Reverification Site Visit  
Level II Trauma Center

<table>
<thead>
<tr>
<th>Name of Facility</th>
<th>Hillcrest Baptist Memorial Center</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Waco, Texas</td>
</tr>
</tbody>
</table>

| Site Visit ID Number   | 6009                             |

| Chief Executive Officer | Glenn A. Robinson, FACHE         |
| Medical Director       | Christopher Newton, MD FACS      |
| Program Director       | Lori Boyett, RN BSN             |

| Survey Dates           | April 17-18, 2014               |

| ACS Surveyors          | Frank L. Mitchell, III, MD FACS|
|                        | Scott G. Sagraves, MD FACS     |
|                        | John Kendall, MD FACEP         |
|                        | Connie Mattice, RN            |
|                        | Lori McDonald, RN             |
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EXECUTIVE SUMMARY

Hillcrest Baptist Medical Center in Texas was reviewed on April 17-18, 2014 by Drs. Frank Mitchell III, Scott Sagraves, and John Kendall, along with nurse reviewers Connie Mattice and Lori McDonald for reverification as a Level II trauma center. This hospital provides trauma care for adults and children. The findings of the reviewers are as follows.

Deficiencies

1. (5.22) The trauma medical director (TMD) does not ensure and document dissemination of information and findings from the peer review meetings to the noncore surgeons on the trauma call panel. (Type II)

2. (5.10) The criteria for graded activation are not clearly defined by the trauma center and continuously evaluated by the performance improvement and patient safety (PIPS) program. The site reviewers identified a number of trauma patients in which there was a lengthy delay in the identification of injured patients who needed earlier involvement of the trauma surgeon. This resulted from several reasons, including the following.
   a. Missed triage of severely injured patients upon arrival in the emergency department (ED), and subsequently not placing the patient in the trauma area of the department
   b. Variable medical care by some emergency physicians in identification of patients who were unstable and should have been upgraded to a level 1 patient
   c. Delay in identification of trauma patients by the process outlined with the trauma level alert form, which includes the activation levels: level 1, level 2, and trauma mechanisms (Type II)

Strengths

1. Administrative support of the trauma program
2. Leadership of the TMD, Dr. Ted Smith
3. Trauma program manager (TPM), Lori Boyett, RN, and her support staff
4. Dedication and expertise of the trauma surgeons
5. Daily weekday morning rounding, and the excellent communication between the trauma surgeons
6. Physical plant
7. Orthopaedic trauma program
8. Anesthesia support of the trauma program by trauma patient coverage and the pain management program.
Overall operating room (OR) readiness

Radiology availability and expertise

Critical care unit, from the excellent communication among personnel and physicians, to the care provided, and to the overall culture that is evident in the intensive care unit (ICU) (although the ICU is frequently full and may need expansion)

Injury prevention program

New ED director, April Hayes, RN

Concurrent trauma registry

Weaknesses

Variable evaluation and management of patients in the ED results in patients with significant injuries having delays in care. This is partially due to internal undertriage.

There is one full-time neurosurgeon, one who works every other month, and two locum tenens neurosurgeons.

There are a large number of new emergency physicians in the department. This includes recently trained emergency physicians, recently hired physicians, and locum tenens emergency physicians. This appears to be the main reason for the variable levels of trauma care that are being provided by the emergency physicians, which has contributed to delays in care of patients with time-dependent injuries, and resulted in high risk patients being identified late.

There is a high turnover rate of RNs in the ED.

There is no standard process for transporting patients from the ED, resulting in occasional inadequate personnel in attendance of trauma patients when they travel to the CT scanner or other locations. This was evident from the review of the medical records of a number of patients.

The goals of the massive transfusion protocol are not always being met in terms of having overall adequate blood products (FFP, platelets).

There is a lack of guidelines for common trauma situations, such as reversal of coumadin, TBI, and spleen injury management.

The TPM has too many duties, and needs assistance with some of her responsibilities.

There is a lack of operative experience for trauma surgeons.

There is infrequent utilization of ultrasound, secondary to physician preference and aging equipment.

The multidisciplinary peer review committee appears only to be reviewing deaths.

Recommendations

Consider developing an acute care surgery model, in order to increase operative cases for the trauma surgeons, to maintain and improve their operative skills for the complicated operative trauma cases.

The “15 minute rule” for waiting 15 minutes prior to bringing a trauma patient to the OR from the ED apparently worked well when it was started, but to the site reviewers this rule seems to delay the movement of unstable patients to
the OR from the ED. In order to get patients to the OR quicker, this “rule” needs to be changed to notification that a “trauma patient needs to come to the OR now” - which would be for time dependent injuries. The OR must have the readiness to be available for these types of cases.

(3) Because the TPM has too many duties, there must be efforts to offload some of that workload, such as looking at the possibility of obtaining a PI coordinator and/or someone to oversee the injury prevention program.

(4) There must be efforts to improve the prompt diagnosis and management of severely injured trauma patients in the ED. The current efforts of the new nursing director of ED should be of benefit, as she is making good initial changes related to the development of identified charge nurses, triage nurses, and core trauma nurses, along with improvement of the processes. There should also be efforts to reduce the variability of care provided by the emergency physicians, which should be addressed by the trauma PI program.

(5) The process of trauma activations and the “Trauma Level Alert Form” need to be evaluated and revised, as much of this process relies on identification of injuries based on images from the CT scans. There needs to be improvement in the identification of trauma patients based on clinical issues, and the subsequent management by some of the emergency physicians. This will need to be determined by the trauma program and the PI process. Options for the emergency physicians participating in the initial evaluation of trauma patients might include being current in ATLS, and developing an internal educational conference to review the initial evaluation and management of trauma patients on a monthly or every other month basis.

(6) PI committees should be changed to have more frequent multidisciplinary peer review meetings in order to review cases other than just deaths in the current every other month meeting format. This will be necessary in order to further mature the trauma program. This should be of benefit in the further development and monitoring of trauma guidelines. See Section VII-F for additional recommendations related to the PIPS program.

(7) Improve the process of issue identification during the patient’s hospital course, and then evaluate and close the loop if necessary.

(8) Increase the use of ultrasound in the initial evaluation of trauma patients, by improved machines and additional training for the trauma surgeons and emergency physicians.

(9) Continue to mature the trauma program related to patient care and the PIPS program, as this program is critical to the injured patients of this city and region.

_____________________________   _____________________________
Frank Mitchell III, MD, FACS   Scott Sagraves, MD, FACS

____________________________   _____________________________
John Kendall, MD, FACEP    Connie Mattice, RN

_____________________________
Lori McDonald, RN
I. PURPOSE OF REVIEW

Hillcrest Baptist Medical Center (HBMC) in Waco was reviewed on April 17-18, 2014 by Drs. Frank Mitchell III, Scott Sagraves, and John Kendall, along with nurse reviewers Connie Mattice and Lori McDonald for reverification as a Level II trauma center. This hospital provides trauma care for adults and children. The review was requested by HBMC, and by the state as its designating agency. The reporting year for the review was January, 2013 through December, 2013.

The last review was conducted in April, 2012 by Drs. Roxie Albrecht and Steven Johnson for a focus review as a Level II trauma center. The five deficiencies from the April, 2011 Level II trauma center verification site review were determined to be resolved. At the time, the hospital provided trauma care for adults and children.

Programmatic changes that have occurred impacting the trauma program since the last review include a new chief nursing officer (Marcy Weber), four new trauma surgeons, a second trauma clinical nurse, a second registrar, a new medical director of the emergency department (ED), two neurosurgeons providing full-time neurosurgery coverage, and a third orthopaedist. Also, the hospital systems of Scott and White and Baylor Health merged as of November, 2013, creating the largest healthcare system in the state, Baylor Scott and White Healthcare. The hospital is early in the merger process and there have been no other significant changes at this time.

Additionally, the position of nursing director of the ED has turned over five times since the last review. The new nurse director, April Hayes, RN started 5 weeks ago and has made significant changes related to the triage and charge nurse positions, along with a number of other initiatives.

During the prereview meeting, the site surveyors met with the following members of the trauma program.

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ted R. Smith, MD</td>
<td>Trauma Medical Director</td>
</tr>
<tr>
<td>Lori Boyett, RN, BSN</td>
<td>Trauma Program Director</td>
</tr>
<tr>
<td>Thomas J. Goaley, Jr., MD</td>
<td>Surgical Director of Critical Care Unit</td>
</tr>
<tr>
<td>Glenn A. Robinson, FACHE</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td>Joe Monk, MD</td>
<td>Anesthesia Liaison</td>
</tr>
<tr>
<td>David Risinger, MD</td>
<td>Radiology Liaison</td>
</tr>
<tr>
<td>Richard E. Scott, Jr., DO</td>
<td>Physical Rehabilitation Liaison</td>
</tr>
<tr>
<td>Charles J. Wright, MD</td>
<td>Neurosurgical Liaison</td>
</tr>
<tr>
<td>Brent J. Bauer, MD</td>
<td>Orthopaedic Liaison</td>
</tr>
<tr>
<td>Randy Hartman, MD</td>
<td>Emergency Medical Director</td>
</tr>
</tbody>
</table>
During this meeting, the verification program was reviewed, and the prereview questionnaire was discussed in detail. Important issues that were addressed included the merger to Baylor Scott and White Healthcare, the anticipated benefits of the merger in the future, changes in recent years related to the ED, and the expansion of the orthopaedic trauma program.

II. HOSPITAL INFORMATION

HBMC is a community, not-for-profit hospital. It has an affiliation with The University of Texas Southwestern Medical School and Baylor University.

The payer mix for the hospital is as follows.

<table>
<thead>
<tr>
<th>Payer</th>
<th>All Patients (%)</th>
<th>Trauma Patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial</td>
<td>26</td>
<td>16</td>
</tr>
<tr>
<td>Medicare</td>
<td>27</td>
<td>41</td>
</tr>
<tr>
<td>Medicaid</td>
<td>18</td>
<td>8</td>
</tr>
<tr>
<td>HMO/PPO</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Uncompensated</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

The "other" category includes Champus, state VA administration, and worker’s compensation. The medical center receives uncompensated care money as well as disproportionate care funds from the State of Texas.

All of the trauma activities are within one campus. The bed status for the hospital is as follows.

<table>
<thead>
<tr>
<th>Hospital Beds</th>
<th>Adult</th>
<th>Pediatric</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licensed</td>
<td>177</td>
<td>30</td>
<td>207</td>
</tr>
<tr>
<td>Staffed</td>
<td>115</td>
<td>12</td>
<td>127</td>
</tr>
<tr>
<td>Average Census</td>
<td>112</td>
<td>7</td>
<td>119</td>
</tr>
</tbody>
</table>

The health system also has additional beds at its rehabilitation and skilled nursing facility. The average daily census for the combination of the two facilities approaches 178 patients.

The hospital has the commitment of the institutional governing body and the medical staff to maintain its status as a trauma center. There are resolutions supporting the trauma program from both the hospital administration and the medical executive committee. These written resolutions have resulted in generous support for the trauma program. Budgetary, administrative, and medical staff support are evident.

