionable Threshold	Goal	Supporting Priority/Strategy/ Rationale	1Q13	2Q13	3Q13	4Q13	YTD
Total patients								
Prehospital								
Activations: mode of arrival—EMS	NA—volume stats	NA—volume stats	ACS	19/32	32/57	49/69		118/183
Codes and Alerts				59%	56%	71%		64%
Activations: mode of arrival—transport team	NA—volume stats	NA—volume stats	ACS	7/32	16/57	12/69		41/183
Codes and Alerts				22%	28%	17%		22%
Activations: mode of arrival—private auto	NA—volume stats	NA—volume stats	ACS	6/32	9/57	8/69		24/183
Codes and Alerts				19%	16%	12%		13%
Trauma Code with no prehospital notification	≥10%	0%	Internal	0/6	0/12	0/10		0/35
Includes all Codes				0%	0%	0%		0%
Prehospital reports: Codes and Alerts	≤80%	≥90%	ACS	17/19	29/32	49/49		113/118
Received RPTs via EMS				89%	91%	100%	%	96%
Trauma team response								
Delay in trauma attending arrival for Codes	≥10%	0%	DVC02	0/6	0/12	0/10		0/35
>15 min from patient arrival per flow sheet				0%	0%	0%	%	0%
Delay in trauma attending arrival for Alerts	≥10%	0%	DVC02	0/26	0/45	0/59		0/148
> 30 min from patient arrival per flow sheet				0%	0%	0%	%	0%
History and physical completed	95%	100%	DVC02	41/67	92/120	107/125		304/388
Signed by noon following day of patient admission				61%	77%	86%	%	78%
Emergency department								
Vascular access problems	≥10%	0%	Internal	0/6	1/3	2/4		5/19
Vascular access >5 min for Codes from time placed in room				0%	33%	50%	%	26%
Immobilization on backboard Codes and Alerts in ED	≤80%	85%	Internal	17/24	29/33	41/49		108/146
Documented time of arrival to removal should be <30 min				71%	88%	84%	%	74%

(*continues*)

TABLE 2 Sample of 2013 Trauma Dashboard (Not All Indicators Included) (*Continued*)

Indicators	Actionable Threshold	Goal	Supporting Priority/Strategy/ Rationale	1Q13	2Q13	3Q13	4Q13	YTD
Vital signs on Codes	≤90%	100%	ACS	5/6	12/12	9/10		31/35
Initial BP/P/R within 5 min				83%	100%	90%	%	89%
Over triage rate	≥55%	≤50%	Cribari					
Based on the Cribari method				33%	33%	67%		36%
Under triage rate	≥10%	≤5%	Cribari					
Based on the Cribari method				9%	7%	8%		5%
PICU								
Ventilator-associated pneumonia (VAP)	10%	0%		1/13	0/23	0/19		1/66
No. of VAP/trauma patients in PICU				8%	0%	0%	%	2%
Catheter-associated urinary tract infections (CAUTI)	10%	0%		0/13	0/23	0/19		0/66
No. of CAUTI/trauma patients in PICU				0%	0%	0%	%	0%
Blood Bank								
Signed emergency release forms	95%	100%		5/6	12/12	6/10		30/35
No. of forms signed/ no. of trauma Codes				83%	100%	70%	%	86%
Type and screen completed	95%	100%		4/6	8/12	5/10		24/35
No. of type and screen received/no. of trauma Codes				67%	67%	50%	%	69%
Operating room								
Operating room availability	100%	100%	ACS	0/1	0/0	0/0		0/3
Delay in OR access/ level A cases (>30 min from posting to OR)				100%	100%	100%	%	100%

Abbreviations: ACS, American College of Surgeons; CAUTI, catheter-associated urinary tract infections; DVCO2, Delaware Valley Strategic Plan; EMS, emergency medical services; P, pulse; PICU, pediatric intensive care unit; R, respirations; RPT, prehospital reports; VAP, ventilator-associated pneumonia.

committee. Annually, the trauma multidisciplinary committee evaluates the indicators, which are being monitored to determine the need to continue to evaluate. If an indicator continues to meet benchmarks, it may need periodic spot checks and not constant evaluation. The visual display of the trauma dashboard serves as a reminder, while also tracking progress, of all the hard work that a department is doing to achieve its threshold and improve patient care. In addition to tracking opportunities for improvement,

TABLE 3 Sample Action Plan

Blood Bank Indicator	Score	Action Plan
Type and screen completed	8/12	Evaluating cases in which type and screen was not received to determine reason and ways to alleviate in future.
No. of type and screen received/ no. of trauma Codes	67%	Process map and reliable method developed. Education provided to impacted department through trauma liaisons and trauma multidisciplinary committee. As part of trauma room 5S (Sort, Simplify, Sweep, Standardize, Sustain), type and screen tube bundled with rest of laboratory tubes and labeled. Blood Bank met with laboratory to discuss type and screen samples.