There is involvement by the trauma program staff in state/regional trauma system planning, development, and/or operation.
III. PREHOSPITAL

HBMC is located in the Heart of Texas Regional Advisory Council (HOTRAC) service area that is comprised of one urban county (McLennan) and four rural counties (Bosque, Hill, Falls, and Limestone). Interstate 35, a heavily traveled transportation artery, transects McLennan and Hill counties, and is the source of many multivehicle crashes every year. Also, heavily traveled state highway 6 traverses McLennan, Falls, and Bosque counties, while Limestone’s transportation primarily occurs via farm-to-market roads. There is one Level I facility, two Level II facilities (one adult and one pediatric), one Level III facility, seven Level IV facilities, and two non-trauma facilities within a 50-mile radius of HBMC.

The day-to-day authority over emergency medical services (EMS) is assigned to the region. The air medical support services for the hospital include two rotor-wing services: one based in Hillsboro, Texas and the other with bases in Temple and Killeen, Texas. Both services have multiple bases surrounding the region and can provide assistance when multiple patients are injured. Response times vary from about 10 to 45 minutes, depending on the service requested and the patient location. Both primary services actively participate in the HOTRAC. Patients are flown from the scene (based upon HOTRAC protocols) as well as from hospitals in the region. All of the helicopter services are staffed with a flight nurse and a flight paramedic and provide access to ALS services in regions of the HOTRAC where there are limited ALS providers.

The trauma program team is involved in prehospital training with such offerings as the biannual CE rounds for ETMC, the largest ground EMS provider in the region; HOTRAC case review; and access to the anesthesiology staff in the OR for EMS students to gain airway experience.

The trauma program team participates in prehospital care protocol development and the performance improvement and patient safety (PIPS) program. Examples include prehospital protocol development done at the regional level and the HOTRAC Regional Trauma Plan annual update.

IV. TRAUMA SERVICE
A. TRAUMA MEDICAL DIRECTOR (TMD)

The TMD, Dr. Ted Smith, graduated from University of Texas Health Science Center in 1987, and completed his residency in general surgery at Wilford Hall Medical Center and Rush Presbyterian St. Luke's Medical Center in 1992. He also completed a trauma fellowship. He is board certified in general surgery and surgical critical care. He is a Fellow of the American College of Surgeons (ACS), and is current in ATLS as an instructor. His external trauma continuing medical education (CME) for the last three years is adequate. The TMD is a member of the state Committee on Trauma (COT). During the reporting year, he admitted 141 patients, with 41 having an ISS greater than 15. Twenty of these required operative intervention.

The TMD reports directly to the chief medical officer. He has the authority and administrative support to lead the program; to set the criteria for the trauma center members; to correct deficiencies in trauma care or exclude from trauma call the trauma
team members who do not meet specified criteria; to recommend changes for the trauma panel based on performance review through the trauma PIPS program and hospital policy; and to ensure compliance with verification requirements.

B. TRAUMA SURGEONS

Including Dr. Smith, there are five board-certified/eligible surgeons currently taking trauma call. There are four core trauma surgeons who take at least 60% of the total trauma call hours each month. Trauma-related CME or internal educational process (IEP) participation over the past 3 years is adequate for the surgeons on the call panel, and all have successfully completed the ATLS course at least once. While on call, the trauma surgeon is dedicated to the trauma center. There is a published backup call schedule. Two of the trauma surgeons are board certified in surgical critical care.

C. TRAUMA PROGRAM MANAGER (TPM)

Lori Boyett, the TPM, with a bachelor’s degree in nursing, has been in her full-time role for 9 years and reports to the TMD and administration. She has a well-defined job description for the TPM role and is responsible for 15 personnel in supporting roles. Trauma program staffing includes two trauma nurse clinicians, two registrars, 10 grant supported injury prevention staff and an office support staff. Ms. Boyett has additional role responsibilities including injury prevention oversight, hospital disaster management oversight, and active participation at the regional and state level in trauma system committees. She shows evidence of educational preparation, extensive annual trauma-related continuing education and clinical experience in the care of injured patients. Ms. Boyett has a pivotal role in the leadership of the trauma program; however, ongoing additional responsibility demands may impact her effectiveness in the role of TPM.

D. TRAUMA SERVICE

There is a trauma service at HBMC, with surgical commitment to the trauma center. The trauma director is involved, and oversees all aspects of medical care provided to patients admitted to the trauma service. This oversight includes care from the initial resuscitation until the final patient disposition is determined. Trauma service holds daily multidisciplinary rounds Monday through Friday at 0900. Members of the team (case management, social service, nutrition, pharmacy, physical/occupational therapy, chaplain, infection control, comprehensive rehabilitation, TPM, trauma nurse coordinator [TCN], registrar, surgery clinic nurse, and so forth) gather to discuss the trauma patients and make plans for the day regarding patient care, needed family discussions, and discharge planning. In addition, all imaging obtained over the past 24 hours is reviewed with the radiologist and serves as part of the tertiary exam. Postdischarge follow-up care is provided at the surgeons’ clinic adjacent to the hospital. The trauma clinical nurses communicate with the surgery clinic staff regarding plans for follow-up and any other issues that arise regarding patient care. This enhances continuity of care and allows for reporting of complications within the PIPS program.

Seriously injured patients are admitted to or evaluated by an identifiable surgical service staffed by credentialed trauma providers. There is sufficient infrastructure and support to the trauma service to ensure adequate provision of care. The trauma service is an
admitting service at HBMC under the general surgery section. There are four general
surgeons that are employed by the hospital to provide trauma call coverage and care of
trauma patients from admission to discharge. In addition to the TMD, there are two
trauma clinical nurses, two registrars, and an office coordinator. There are also 10 grant-
funded injury prevention positions that report to the TMD. Occasionally, there is also a
family practice resident that performs a 2-week-to-1-month elective rotation with the
trauma surgeons.

The hospital has additional credentialing criteria for serving on the trauma panel,
including the following.

- Board certified in general surgery
- Demonstrate a case load of 50 admissions per year
- Required 16 hours of CME in trauma per year
- Current verification of ATLS completion
- Approval of the TMD

E. TRAUMA RESPONSE/ACTIVATION

HBMC has three levels of response. The emergency physician, ED nurse, and trauma
surgeon can activate the trauma team. The statistics for each level of response are
tabulated below.

<table>
<thead>
<tr>
<th>Level</th>
<th>Number</th>
<th>Response (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest</td>
<td>99</td>
<td>14</td>
</tr>
<tr>
<td>Intermediate</td>
<td>567</td>
<td>82</td>
</tr>
<tr>
<td>Lowest</td>
<td>24</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>690</td>
<td>100</td>
</tr>
<tr>
<td>Direct Admits</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

The policy for when the trauma attending is expected to respond to the ED is the
following.

- The trauma surgeon is expected to respond to a 911 within 15 minutes of being
  paged, which could be prior to the patient’s arrival.
- The trauma surgeon is expected to respond to a 922 within 30 minutes of being
  paged.
- The trauma surgeon is expected to respond to a consult within 60 minutes of
  notification.

The highest level of activation is instituted via group pager.

The criteria for activation of each level include the six minimum criteria of the COT for
the highest level of activation. However, it is evident that the activation criteria are not
continuously evaluated by the PIPS program, as there were numerous cases that were
found during the case reviews that were not identified and managed in a prompt fashion.
The main reason had to do with the activation criteria and process. Notably, the process
includes the trauma level alert form, that includes the activation levels level 1, level 2,
and trauma mechanism. This created an internal delay in identification of trauma patients.
There have been some recent initial efforts by the new ED director in this area related to core triage and charge nurses; however, the process needs to be revised so that the appropriate criteria are included within each level of activation, and the process should not be primarily dependent on radiologic diagnoses. This was determined to be a deficiency by the site review team, and suggestions were made to improve this process.

The trauma surgeon is present in the ED on patient arrival, or within 15 minutes of notification, for the highest level of activation 93% of the time. Therefore the 80% compliance of the surgeon's presence in the ED for the highest level of activation is confirmed and monitored by PIPS.

F. TRAUMA/HOSPITAL STATISTICAL DATA

The personnel on the trauma team for each level of activation include the following.

<table>
<thead>
<tr>
<th>Responder</th>
<th>Activation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Highest</td>
</tr>
<tr>
<td>Trauma Surgeon</td>
<td>X</td>
</tr>
<tr>
<td>ED Physician</td>
<td>X</td>
</tr>
<tr>
<td>TNCC RN</td>
<td>X</td>
</tr>
<tr>
<td>TNCC RN</td>
<td>X</td>
</tr>
<tr>
<td>Trauma Clinical Nurse*</td>
<td>X</td>
</tr>
<tr>
<td>Respiratory Therapist</td>
<td>X</td>
</tr>
<tr>
<td>Anesthesiologist*</td>
<td>X</td>
</tr>
<tr>
<td>Radiology Technologist</td>
<td>X</td>
</tr>
<tr>
<td>Phlebotomist</td>
<td>X</td>
</tr>
<tr>
<td>Chaplain</td>
<td>X</td>
</tr>
<tr>
<td>Security Officer</td>
<td>X</td>
</tr>
<tr>
<td>Code Pink Team (&lt;13)</td>
<td>X</td>
</tr>
<tr>
<td>Blood Bank</td>
<td>X</td>
</tr>
<tr>
<td>CT Technologist</td>
<td>X</td>
</tr>
<tr>
<td>Nursing Supervisor</td>
<td>X</td>
</tr>
</tbody>
</table>

* when in house

The ED activity and trauma demographics are summarized below.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ED Visits:</td>
<td>56,187</td>
</tr>
<tr>
<td>Trauma ED Visits:</td>
<td>11,990</td>
</tr>
<tr>
<td>Blunt trauma:</td>
<td>93%</td>
</tr>
<tr>
<td>Penetrating trauma:</td>
<td>7%</td>
</tr>
<tr>
<td>Burns:</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>
The trauma-related ED activity led to the following trauma admissions.

<table>
<thead>
<tr>
<th>Service</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trauma</td>
<td>595</td>
</tr>
<tr>
<td>Orthopaedic</td>
<td>85</td>
</tr>
<tr>
<td>Neurosurgical</td>
<td>1</td>
</tr>
<tr>
<td>Other Surgical</td>
<td>19</td>
</tr>
<tr>
<td>Burn</td>
<td>0</td>
</tr>
<tr>
<td>Non-Surgical</td>
<td>96</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>796</strong></td>
</tr>
</tbody>
</table>

The disposition of trauma admissions from the ED is shown below.

<table>
<thead>
<tr>
<th>Disposition</th>
<th>Number</th>
<th>Admitted to Trauma Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED to OR</td>
<td>82</td>
<td>50</td>
</tr>
<tr>
<td>ED to ICU</td>
<td>319</td>
<td>314</td>
</tr>
<tr>
<td>ED to Floor/Ward</td>
<td>391</td>
<td>227</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>792</strong></td>
<td><strong>591</strong></td>
</tr>
</tbody>
</table>

The ISS and percent mortality are as follows.

<table>
<thead>
<tr>
<th>ISS</th>
<th>Trauma Admissions</th>
<th>Deaths</th>
<th>Mortality (%)</th>
<th>Admitted to Trauma Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9</td>
<td>439</td>
<td>5</td>
<td>1</td>
<td>256</td>
</tr>
<tr>
<td>10-15</td>
<td>150</td>
<td>4</td>
<td>3</td>
<td>138</td>
</tr>
<tr>
<td>16-24</td>
<td>133</td>
<td>4</td>
<td>3</td>
<td>130</td>
</tr>
<tr>
<td>&gt;25</td>
<td>74</td>
<td>17</td>
<td>23</td>
<td>71</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>796</strong></td>
<td><strong>30</strong></td>
<td><strong>4</strong></td>
<td><strong>595</strong></td>
</tr>
</tbody>
</table>

The differences in the totals of the above three tables are because there were four patients who died in the ED.

The number of trauma transfers is as follows.

<table>
<thead>
<tr>
<th>Transfers</th>
<th>Air</th>
<th>Ground</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfers In</td>
<td>13</td>
<td>150</td>
<td>163</td>
</tr>
<tr>
<td>Transfers Out</td>
<td>-</td>
<td>-</td>
<td>131</td>
</tr>
</tbody>
</table>

The hospital does not track the mode in which patients were transferred out of the facility, only that they were transferred out acutely.

A mechanism for direct physician-to-physician contact is present for arranging patient transfer. The decision to transfer an injured patient to a specialty care facility in an acute situation is based solely on the needs of the patient.

G. TRAUMA BYPASS
HBMC has a bypass protocol, and during the reporting year, was not on bypass. The trauma surgeon is involved in the development and decisions of the trauma center's bypass protocol.

**H. NEUROSURGERY**

Dr. Luiz Cesar was the neurosurgical liaison to the trauma program in 2013. He graduated from Escola De Medicina E Cirurgia Do Rio De Janeiro in 1971, and completed his residency training at University of Minnesota and Rush University in 1978. Dr. Cesar was board certified in 1983 and is a Fellow of the ACS. He is a member of the Congress of Neurological Surgery. Dr. Cesar has adequate external trauma CME over the past 3 years.

Dr. Charles Wright became the neurosurgical liaison in January, 2014, and is the only full time neurosurgeon on the call panel. Dr. Wright graduated from the University of Illinois in 1985, and completed his residency training at the University of California San Diego in 1991. Dr. Wright was board certified in 1996 and is a Fellow of the ACS. He is a member of the American Association of Neurologic Surgeons. Dr. Wright has adequate external trauma CME over the past 3 years.

Including Drs. Cesar and Wright, there are four board-certified/eligible neurosurgeons on the call panel. Drs. Cesar and Wright each cover neurotrauma call every other month, but Dr. Cesar lives out of state when he is not on-call. There are also two locum tenens neurosurgeons who live in the region and fill in when additional coverage is needed. Their credentials were available and reviewed by the review team. Trauma-related CME or IEP participation over the past 3 years is adequate for the neurosurgeons on the call panel.

While on call, the neurosurgeon is dedicated to the hospital. Neurotrauma care is promptly and continuously available for severe traumatic brain injury and spinal cord injury, and for less severe head and spine injuries when necessary. An attending neurosurgeon is promptly available to the hospital's trauma service when neurosurgical consultation is requested. During the reporting year, the neurosurgeons performed 10 emergency craniotomies within 24 hours of admission. Qualified neurosurgeons are regularly involved in the care of head and spinal cord injured patients and are credentialed by the hospital with general neurosurgical privileges. The hospital provides an on-call neurosurgical backup schedule with formally arranged contingency plans in case the capability of the neurosurgeon, hospital, or system to care for neurotrauma patients is overwhelmed. An alternate neurosurgical backup system is not in place because of the low volume of emergent craniotomies within 24 hours per year. In addition, there is the capability of transferring neurotrauma cases if needed to a regional Level I trauma center that is also within the same health system. All neurosurgical transfers/diversions are monitored in the PIPS program and convincingly demonstrate appropriate care in the receiving institution.

**I. ORTHOPAEDIC SURGERY**

Dr. Brent Bauer, the orthopaedic liaison to the trauma program, graduated from the University of Texas Health Science Center in 2003, and completed his residency training
at Parkland Memorial Hospital, University of Texas Southwestern in 2008. He was board certified in 2011, and is a member of the Orthopaedic Trauma Association. Dr. Bauer has adequate external trauma CME over the past 3 years.

Including Dr. Bauer, there are three board-certified/eligible orthopaedic surgeons on the call panel at HBMC. Trauma-related CME or IEP participation over the past 3 years is adequate for orthopaedic surgeons on the call panel.

During the reporting year, 152 operative cases were done within 24 hours of admission by the orthopaedic service. Also during the reporting year, there were 20 operative pelvis and acetabular fracture cases performed at this institution, and there were none that were transferred out. All three of the orthopaedic surgeons have completed a 1-year orthopaedic trauma fellowship involving operative care of fractures. There is not an orthopaedic surgery residency program.

An orthopaedic team member is promptly available in the trauma resuscitation area when consulted by the surgical trauma team leader for multiply injured patients. Orthopaedic team members have dedicated call at their institution. The design of the backup call system is the responsibility of the orthopaedic trauma liaison and has been approved by the TMD.

The trauma center provides sufficient resources including instruments, equipment, and personnel for modern musculoskeletal trauma care, with readily available operating rooms (ORs) for musculoskeletal trauma procedures. Physical/occupational therapists and rehabilitation specialists are involved in the acute and rehabilitation phases of care. Operating rooms are promptly available to allow for emergency operations on musculoskeletal injuries, such as open fracture debridement/stabilization and compartment decompression. There is a mechanism to ensure operating room availability without undue delay for patients with semi-urgent orthopaedic injuries. The PIPS process reviews the appropriateness of the decision to transfer or retain major orthopaedic trauma.

V. HOSPITAL FACILITIES
A. EMERGENCY DEPARTMENT

The ED has a designated emergency physician director, Dr. Randy Hartman, who is supported by additional physicians, both full- and part-time, to ensure care for injured patients. Dr. Hartman, who is the emergency medicine liaison to the trauma program, graduated from Baylor College of Medicine in 2007, and completed his residency at Scott & White Memorial Hospital, Texas A&M Health Sciences Center, in 2010. He is board certified by the American Board of Emergency Medicine, has taken ATLS, and is currently an ATLS provider. Additionally, Dr. Hartman has documented 16 hours annually or 48 hours in 3 years of verifiable, external trauma-related CME.

Including Dr. Hartman, there are 28 board-certified/eligible emergency physicians who treat trauma patients, 10 of whom are considered full-time employees. All emergency physicians on the call panel are board certified/eligible in emergency medicine. Trauma-related CME or IEP over the past 3 years is adequate for the emergency physicians on the call panel. All of the emergency physicians have successfully completed the ATLS.
course at least once.

The ED is staffed with at least two emergency physicians 24 hours a day, with plans to increase staffing to triple coverage. Although the emergency physicians respond to hospital emergencies and those in the intensive care unit (ICU), the department is always staffed with at least one physician. There are no emergency medicine residents at HBMC.

The ED at HBMC has an ambulance docking site with six bays that are covered and easily accessible. The helipad is within 200 feet of the ambulance door and there is a security gate surrounding the entire landing area. There is a dedicated decontamination room with a separate entrance from the ambulance dock. Additionally, there is an easily accessible area for a decontamination tent that has a separate water source. The decontamination equipment is housed in the basement of the hospital, directly below the ED.

There are four main trauma resuscitation bays located immediately after passing through the ambulance entrance. Each bay is adequately stocked with basic equipment for resuscitation, including a level 1 infuser, monitors, and procedural supplies. There is also a separate cart that can be wheeled to trauma activations, which includes airway equipment, surgical trays, central line equipment, IO drill, and needles. It is well organized, easily accessible, and an excellent addition since the last survey. Additionally, there is a difficult airway box and a separate cart dedicated to airway supplies. Each room can also be temperature controlled and there is a dedicated PACS monitor, which is another addition since the last survey.

Pediatric equipment was available in a separate cart that follows the Broselow tape organization. An emergency radiology room is directly across from the resuscitation bays and the radiology department, including two CT scanners, interventional radiology, and MRI and in close proximity to the ED. There are two ED ultrasound machines, but there is no process for image archival, QA, specific report generation, or generating a charge for the procedure. The reviewer felt that greater emphasis should be placed on utilizing the technology of ultrasound at the bedside by emergency physicians and trauma surgeons and processes should be developed to upgrade the equipment, education, and methods for documenting and archiving ultrasound images.

Transfer requests to the trauma center and EMS calls are received at the EMS base station via a recorded “800” number. A log of all calls is maintained. Notebooks containing the disaster plan and trauma-related protocols were present in the physician area of the ED and were clearly marked as such.

The reviewer felt that the trauma flow sheet was adequate quality, but it was often not completely filled out. Specifically, timing of consult arrival was often missing. The reviewers also identified instances when trauma patients were initially triaged to a room that was not a resuscitation bay and the nursing documentation was initiated on a non-trauma flow sheet. Subsequently, when a decision was made to upgrade the patient to a level 922 activation, nursing documentation commenced on the trauma flow sheet.

The reviewers identified patients (see case discussions below) with significant injuries who were not identified and treated in a timely manner in the ED. Most often it occurred
in patients who did not meet physiologic criteria to trigger a 911 activation. Instead, trauma surgery was consulted in the context of a 922 activation, which is primarily based on anatomic pathology criteria (multiple rib fractures, splenic laceration, pelvic fracture, hemothorax, spine fracture, and so forth). The failure to identify these patients can be attributed to a number of different processes, including under-triage, delay in diagnosis, or poor initial assessment. It was not entirely clear why these issues were occurring and the survey team postulated that it could be a result of a number of factors including large turnover of ED nursing staff, instability of ED nursing leadership, inexperience of emergency physicians, poorly applied triage mechanism, or faulty triage mechanisms. While some of the cases activated in the ED based on physiologic criteria were discussed in the PI process, it was not evident that those without vital sign abnormalities were being reviewed.

Credentialing requirements for nurses who treat trauma patients include certification in ACLS (within 1 year of hire), and PALS, TNCC, and ENPC within 18 months of hire. Nurses assist and observe in the trauma room prior to being given that assignment. Additionally, all ED nurses are required to complete annual competencies which include a level 1 infuser, chest tube set-up, massive transfusion protocol (MTP), 15 minute rule, and procurement of ABG’s. Nurses in the department average 6 years of experience, with an annual turnover rate of 37%. This represents a significant increase from the prior survey in 2011, when it was 1%. Extra certifications for ED nursing staff includes 100% TNCC, 2% CEN, 90% PALS, 100% ACLS, and 31% ENPC.

B. RADIOLOGY

There is a radiologist appointed as liaison to the trauma program and actively engaged with radiology aspects of trauma. He participates in the trauma PIPS program by involvement in protocol development and trend analysis that relate to diagnostic imaging. One of the outstanding aspects of radiology committee is daily AM rounds conducted with the trauma surgeon group and radiologist to review images of patients admitted over the past 24 hours. Radiologists are promptly available, in person or by teleradiology, when requested, for the interpretation of radiographs, performance of complex imaging studies, and interventional procedures. Radiologists are not in-house 24/7. Between 2300 to 0600 the VRAD service provides readings for CT and MRI. A report is faxed to the ED but both the VRAD group and a local radiologist are available for consultation by phone. The local radiologist on call is also available to come in after hours. Diagnostic information is communicated in a written form and in a timely manner and all VRAD images are re-read in the morning. Critical information is verbally communicated to the trauma team. Final reports accurately reflect communications, including changes between preliminary and final interpretations. Changes in interpretations are monitored through the PIPS program. A process to track discrepancies with evidence of a standard monthly quality review report was provided on site.