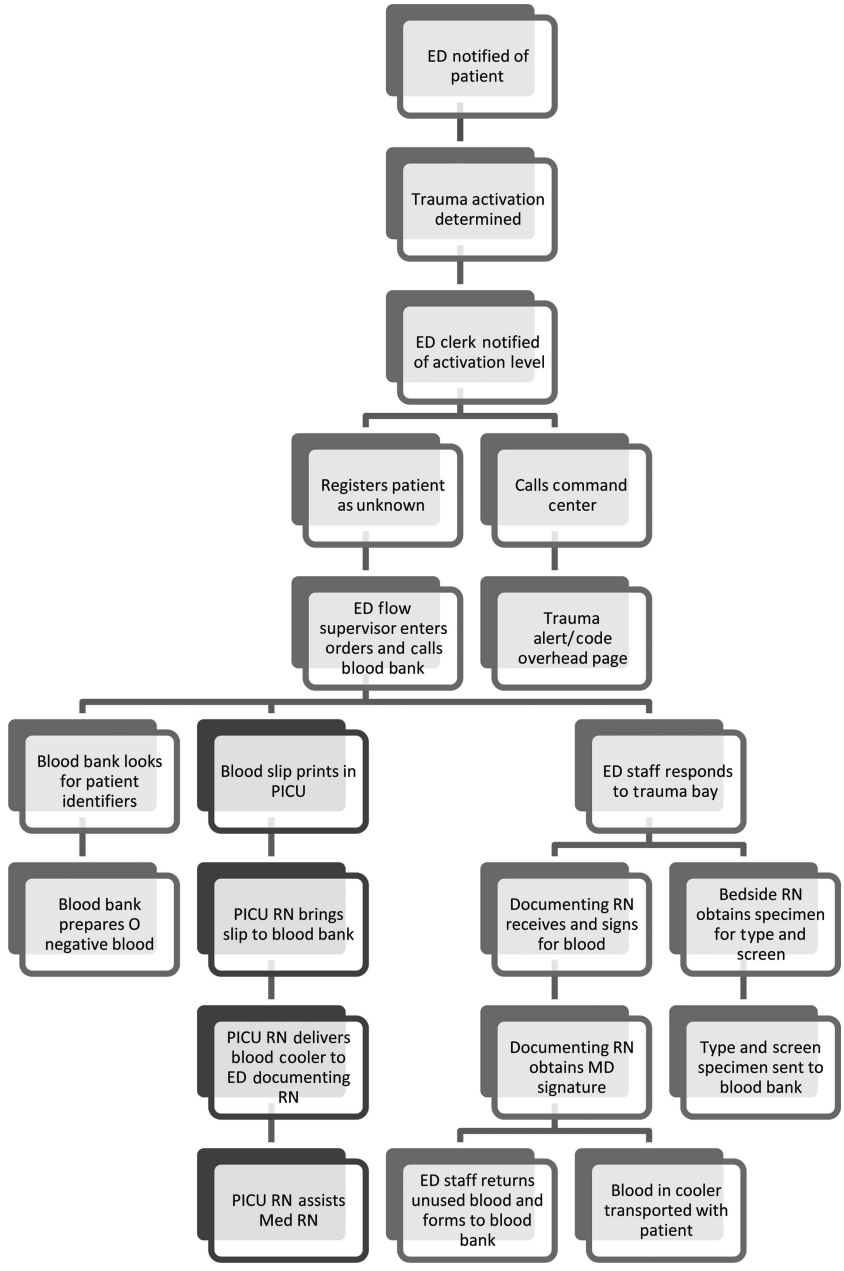

Figure 1. Action plan process map.

positive gains are celebrated among the entire committee and relayed to administration.

CONCLUSION

Our maturing trauma PI program now guides the overall trauma care provided to our pediatric patients. Development and utilization of the electronic dashboard was an essential part of this growth. It provides a highly visible scoreboard, highlighting successes and areas for improvement. All trauma-related departments own at least one performance indicator and must report out on results, while also providing action plans for improvement. Some action plans require multidisciplinary process improvements as a solution. Quarterly progress is color coded, and departments share their successes at our trauma operations committee meetings. Departments now strive to show their indicators "in the green." Even if a department has not met its predetermined threshold for the year, if improvement is noted, then this progress is also celebrated, but that indicator remains for the following year. We are hopeful that we can link meeting thresholds and sustaining that success to overall improved patient care outcomes. In the future, we hope to develop interfaces between our institution's electronic medical record and our electronic dashboard to reduce the amount of manual input. Increased participation from all trauma-related departments demonstrates everyone's commitment to improving trauma patient outcomes.

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