There is resuscitation equipment for both adult and pediatric patients in the radiology department. There is inconsistent practice to ensure that trauma patients who may require resuscitation and monitoring are routinely accompanied during transportations to and while in the radiology department. This includes the level 1 activation only. Conventional radiography and CT are available 24 hours per day. Conventional catheter angiography
and sonography are available 24 hours per day. After hours, response time for starting procedures for angiography and MRI is 30 minutes.

C. OPERATING SUITE

The nine-bed operating suite is located on the third floor one level above the ED. There are three oversized staff elevators with a priority override system via badge access to assure timely transport from the ED to the OR suite. The ORs are located adjacent to the SICU. Two have cardiopulmonary bypass capability. A 10th room is designated for urologic procedures. There are also four ambulatory surgical suites located on the first floor of Medical Office Building 1 that is attached to the main hospital and could be used in an emergency situation. The OR is adequately staffed and readily available. Personnel routinely respond to the level 1 (911) activations in the ED. The OR director has personnel who are in-house 24/7 to start an operation and there is always a room designated for an emergency/trauma case. There is a mechanism for providing additional staff for a second room when the first OR is occupied. When the backup unit is called, the circulating nurse will notify the second call team. Anesthesia will call the second on call anesthesiologist. They are expected to be here within 30 minutes. If a room is being used for a trauma case the backup team is called in to prepare a second room during afterhours and is ready for a second case. The goal set forth for the trauma center is operating within 30 minutes of the patient’s arrival.

The mechanism for opening the OR is provided by personnel who report to the ED for all level 1 and 2 alerts and stays in the ED until a decision is made by the trauma surgeon on the need for the OR. During the day, a room is made immediately available. After hours, the personnel return to the OR and begin opening room #3. The OR staff notifies the on call anesthesia personnel to report if they are not in-house. Fifteen minutes after the surgeon notifies the OR, the patient is transported from the ED by the ED resuscitating team and the surgeon. The patient is placed in room #3 and the resuscitation is continued until the anesthesiologist arrives and a handoff report is given. The patient is then moved from the stretcher to the operating table and the monitoring equipment is exchanged.

The PIPS program evaluates OR availability and delays when an on-call team is used. There is a mechanism for documenting the trauma surgeon's presence in the OR. Availability and any delays are reviewed when on-call team is used. The OR has the essential resuscitation equipment. The trauma center does have the necessary equipment for craniotomy immediately available.

The anesthesia liaison to the trauma program is Dr. Joseph Monk. He is a graduate of the University of Texas Medical Branch in 1985. He completed his anesthesia training at the University of Arizona Health Science Center, and was board certified in 1990. He is not ATLS certified. There are nine anesthesiologists on staff, and two are always on backup call during off-hours. All of the anesthesiologists taking call have successfully completed an anesthesia residency program. HBMC utilizes CRNAs, and they are involved in the care of the trauma patient, with one providing in-house call and two on backup. Dr. Monk’s commitment to the trauma service is a strength of the program.

Anesthesiology services are promptly available for emergency operations and for airway problems. The availability of the anesthesia services and the absence of delays in airway
control or operations are documented by the hospital PIPS process. Anesthesia services are available 24 hours a day and present for all operations.

The commitment of the surgical services/OR director to the trauma program is quite evident by the maintenance of a full OR team in house 24/7 as well as the early call back of the on call team when a trauma case is ongoing. The OR prides itself on its resuscitative equipment readiness regardless of which OR is being utilized. Surgical services is a strength of the program.

D. POSTANESTHESIA CARE UNIT (PACU)

The PACU contains 12 beds, and has qualified nurses available 24 hours per day as needed during the patient's postanesthesia recovery phase. The PIPS program documents that the PACU nurses are available and delays are not occurring when the PACU is covered by a call team from home; and that it has the necessary equipment to monitor and resuscitate patients. The PACU occasionally serves as an overflow for the ICU, and in fact was utilized as a triage and treatment area for the “yellow” tagged patients in the recent mass casualty incident in the neighboring community of West Texas. Anesthesia covers the patient while in the PACU, but for critical trauma patients they are transferred directly to the ICU for continued resuscitation and recovery after their operation.

PACU nurses must have 2 years of critical care nursing prior to being hired. Their annual competencies follow the American Society of Perianesthesia Nursing, and they must maintain BLS, ACLS, and PALS certifications. Extra certification in PACU staff includes 100% PALS and 100% ACLS.

E. ICU

The ICU consists of 24 beds, divided into two 12-bed units, with one including surgical beds. These units are frequently full, and it seemed from discussion with the ICU leadership and staff that additional ICU beds would be needed in the near future. Dr. Thomas Goaley is the surgical director of the ICU who is responsible for setting policies and administration related to trauma ICU patients.

The trauma surgeon remains in charge of patients in the ICU. The immediate response for life-threatening injuries, day or night, is provided by the on-call trauma surgeon, who is available by the paging system 24/7. If there is an emergency condition that develops in the SICU for any trauma patient, a “555” is called via the trauma pager and the surgeon responds to the SICU without delay. The nurses confirmed that this was a great system for the patients and nurses and it worked well. An ED physician is also notified by phone and responds until relieved by the trauma surgeon. This process is monitored by PI. When issues are identified, the TPM, TCN, or TMD work with the critical care director to achieve resolution and initiate a process to facilitate any system changes to improve care and prevent recurrences. Trends are monitored. Major issues are referred to the hospital critical care committee or the trauma system improvement committee (TSIC) for review and possible action. The trauma service retains responsibility for patients in the ICU and coordinates all therapeutic decisions appropriate for the level of the trauma program.
Qualified nurses are available 24 hours per day to provide care in the ICU. The credentialing requirements for nurses working in ICU are as follows:

- Must have 6 months of ICU nursing experience
- Must have their BLS and ACLS certifications within 6 months of hire
- TNCC and ATCN certifications recommended
- Web-ex in-services that must be completed prior to their annual evaluations.
- Must maintain annual competencies that include ICP monitoring, chest tube management, hemodynamic monitoring, 555 protocol, MTP, pain management, and ABG procurement

Nurses in the unit average 10 years of experience, with an annual turnover rate of 23%. The day shift has had very little turnover, but there are some nurses who obtain their first 1 to 2 years of experience before transferring to other trauma centers in larger cities. The hospital always maintains a one-nurse-to-two-patients or better staffing pattern for patients in the unit.

Extra certification for ICU nurses includes 4% TNCC, 4% ATCN, 64% PALS, 93% ACLS, and 18% CCRN. The hospital offers BLS, ACLS and TNCC courses throughout the year. FCCM is also offered several times a year, and Dr. Goaley serves as the director. This trauma program, along with another trauma program within the system, provides an annual trauma symposium. Additionally, the TPD, TCN, and trauma surgeons present trauma related in-services at staff meetings when requested or the need is identified.

The ICU has the necessary equipment to monitor and resuscitate patients. Intracranial pressure monitoring equipment is available. There is a respiratory therapist available to care for trauma patients 24 hours per day. The hospital has dialysis capabilities. Nutritional support services are available.

F. BLOOD BANK

The regional source of blood products is located adjacent to the hospital, providing rapid access. Four units of un-crossmatched O-negative blood are automatically deployed to the ED for all level 1 activations. A MTP is in place and utilized on average once per month. Activated by the trauma surgeon, a runner is assigned to the MTP to facilitate blood product transport. Blood is issued in successive pairs of coolers with a goal of 1:1:1 administration. Each cooler contains 4 units each of RBC and FFP and every other cooler contain platelets alternating with cryoprecipitate. The protocol is evaluated during specific case reviews. The 1:1:1 ratios are not met on a consistent basis.

The average turnaround time for type-specific blood is 5 to 10 minutes and 40 to 45 minutes for crossmatched blood. The blood bank has an adequate supply of red blood cells, fresh frozen plasma, and cryoprecipitate; however, it keeps only one platelet pack on site and no thawed plasma which may contribute to the difficulty meeting replacement goals.
VI. SPECIALTY SERVICES
A. PEDIATRIC TRAUMA

The trauma program defines an injured pediatric patient as younger than 15 years. The number of pediatric trauma admissions to the specific services during the reporting year is summarized below.

<table>
<thead>
<tr>
<th>Service</th>
<th>Number of Admissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trauma</td>
<td>1</td>
</tr>
<tr>
<td>Orthopaedic</td>
<td>2</td>
</tr>
<tr>
<td>Neurosurgical</td>
<td>0</td>
</tr>
<tr>
<td>Other Surgical</td>
<td>14</td>
</tr>
<tr>
<td>Non-Surgical</td>
<td>2</td>
</tr>
<tr>
<td>Total Trauma Admissions</td>
<td>19</td>
</tr>
</tbody>
</table>

The ISS and mortality rates for these patients are shown below.

<table>
<thead>
<tr>
<th>ISS Category</th>
<th>Trauma Admissions</th>
<th>Deaths</th>
<th>Mortality (%)</th>
<th>Admitted to Trauma/Pediatric Surgery</th>
<th>Admitted to Non-Surgical</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>10-15</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>16-24</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>&gt;25</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

The hospital annually reviews the care of the injured children through the PIPS program. There is not a separate pediatric trauma team. The reviewers did not see any missed issues in the PIPS program review of the injured children that were cared for during the reporting year.

During the reporting year, HBMC did not admit a pediatric trauma patient with a splenic injury.

B. REHABILITATION SERVICES

Dr. Richard E. Scott, Jr. is the director of the rehabilitation program, and is board certified in physical medicine and rehabilitation. The relationship between comprehensive rehabilitation and trauma services is cooperative and supportive. The nurse liaison and an acute care therapy representative attend trauma team rounds most weekdays to facilitate communication between the trauma team, acute therapy services, inpatient rehabilitation and case management.

Rehabilitation typically begins in acute care (ward or ICU) via physician referral for physical therapy and/or speech language pathology services. The patient is then screened by a rehabilitation nurse liaison who subsequently reviews the case with the medical director for admission. All of these services are available within the facility, and offer therapy at the appropriate intensity for that level of care. Therapists recommend
discharge placements including rehabilitation, skilled nursing facility, long-term acute hospital, outpatient, or home care.

The rehabilitation medical director and the administrator for rehabilitation attend the trauma system improvement committee for coordination of care and improvement outcomes. There is an inpatient, CARF-approved rehabilitation unit with 53 inpatient beds. The system used to measure rehabilitation is FIM. There is a pediatric rehabilitation service, which includes acute care therapies that see pediatric referrals in the hospital and as outpatients. Inpatient comprehensive rehab does not accept pediatric admissions but admits ages 14 and up.

C. BURN PATIENTS

During the reporting year, the hospital admitted three burn patients, and there is not a separate burn team. The hospital is not a verified burn center. No patients were transferred in; the number transferred out was 14. The hospital has transfer arrangements for burn patients with Parkland Memorial in Dallas.

D. VERTEBRAL COLUMN INJURIES

During the reporting year, the hospital admitted 145 patients with spinal column injuries, and these included 11 with neurological deficits. Twenty were transferred in, while four were transferred out. There are no transfer agreements in place, but traditionally these patients who require a higher level of care are transferred to the Scott & White Level I center in Temple, or alternatively to the Level I center at Parkland Memorial in Dallas.

E. ORGAN PROCUREMENT

HBMC has an organ procurement program. This program led to 24 trauma referrals during the reporting year, which in turn resulted in four donors. The trauma center has an established relationship with a recognized organ procurement organization (OPO). There are written policies for triggering notification of the OPO. The PIPS process reviews the organ donation rate. There are written protocols for declaration of brain death. The autopsy rate is low as there is not a county medical examiner. Criminal cases are referred to either Dallas or Temple.

F. SOCIAL SERVICES

The social worker team is actively involved with injured patients. There is a case management social work team involved with all trauma patients. The social worker addresses psychosocial issues and discharge planning needs while the case manager addresses utilization management/review, appropriate DRG assignment, and clinical appropriateness. The trauma program does not have a social worker dedicated to the injured patient. Social workers and pastoral care chaplains are available for intervention with patients and families. Referrals are also made to community resources applicable to the patient and family needs (financial services, long-term counseling, mental health, pharmaceutical assistance). Both a chaplain and a social worker attend the daily trauma rounds to help identify special patient and family needs and to assist in the coordination of discharge planning.
G. DISASTER PLANNING AND MANAGEMENT

The trauma center has a hospital disaster plan described in the hospital disaster manual. The hospital meets the disaster-related requirements of the Joint Commission. A trauma surgeon is a member of the hospital's disaster committee. Hospital drills that test the disaster plan are conducted at least every 6 months. The hospital is able to respond to radioactive, chemical, and biological hazardous materials.

The decontamination needs of the medical center are handled in the ED with a separate, climate-controlled shower with separate entrance into the resuscitation area. Any waste is collected into a separate storage tank and pumped clean after the event has concluded. The other decontamination set is a collapsible tent with separate water source and a waste collection bladder system isolated from the main sewage system. This tent system is stored away from the ED and is brought to the ED ambulance bay by non-clinical personnel and set up when a MCI has been initiated. The hospital drills with the equipment at least once a year. PPE and SCBA air units accompany the tent. Managers, directors, administrative, and some clinical personnel have received training in the incident command system. The survey team could not ascertain if HBMC was a regional storage site for hazardous material exposure antidotes.

H. OTHER SURGICAL SPECIALISTS AND MEDICAL CONSULTANTS

The trauma center has the full required surgical specialists.

VII. PERFORMANCE IMPROVEMENT AND PATIENT SAFETY (PIPS)

A. PIPS

The trauma center demonstrates a clearly defined PIPS program for the trauma population and is able to separately identify the trauma patient population for review. There is a PI plan in place that is integrated with the hospital quality department. The PIPS program is supported by a reliable method of data collection that consistently gathers valid and objective information necessary to identify opportunities for improvement. The process of analysis includes multidisciplinary review, occurs at regular intervals, and defines and documents corrective strategies. There is identification of specific system problems. The trauma program has adequate administrative support and defined lines of authority that ensure comprehensive evaluation of all aspects of trauma care. The TMD has the authority to monitor and direct performance improvement in trauma care. The trauma program is empowered to address issues that involve multiple disciplines. Identified problem trends undergo multidisciplinary peer review by the trauma systems improvement committee.

The PIPS program is accomplished by both concurrent and retrospective review. Events are categorized as sentinel and rate based. Although the program monitors standard indicators to track processes of care, data driven specific discretionary clinical screening audit filters (such as TBI care, solid organ metrics, guideline compliance) have not been developed based on PI events and/or outcomes analysis. The trauma triage activation criteria are routinely analyzed for compliance with criteria outliers referred to the emergency colleague. However, delays in care were evident and the impact of change to
comply with triage criteria has not been realized in the PI process. Issue identification occurs in multiple system approach, and includes daily rounding of the entire trauma surgeon complement with a multidisciplinary team to include the sub specialties of neurosurgery and orthopaedics. In addition, daily radiology rounding occurs in the morning. This enhances communication and is an excellent feature of the PI process. Identified problem trends undergo various levels of review: initial screening by trauma clinicians; secondary review by TMD or appropriate department leader; or tertiary review by the multidisciplinary committee. However, the multidisciplinary peer review committee agenda is limited to address death reviews only. All the trauma peer review members also attend the system committee meeting with a robust agenda that includes identification of specific system problems with demonstrated data analysis, trending of care metrics, and loop closure.

**B. TRAUMA REGISTRY**

The trauma program utilizes the Traumabase registry program. Trauma registry data are collected and analyzed and data entry is completed within 2 months of discharge in at least 80% of cases. All patients admitted to the hospital, those who die in the ED, or those transferred out acutely from the ED, with ICD-9 codes from 800.0 to 959.9 (except isolated superficial injuries) are entered into the registry. Patients transferred in with traumatic diagnoses and treated and released are also included. The registrars have been hired over the past year and are in an entry-level phase in their role. Nevertheless, they were able to demonstrate rapid facility with data retrieval. PI documentation is handwritten; therefore, the registry is underutilized in the area of electronic management of PI files. The registry data are submitted to the National Trauma Data Bank (NTDB) and to the state. The trauma registry is supportive of the PIPS program and ensures that trauma registry confidentiality measures with strategies for monitoring data validity for the trauma registry.

**C. TRAUMA DEATH AUDITS**

During the reporting year, the hospital had a total of 41 deaths, including 11 dead on arrival, four deaths in the ED, and 26 in-hospital deaths. There were two unanticipated mortalities with opportunity for improvement, six anticipated mortalities with opportunity for improvement, and 22 mortalities without opportunity for improvement. The autopsy rate was 15%. Autopsy findings are reported to the trauma committee in writing from the medical examiner’s office. The reports are reviewed by the TPD and TMD and any additional information about the injury diagnoses is entered into the trauma registry and reported to trauma M&M and or to the MDQI committee.

**D. MULTIDISCIPLINARY TRAUMA COMMITTEE**

The multidisciplinary trauma program evaluates its processes. After review of non-surgical admissions less than 10% of injured patients were admitted to non-surgical services and the appropriateness of that practice was demonstrated through the PIPS process.

There are three main trauma committees that cases may be referred to after secondary review for discussion and solution:
• The trauma morbidity and mortality (M&M) committee members include the trauma surgeons and trauma program team only. This is a monthly meeting with documented, robust minutes. Event resolution can be attained at this level. The purpose of this committee is to review all deaths monthly, address concurrent identified concerns, surgeon education; review audit filters trends and complications in care management.

• The Level III, peer-specific multidisciplinary quality improvement (MDQI) meets bimonthly, chaired by the TMD with participation from general surgery, orthopaedic surgery, neurosurgery, emergency medicine, anesthesia, and radiology. The focus of this meeting is to rereview all deaths. If the issue is not resolved at one of those levels, it is referred to medical staff quality improvement (MSQI) or medical staff peer review (MSPR). The function of this committee currently is to review deaths only. Trauma trends, audit filter indicators and complications are not addressed in this forum for multidisciplinary discussion. There is demonstrated documented adequate attendance of at least 50% by each of the core group of trauma surgeons and evidence of appropriate participation and documented attendance of emergency medicine, neurosurgeon, orthopaedics, and anesthesiology liaison representatives to the multidisciplinary peer review MDQI meetings. The TMD does not ensure document dissemination of information and findings from the peer review meetings to the non-core surgeon on the trauma call panel.

• TSIC meets bimonthly for a system quality measures. This committee addresses the trauma program operational issues. There is documentation reflecting the review of operational issues and, when appropriate, the analysis and proposed corrective actions. The liaison representative also attends and participates in at least 50% of the TSIC meetings. Nursing performance improvement issues are reviewed by the trauma PI program and TPM participates in multiple hospital nursing focused quality committees and initiatives.

Overall, the PI program has maintained and hardwired processes over the past 3 years. The review team assessed the program to be adequate in demonstrating PI processes for care analysis. The program excels in multidisciplinary routine rounding and communication with the entire trauma panel. The program is evolving and has opportunities in the areas of data analysis, electronic PI management and trauma triage/case identification. Identification and correction of problems was demonstrated. Identification of specific system problems and patient care problems was demonstrated with evidence of loop closure. The multidisciplinary peer review committee role is underutilized and needs to evolve in the areas of clinical and outcomes analysis of care management. There should be more than just the review of deaths in this committee.

E. PROTOCOL MANUAL, EVIDENCE-BASED GUIDELINES AND BENCHMARKS

The trauma program has a protocol manual for trauma. During the past 3 years, the trauma program has not expanded upon additional evidence-based trauma management guidelines. The current ones in place are c-spine clearance, ventilator weaning, ICU sedation, chest tube management and pelvic fracture management. The trauma program
benchmarks their trauma care within the program and with NTDB and the Trauma Center Association of America.

F. RECOMMENDATIONS FOR PIPS PROGRAM

Deficiencies or weaknesses in the PIPS process found during the review could be corrected or improved by the following.

- Recommend a designated PI coordinator to be responsible for performance improvement management for the program.
- Expand PI minutes template for systematic approach of documentation to show evidence of actions and process resolution in the multidisciplinary peer review committee and PIPS system committee. This would be inclusive of:
  - Expanding the multidisciplinary peer review agenda and minutes discussions to justify and/or enhance clinical rationales and decisions that are brought forward to the committee.
  - Incorporate trauma registry benchmarks, data analysis to integrate into performance to drive consensus of care management and to support loop closures and reevaluation
- Incorporate a process to evaluate evidence-based guidelines, clinical practice guidelines or protocols, and report via the PI process.
- Expand clinical audit filter screens to monitor TBI management, solid organ grading, and so forth.
- Consider implementing the PI component of the registry software to enhance PI organization and display of event resolution at all levels of review.
- Consider redesign of PI committee structure to reduce redundancy and expand role of the multidisciplinary peer committee.
- Consider review/redesign of trauma triage criteria directed at the level 2 activation based on over/under triage data analysis.
- Consider including elderly and anticoagulation therapy use in the level 2 activation.
- Ensure transport bedside attendance is consistently in place for the level 2 activation and high index of suspicion injured patient.
- Develop additional practice management guidelines in areas of TBI management, anticoagulant reversal, spleen management, and integrate into PI process measures.
- Recommend the TMD and/or trauma clinicians and support staff to attend annual vendor trauma registry software educational updates to maximize the registry utilization for the PI section of the software.
- Recommend adding key documentation elements to the emergency trauma nursing flow sheet to enhance documentation.
- Develop a consistent process to document sub-specialist notification and response.

VIII. EDUCATIONAL ACTIVITIES, OUTREACH PROGRAMS, AND PREVENTION

HBMC is accredited to award continuing medical education certificates, and collaborates with an affiliate hospital to provide educational opportunities.
• Physicians: All trauma surgeons at HBMC are active ATLS instructors and collaborate with Scott & White Memorial Hospital to provide access to ATLS. The orthopaedic trauma surgeons provide a weekly fracture conference that awards CME. A multidisciplinary regional trauma conference was conducted at HBMC this past year.

• Nurses: ACLS, PALS, and TNCC classes are conducted at HBMC. The Scott and White system provides access to ENPC and ATCN. Trauma topics are presented in nursing internships (ER, critical care, and medical/surgical) and annual competencies by the TPM at HBMC.

• Prehospital providers: Case reviews are done on a concurrent basis with the primary transport agency (ETMC) PI coordinator and medical director. Trended issues are presented as education to EMS agencies at regional HOTRAC meetings. The ED medical director at HBMC also participates in a biannual EMS education series. HBMC provides support for HOTRAC sponsored EMT classes as the lead trauma center for the region.

HBMC funds all mandatory certifications including TNCC, PALS, ACLS, and ENPC and provides clinical access for primary EMT education. The trauma program staff have been sponsored for trauma continuing education.

HBMC has an extensive injury prevention program with 10 FTEs dedicated to various motor vehicle related prevention initiatives. The hospital collaborates with the Texas Department of Transportation to provide these programs through partial matching grants. Ms. Boyett is also the injury prevention coordinator. These responsibilities are described in her job description. HBMC partners with the Texas Department of Transportation to provide partially matched grant funds to sponsor the following programs.

- Texas KidSafe Program
- Mature Driver Program
- Statewide RED (Reality Education for Drivers) Program

HBMC has a trauma transfer line with direct access to an ED nurse to facilitate patient transfers. A registry form is generated on transferred patients relating diagnoses and procedures done which is sent to referring facilities. Referring hospitals/EMS agencies may call for contemporaneous follow-up information which is provided by the trauma staff. The trauma program director provides follow-up information for referring hospitals on a quarterly basis at the HOTRAC meetings.

The HBMC trauma program conducted a regional trauma symposium in 2013. The TPM chairs the HOTRAC Hospital Care and Management committee, the HOTRAC Healthcare Coalition (Emergency Preparedness), and Emergency Medical Task Force-7 Coordinating Body.

The trauma center has a mechanism to identify patients who are problem drinkers. Binge questions are included in both ED and admission assessments. Positive results are flagged and reported to medical counselors to provide referrals. Brief Interventions are being conducted. Blood alcohol levels are intermittently drawn on level 1 activations.
IX. RESEARCH

HBMC does not have a trauma research program.

X. CHART REVIEW PROCESS

The requested charts were fully provided by the trauma team. These charts were appropriately subdivided by the requested categories, and the trauma team members were helpful in the chart review process. The charts were more than 90% complete as it relates to OR reports, EMS run sheets, discharge summaries, ED flow sheet, history/physical examinations, and specialty consults. The chart review process demonstrated that the quality of patient care overall in the trauma program was good, but variable in the ED. The surgical response times to the ED were excellent, after they were contacted to see a patient.

XI. EXIT INTERVIEW

The exit interview was attended by many of the same members who were present at the prereview dinner. The VRC statement was read verbatim. The summary was then presented and various aspects of the review were discussed by the site visitors and the trauma team members. There were no disagreements with the summary report expressed by the trauma team members. There was some additional discussion related to the deficiency about activation criteria and the evaluation by the performance improvement process. It was acknowledged that some of these cases were identified (see case reviews), but that the process of promptly identifying critically injured patients was frequently delayed and needed to be corrected by the trauma program’s PI process.
1. **Spleen/Liver Injury**  **ISS - 22**

This was a middle-aged male involved in a MCC, in which he was traveling at around 60 mph, and a car pulled out in front of him. He was forced to lay his motorcycle down, and he struck the vehicle. He had no loss of consciousness. He complained of left shoulder and left side pain. The patient was tachycardic prehospital (126), and was placed in the main ED and not in one of the trauma resuscitation rooms. However, his initial vital signs were BP - 58/40, pulse - 96, RR - 20, and GCS - 15. Therefore a 911 trauma was paged after arrival when the patient was upgraded. The trauma surgeon arrived within five minutes of the activation. The patient was given IVFs, with a transient increase in SBP to 108. The patient went to CT scan about one hour after arrival, and about 90 minutes after arrival the patient’s blood pressure decreased again, and the patient was taken to the OR about 15 minutes later. The CT scan revealed a scapular fracture, multiple left rib fractures (#3,4,5,6,7), and a ruptured spleen (grade V) with active extravasation. The patient also had facial lacerations and 7% TBSA deep partial thickness road rash. The patient underwent splenectomy. The EBL was 750ml plus blood from laparotomy pads, and 4 units of PRBC were given, and 2800ml of crystalloid. In addition, the facial lacerations and some areas of the road rash were also addressed in the OR by the trauma surgeon at the completion of the laparotomy. The patient was seen by the orthopaedic service for the scapular fracture, and determined that it was non-op. The patient was managed by the trauma surgeon in the ICU for a few days, weaned from the ventilator, and then transferred to the floor. The patient did well, but about one week after admission the patient was noted to have a left lung infiltrate and a left upper abdominal fluid collection. Treatment for pneumonia was started, and IR placed a percutaneous drain in the fluid collection and removed 360 ml of bloody/purulent appearing fluid. Cultures were negative but the patient had elevated amylase and lipase, and therefore was diagnosed with a pancreatic fistula. The drain had about 70 ml of output per day, and was advanced on his diet, and was discharged with the drain in place a couple days later.

*Postsplenectomy vaccines were given.*

**PI** - The PI process identified that this case was undertriaged and admitted to a “back hall room”, and should have been a level 2 activation. The 911 upgrade was noted to be appropriate. The care was documented as being “appropriate”, however there was also review of the case getting to the OR sooner, and it was determined that it “could have been quicker”. It was documented that the TMD discussed this with the trauma surgeon. It was also noted that there were nurse documentation issues, and that apparently the nurse no longer works here. It was determined that there was opportunity for improvement in the triage and promptness to the OR. There was also additional documentation a few months later, in another PI meeting, about the “15 Minute” Rule that was put in place a few years ago to improve the transport of unstable patients to the OR. This is used when the patient needs an emergent operation, and allows the OR team to get in place and the anesthesiologist, and the patient is automatically brought over 15 minutes later. There was a memo related to clarification between anesthesia and the surgeons on this protocol.

**Comments** - The management of this patient’s injuries were appropriate, but delayed, as this patient had life threatening bleeding. Good recognition of the need for upgrade after the patient was not triaged to the trauma room. When the patient deteriorated he was taken to the OR; however, there was still a slight delay because of waiting the 15 minutes. The PI process had good documentation related to the issues identified and
discussed, although spread out over many months. The postop complication of the pancreatic leak was not identified, and would have been a good discussion topic at the peer review committee meeting, along with a discussion about the delay in this patient’s operative intervention. Discussion of how to decrease occurrence of postop complications would have been of benefit. It is not clear how this patient did after discharge home a couple days after the drain was placed, as that seemed rather prompt. Other options of management may have been needed to be considered. While the “15 Minute” rule has apparently improved the timeliness of getting unstable patients to the OR, there may need to be a renewed look at a “0 minute” rule in order to get patients to the OR even sooner while the personnel are being organized. Overall - fair management of case, and while some good PI, other issues could have also been addressed, and this would have been a great case to discuss in the multidisciplinary peer review meeting. Timeliness of the PI discussions was another concern.

2. **Spleen/Liver Injury**  **ISS - 38**

This elderly female was involved in MVC in which her vehicle was rear-ended. The patient did have a loss of consciousness at the scene. She also complained of left flank and chest wall pain. The patient was not initially triaged as a trauma patient. However, her initial blood pressure was 81/55. This patient was upgraded two hours later, and the trauma surgeon arrived. Further evaluation in the ED revealed a grade V spleen laceration with active hemorrhage, and multiple left sided rib fractures (8 total). The patient required two units of PRBC in the ED. It was decided to embolize the spleen. The trauma surgeon apparently went to IR with the patient, and a successful embolization was done. The patient was admitted to the ICU and an epidural catheter catheter was placed by anesthesia. The patient made gradual improvement, and was discharged to SNF one week later. Immunizations were given for this postembolization of spleen patient.

**PI** - There was documentation in the PI process of the inappropriate triage and delay in activation of this patient. There was reference in the documentation that the nurse was a registry nurse, and that they needed to look at better education of the trauma process for this nurse and others. There was also documentation about the patient’s readmission shortly after discharge from this admission with an upper extremity DVT. There was no discussion or documentation related to the treatment of this patients splenic injury.

**Comments** - There was an obvious problem with the triage of this patient, and the initial identification in the first two hours of this patient being in shock. The PI process identified this as being a major issue, and work is being done in this area (establishing core triage nurses and charge nurses). This reviewer believes that this patient should have been taken directly to the OR after identification of her shock and grade V splenic injury with active extravasation. Obviously this patient survived with the treatment of embolization, which is an option, but not first choice in an elderly patient in shock. Good assistance by anesthesia with the epidural catheter for pain management. It was discussed with the trauma team that the development of a splenic injury guideline would be a good PI project, and then monitor the appropriateness of the care provided. This patient was fortunate to have done this well, with the missed triage, missed recognition of shock, and then ongoing bleeding while IR was being arranged. Would also include in the splenic injury guideline the appropriateness of giving vaccines for an embolized spleen.

3. **Thoracic/Cardiac**  **ISS - 17**

This was a middle-aged male involved in a MCC. The patient was initially triaged as a mechanism of injury to be seen by the emergency physician. The initial vital signs were
within normal limits. He complained of left sided-chest pain. The patient was moved to one of the trauma rooms about one hour after arrival. CT scans revealed multiple left rib fractures, a small PTX, left scapular fracture, left clavicle fracture, and a left-flail chest. The patient was admitted to the ICU by the trauma service and seen in consult by orthopaedics. Pulmonary toilet, PCA for pain control, and follow-up evaluation were done. The patient was making good progress after transfer to the floor, until several days later he became acutely ill, and was found to have a large left effusion, and a diaphragm injury that was apparently not evident on the first CT scan, along with a Hb of 7.0. The patient was taken to the OR for exploratory laparotomy and found to have a splenic injury, and a splenorrhaphy was done, a chest tube was placed for the HTX and the chest was washed out, and the diaphragm was repaired. An epidural catheter was placed for pain management postop by anesthesia. The hospital course postop was relatively routine and the patient was discharged to Rehabilitation about 12 days after admission. The patient apparently missed his follow-up appointment.

**PI** - Several issues were identified in the PI process. The patient returned to the ICU from the floor. It was determined that the transfer out of the ICU was appropriate, and the patient’s transfer back with the clinical deterioration was appropriate. The delayed diagnosis was evaluated, and it was noted that even in retrospect there was not an identifiable injury of the diaphragm. It was also identified that the patient did not have follow-up because of errors at the time of discharge in arranging follow-up. There was re-education for that process.

**Comments** - Good identification and management of the acute clinical change after the patient had been transferred out of the ICU. Appropriate management and good PI efforts.

### 4. Adverse Events  
**ISS - 34**

This was a middle-aged male with self-inflicted GSW to left upper quadrant of his abdomen. He was a level 1 activation and the trauma surgeon saw the patient upon arrival. The patient was tachycardic with a heart rate around 150 while in the ED. His SBP was 100 or more. The patient was taken to CT first, and about 40-45 minutes later was taken to the OR for exploratory laparotomy. The CT scan confirmed a spleen and colon injury. In the OR the patient underwent splenectomy and resection of a segment of colon, without anastomosis, and placement of ABThera. There were numerous adhesions from a previous GSW to the abdomen. EBL was one liter. He returned to the OR the next day for colon anastomosis, and again a few days later for abdominal closure. About 2 weeks after admission, the patient remained on the ventilator and then developed hypotension, followed by CPR. The patient was resuscitated and then the family made him a DNR. He expired a couple days later. It was noted that he had a marked elevation in his WBC to over 30k around the time that he arrested.

**PI** - Issues identified included: 1) laryngoscope light would not work, 2) bronchoscope did not fully function - as could not irrigate, 3) bronchoscope - lack of enough for ICU, 4) issues with processing bronchoscopes, and 5) unexpected cardiac arrest. There was documentation of improving the “scope” issues. Also extensive discussion related to arrest - felt to be respiratory in nature, and also discussed sepsis as being a probable issue. There was documentation in the minutes of the trauma multidisciplinary quality improvement committee - related to the lack of recognition of the patient clinically deteriorating prior to his arrest. There was discussion about lack of autopsy, and the possibility of a PE (although on Lovenox), and the possibility of sepsis.
Comments - There was a delay in OR secondary to getting a CT scan that was not needed based on the GSW location and the clinical picture. Ideally this patient should have gone directly to the OR, based on the clinical status of the patient. There were extensive PI efforts. While there were multiple possibilities as the cause of the patient’s clinical deterioration (abdominal abscess, ischemic bowel, anastomotic leak, PE, etc) earlier identification and evaluation of the patient’s worsening clinical situation, would have been beneficial in potentially preventing the patient’s death. However, the lack of identification of the patient’s deterioration in clinical status did not allow evaluation prior to the patient’s arrest. There was some focus on no labs being ordered the morning of deterioration, however it should be the clinical picture that leads to further evaluation of a patient who is deteriorating. There are further opportunities for improvement with this case - such as an educational presentation related to recognition of early sepsis, etc. in a postop patient. This was also reviewed in the M and M meeting.

5. Adverse Events        ISS - 20
This was a young male who accidently shot himself in the left chest. He arrived as a level 1 activation. The initial BP was 80/64 with a pulse of 134, and he was pale. The patient underwent intubation shortly after arrival in the ED, and then blood was started and a left chest tube was placed. The patient was then sent to CT scan within 30 minutes of arrival, and then to ICU. The CT scan revealed a path from the anterior second rib through the posterior left 5th rib and into the scapula. There was active extravasation from “bronchial branches”, and evidence of a HTX/PTX. There was a total of 1300ml of blood out of the chest tube prior to going to the ICU per the trauma flow sheet documentation. The patient was in the OR just over 3 hours later because of the persistent need for blood products. The EBL was three liters and it was documented on the operative note that 4 units of PRBC and 3 units of FFP were given. The patient underwent a left posterolateral thoracotomy and “debridement of the left upper and middle lobe injuries” using a TA 60 stapler. The patient also underwent a TEE in the OR, which was negative for a pericardial effusion. Postop the patient required ventilatory support and aggressive pulmonary management with treatment for pneumonia, and bronchoscopy under the care of the trauma surgeons. He was discharged about two weeks after his injury to home.

PI - The PI process identified that there had been a change in brands of the chest tubes, without the trauma surgeons knowing. It was discussed that the initial output of 1300 ml could have “justified a thoracotomy”. It was mentioned that the attempted non-operative management was acceptable with close monitoring. There was also discussion about an iatrogenic central line injury on the right side (subclavian) - as FFP accumulated in the right chest, which was identified when a right chest tube was placed by IR. It was determined that the CVP placement was an error in technique.

Comments - With this patient’s hemodynamic status and rapid blood loss from the chest tube - this reviewer believes the patient should have gone directly to the OR for a thoracotomy. Obtaining the initial CT scan may potentially be controversial - depending on the hemodynamic status of the patient at the time. While helpful in evaluation of potential vascular injuries, this patient had clinical signs consistent with the need for an emergent thoracotomy. There was a good review of this case in the PI process, but there could be additional educational efforts (loop closure) discussing thoracic trauma with hemodynamic instability, and output of blood from the chest tube, etc. There was more opportunity for improvement with this case, and the PI process should take advantage of these type of cases to further mature the trauma program.
6. **Acute Transfer Out**  
**ISS - 9**

This was a middle-aged male who was transferred from another facility after evaluation from his mishap of falling out of a loft bed about 8 feet up. He did have a loss of consciousness, and pain in his left leg. He also had a complex laceration to his left eye involving the upper and lower eyelids and his tear duct. Apparently the patient had a previous injury to that eye years ago and is blind in that eye. His evaluation also revealed a left proximal femur fracture. The trauma surgeon evaluated the patient and determined that the patient needed oculoplastics for his eye injury, and arranged for a transfer. The femur was left in traction and the transfer arrangements were made. The CT scans were forwarded by the radiology department to the receiving hospital within the same health system.

**PI** - The transfer was reviewed in the PI process and in addition at the quarterly RAC meeting. There was excellent documentation of the RAC meeting and the quantity of issues being reviewed. This transfer was identified as a double transfer. In discussing with the trauma team, these evaluations have identified some cases that were double transfers, and then educated the referring hospitals about cases that might result in double transfer - such as pediatric injuries. These PI efforts have decreased the number of double transfers.

**Comments** - Appropriate transfer and appropriate PI. Only clinical concern is the length of time the patient was in Hare traction, as it remained in place for the second transfer also.

7. **Mortality Without Opportunity for Improvement**  
**ISS - 75**

This was a young male who was in a gymnastics class, did a back-flip, landed on his head, and then rolled over and could not move. He had agonal breathing and was in PEA when EMS arrived. They “bagged” him with oxygen and began CPR and a pulse returned. Upon arrival to the ED the patient was intubated. He did not have a pulse and CPR was re-started. He was further resuscitated and vital signs were re-established. CT scan evaluation revealed a C-2 fracture with 1 mm of displacement. There was evidence of diffuse pulmonary infiltrates. It was determined that the patient had an anoxic event, along with his quadraplegia. The patient remained with a GCS of 3, with no movement of extremities. Neurosurgery consultation was obtained and an MRI of the c-spine was recommended. An ICP monitor was placed. The patient’s pulmonary status was poor, with severe hypoxemia and also hypercarbia. The patient continued to deteriorate hemodynamically and in spite of the trauma surgeon’s efforts with resuscitation - the patient expired several hours after arrival.

**PI** - The case was reviewed in the PI committees and determined that the care was appropriate, and discussed the fact that the patient’s aspiration was likely the major cause of his difficulty with his ventilatory status. There were no opportunities for improvement identified.

**Comments** - Good PI discussion concerning case related to anoxic brain injury, quadraplegia, neurogenic shock, and aspiration pneumonia.

8. **Pelvis/Femur**  
**ISS - 4**

This was a male who got out of his car, and thought it was in park, but it was still in reverse. The car moved backwards, and the car door knocked him down and the front tire rolled over his right leg. This resulted in a right posterior hip dislocation with a fracture of the posterior wall of the right acetabulum. The patient underwent intubation in the ED with closed reduction of the hip without difficulty. Orthopaedics placed a tibial traction
pin and placed the patient in 30 pounds of traction. He underwent ORIF of his right acetabulum a couple days later. He remained in the ICU for close monitoring. There was a consult for radiation therapy to minimize postop healing complications, and the patient worked with PT. He was able to be discharged about six days after admission to home with a walker.

**PI** - There were no PI issues identified.

**Comments** - Prompt and appropriate management of this patient’s posterior hip dislocation and acetabular fracture.

9. **Pelvis/Femur**  **ISS - 14**
This was a middle-aged male was a restrained driver of a pickup truck who rear-ended an 18-wheeler that stopped suddenly in front of him. His prehospital SBP was in the 80’s, so a level 1 activation was called. The trauma surgeon was present prior to the arrival of the patient. The initial BP was 81/44. The patient responded to resuscitation efforts with an improvement in vital signs. The patient had a history of multiple myeloma. Evaluation in the ED identified no thoracic, abdominal, or head injuries. The right femur had multiple displaced fractures. The patient was admitted to the ICU for close monitoring. He was seen by orthopaedics and was taken to the OR for an IM nail of the intertrochanteric fracture, ORIF of the shaft and distal portion of the femur. Postop the patient did well, with the exception of the need for transfusions for thrombocytopenia and anemia. He had some confusion, but this improved. He worked with PT and was eventually transferred to Rehab about eight days after admission.

**PI** - There were some documentation issues identified and the follow-up of these issues were outlined.

**Comments** - Appropriate management by orthopaedics and trauma services. PI was appropriate.

10. **SDH/SDH**  **ISS - 20**
This was an older male who fell over his trailer hitting his head and had a loss of consciousness, and sustained a scalp laceration. He was seen in the ED with an initial evaluation by emergency medicine. His head CT scan revealed a large left parietal lobe contusion with minimal mass effect, along with SAH and a SDH. The patient was seen by the trauma surgeon in the ED, and admitted to the ICU. Neurosurgery consult was obtained and a follow-up CT scan was scheduled. Serial CT scans were done, which showed no significant changes. The patient was seen by PT, OT and speech therapy, and the patient was ready for discharge three days after admission.

**PI** - Several issues were identified by the PI process, including problems with ED RN documentation, and the lack of a c-collar being placed by EMS. There were discussions, along with good documentation of this case being reviewed at the EMS case review session.

**Comments** - Appropriate management of this patient’s injuries, and appropriate involvement and follow-up by neurosurgery. PI was also good.

11. **Currently In Hospital - Pelvic Fracture**  **ISS - pending**
This is an elderly female who sustained a ground level fall and was admitted to the trauma service, after arriving in the ED approximately 8 hours prior to this case review. She arrived in the ED and her initial vital signs were: BP 120/70, pulse 96, temp-98.5, and GCS - 15. Within a few minutes of arrival in the ED her BP dropped to 90/64. She was evaluated by an emergency physician. Almost 2 hours later the patient went to CT
The scans revealed a right acetabular fracture, sacral fracture, and superior/inferior pubic rami fractures. Almost 4 hours after arrival in the ED a level 2 trauma activation was called. The patient was diagnosed with the above pelvic fractures, along with atrial fibrillation with RVR. Consults with orthopaedics and cardiology were called, and the patient was admitted to the trauma service on the telemetry floor. The patient’s labs included: Na- 133, WBC - 23, H/h - 11.2/34, and platelets - 283k.

**PI** - Pending as patient was just admitted to the hospital.

**Comments** - Delay in trauma activation for a trauma patient identified with pelvic fractures and also with an unstable arrhythmia. This case should be reviewed in the trauma PI process because of the delay in trauma activation.

### 12. Death with OFI  ISS: 26

This was a middle-aged male was a victim of a motorcycle versus car crash. The patient was not helmeted and noted by EMS to have had a loss of consciousness and decreased GCS. EMS scene time was 20 minutes with an eleven minute transport time. The patient was activated as a Level 1 (911) patient and the trauma surgeon was at the bedside within five minutes of the patient’s arrival at the trauma center. The patient’s injuries included: closed head injury; liver laceration, grade 3; renal laceration, grade 5; an open humerus fracture, a L2-3 lumbar fractures, and an open tibia/fibula fractures. EMS did not record any hypotension in the field, however, the patient’s first blood pressure in the resuscitation area was < 90 mm Hg. Three liters of IVF were infused in the ED, but no blood products, a single FAST exam was negative for free fluid in the ED, but noted to have a “rigid” abdominal examination. The patient was taken to the CT scan within 20 minutes of his arrival in the ED. Several episodes of hypotension were noted in the ED. The patient was transported to the SICU two hours after his arrival. MTP was activated in the SICU after his initial set of vital signs was consistent with shock. The first unit of blood was transfused two hours after the patient’s arrival to the trauma center. CT images were reviewed and the patient was noted to have a large retroperitoneal hematoma. The trauma surgeon consulted interventional radiology for their opinion on embolization. IR declined. The patient was taken to the OR three hours after his arrival to the trauma center. Aortic occlusion preceded the repair of the liver laceration and the nephrectomy. An AbThera™ vacuum dressing was placed and the patient was returned to the SICU. The patient appeared to be in DIC and ultimately suffered a cardiac arrest approximately 11 hours after arrival and expired.

**PI**: The PIPS program identified several key issues in the case which included: 1) incomplete VS documentation on the ED flow sheet, despite several readings of hypotension. Hourly VS were not recorded; 2) significant delay to the OR and the question to take an arguably unstable patient to the CT; 3) delay in MTP and blood transfusion. The PIPS also reviewed the MTP ratios as well as questioning whether a second FAST exam or perhaps a DPL should have been done in an unstable patient.

**Comments**: Thorough discussion on the issues identified. The PIPS program identified key issues and closed the loop on the discrepancies in care. They ruled this death as anticipated with opportunity for improvement, but a case could be made for an unanticipated mortality with OFI.

### 13. Unanticipated death with OFI  ISS: 8

This was an elderly female who was involved as an unrestrained rear passenger in a MVC. EMS noted a loss of consciousness and she was flown to the trauma center. She was taking warfarin for atrial fibrillation and had several other comorbid conditions. She
arrived at the TC and was not activated until 58 minutes later. The initial assessment and
workup was done by the ED staff. A FAST was not done. Several blood pressures were
noted to be less than 100 mm Hg. Despite the vital signs, her age, and comorbid
conditions, she was transported to CT scan and the following injuries were noted:
intracerebral hemorrhage, a C2 fracture, a L4 fracture, a renal laceration, a liver laceration
and a spleen laceration with perisplenic hematoma. The trauma service was notified at
this point after the diagnosis was made by CT scan. Prothrombin Complex Concentrate
(PCC) was ordered along with tranexemic acid (TXA). The ED gave a dose of
solumedrol as well. The PCC, TXA, and blood were given 90 minutes after the patient’s
arrival. She was taken to the OR at 1500 after she was noted to be distended and with a
BP < 90 mm Hg. The communication between the ED/OR teams was poor and the
patient lost two of three IVs during the transport to the OR. The patient lost VS as she
was being moved to the OR table and a left anterior thoracotomy was performed and
open cardiac massage was performed after the aorta was cross clamped. The patient
expired in the OR.

PI: The PIPS program identified the following issues: 1) ED documentation was
incomplete; 2) No FAST exam was performed; 3) failure to recognize shock in this age
group; 4) delay in activation of the trauma service, delaying until a diagnosis was
obtained; 5) communication issues between the ED and OR teams; 6) delay in the OR
inducing the patient due to equipment issues. A thorough discussion on each item and
appropriate follow up from the liaisons at the peer meeting was conducted.

Comments: PIPS developed a policy and reviewed the activation criterion for the ED.
The ED staff and physicians have problems with identifying and triaging trauma patients.
This may be due to the extensive turnover in the nursing and physician ranks within the
ED. I agree with the PIPS team review.

14. Anticipated Death with OFI	ISS: 30
This was a young female victim of a MVC with rollover and ejection, and was noted by
EMS first responders to be in cardiac arrest upon their arrival. EMS intubation and CPR
reestablished spontaneous circulation. GCS was 3 and due to the cardiac arrest, EMS
transported the patient to the nearest hospital (level 4) were she was stabilized and noted
to have a right pneumothorax and had a chest tube placed. At the level 4 a CT scan was
also performed, and 5 L of IVF were infused and four units of blood were transfused. A
norepinephrine drip was also started and the patient was flown to the trauma center where
she was noted to be without a neurologic response and she suffered a cardiac arrest in the
ED shortly after arrival and was pronounced death.

PI: There was excellent documentation by the ED staff on this case. The PIPS program
identified several issues: 1) prolonged initial EMS scene time; 2) delay in transfer from
the level 4 center. A robust discussion about the issues ensued and letters and electronic
mail was generated in a collegial fashion with the outside EMS agency and the level 4.
Loop closure was done with receipt of letters of response. Education was ongoing.

Comments: Basically a non-survivable brain injured patient who had herniated already
was transferred to the trauma center. The HBMC corresponded with outside agencies and
tried to educate the providers.

15. ISS > 25	ISS: 29
This case involved a young male who was a victim of an auto versus pedestrian collision.
The patient survived and had a length of stay of 10 days. He was initially activated as a
trauma within 6 minutes of his arrival and the trauma surgeon was at the bedside within
ten minutes of the activation. The following injuries were identified: a SDH with a skull fracture; facial fractures; an open femur fracture, tibia/fibula/ankle fractures, along with foot fractures. Orthopaedics and neurosurgery was intimately involved in his care. Alcohol screening was completed.

**PI:** the PIPS program identified problems with the ED documentation and inappropriately small IV catheter placement. Discussion was held at the PEER and Nursing process meetings and the documentation expectations were reviewed as well as placement of appropriate sized IV catheters. Loop closure was performed.

**Comments:** none

### 16. SDH/EDH  
**ISS:** 24

The patient was a young male involved in an altercation with law enforcement which resulted in him being shot in the head and shoulders by the police. His injuries included: intracerebral hemorrhage, SDH, right scapula fracture. He arrived at the TC and was activated and had a medication assisted intubation. He was in the CT scanner in 21 minutes after arrival and neurosurgery was consulted and had him into the OR for craniotomy < 90 minutes. The patient survived and was discharged to a correctional facility with medical capabilities.

**PI:** The PIPS program supported excellent ED staff documentation. Timeliness to the CT scanner and ultimately to the OR was confirmed. Alcohol questioning was not done during the hospitalization. Loop closure was performed during the case review.

**Comments:** none

### 17. Adverse Event (unanticipated death)  
**ISS:** 22

This case involved an older male who had been involved in a MVC and sustained the following injuries: bilateral multiple rib fractures, a right pneumothorax, a fractured sternum, a calcaneal fracture and a mesenteric hematoma and possibly a SMA thrombosis as a result of his blunt abdominal injury. He was admitted to the SICU. He did receive blood transfusions and was placed on a heparin drip for the SMA thrombosis. He was placed on a PCA for pain control in the SICU. Two days after admission, he was placed on high flow nasal cannula and a regular diet. The day after, he was noted to have a poor cough effort, but was sitting up and using an incentive spirometer, but his abdomen was noted to be distended and the team felt he was developing an ileus. Later that evening, he developed SVT and cardiology was consulted for rate control and cardiac assessment. The next day, he was noted to be more confused although he had converted to NSR with medications. His hemoglobin was noted to be < 10. A KUB was obtained and the radiologist hinted that there may be evidence of free air, but no documentation was seen between the radiologist and the trauma surgeon. No evidence in the chart that the trauma surgeon saw this exam. The next day, the patient was noted to be tachyplecic and hypoxic. The patient was placed on BiPAP and shortly thereafter had several episodes of bilious emesis. He was intubated for presumed aspiration and quickly deteriorated into a septic condition with hypotension and the need for vasopressors. The patient expired later in the day.

**PI:** The following issues were identified during the PIPS review: aspiration pneumonitis, failure to recognize ileus and the need for a NGT versus further imaging to delineate the possible free air, the use of BiPAP in a high risk individual for aspiration versus early intubation. No autopsy was performed. The county lacks a medical examiner. Death certificates are managed by non-medical person (Justice of the peace). A good discussion
reviewed all of the topics and closed loops. Critical care was performed by the trauma service. There was a concern about the failure to review the KUB.

**Comments:** low autopsy rate, cost is an issue in obtaining autopsies. The bodies have to been transported to Dallas in criminal cases. This should have been reviewed as an unanticipated death with OFI, rather than an adverse event. The TPD picked this up during chart review and discussed with her registrars about the coding of the case.

18. **Dehiscence; Adverse Event**  **ISS: 4**
This case involved a young male who was involved in a MVC and admitted to the SICU after blunt abdominal injury with an initial CT scan showing some free fluid in the right colonic gutter, initially presumed to be associated with a liver laceration. Overnight the patient developed increasingly worse abdominal pain and the second CT, obtained the next day, found increasingly significant amounts of free fluid as well as new free air. The patient was taken to the OR and a jejunal perforation was noted. A partial small bowel resection was performed with primary anastomosis and fascial closure after 5 liter irrigation of the peritoneal cavity. The skin was packed open, but closed secondarily on postoperative day 3. On the postoperative day #9 after the closure, the wound had dehisced. Debridement and closure was performed.

**PI:** several issues were delineated by the PIPS program: Delay in diagnosis; OR after 24 hours for an abdominal exploration; the dehiscence, re-admission to the ICU, and the wound infection causing the dehiscence. The case was discussed at several forums and the staff involved were counseled by the TMD and discussion revolved around the delay in diagnosis and the operative management thereafter.

**Comments:** appropriate review and conclusions. Loops were closed.

19. **SDH/EDH (anticipated death with OFI) ISS: 35**
The patient was an elderly male who sustained a ground level fall. He was noted to have sustained a SDH while on plavix as well as a left hip fracture that was noted a couple days after admission after recurring pain in the hip. HD#2 noted increased size in SDH and neurosurgery recommended craniotomy, but family refused. The patient was intubated and remained in the ICU. Eventually the patient was extubated, but he was noted to have dysphagia, so a PEG was performed and the left hip was repaired by orthopaedics. Postoperatively, the orthopaedic surgeon used a standing order set and placed the patient on lovenox without conferring with the neither the trauma surgeon nor the neurosurgeon. Within 2 days, the patient’s mental status declined again and he was reintubated and sent back to the ICU where a CT of his brain showed a significantly enlarged SDH with shift. The family consented to the craniotomy but the patient never recovered and was extubated and transferred to hospice.

**PI:** The PIPS team identified several issues: 1) delayed craniotomy; 2) delay in the diagnosis of the hip fracture; 3) Lovenox in a patient with a SDH; 4) UTI. Discussion revolved around family’s wishes and the benefit of a craniotomy in a 75 year old already on Plavix. The orthopaedic surgeon admitted his error in the Lovenox order without conferring with the primary team or neurosurgeon. Orthopaedics has revised their postoperative order sheets.

**Comments:** none

20. **Adverse Event, aspiration (death)**  **ISS: 13**
This case is an elderly male who had fallen and was noted to have a hip fracture and C7 transverse process fracture. His hospitalization was complicated by dysphagia. He had his
hip fixed during the hospitalization, but failed a swallow test which resulted in a NGT placement for nutritional support on HD #3. By hospital day #6 he was noted to have respiratory insufficiency and was moved to the SICU where he was intubated and subsequently received a therapeutic bronchoscopy. He developed septic shock and died from a cardiac arrest.

**PI:** Issues revolved around surveillance CXR and the readmission to the ICU. It was well documented head of bed position and the monitoring on the floor. Cardiac arrest was unexpected during the intubation and felt to be a result of hypoxia.

**Comments:** the death was reviewed and ultimately felt to be unanticipated with OFI, but was initially sorted as an adverse event. The registrar was new to the position. The category and review was picked up by the TPD.

**21. Transfer Out**  
**ISS: 25**

This case involved a middle-aged male who was a victim of a motor vehicle versus pedestrian collision. He was noted by EMS to be hypotensive in the field. In the trauma resuscitation area he was noted to have the following injuries: multiple rib fractures, a pneumothorax and humerus fracture. His CXR showed a widened mediastinum and a CT angiogram was performed which showed a transected thoracic aorta. Due to the patient’s hypotension, he was receiving blood and FFP. Cardiothoracic surgery was consulted and recommended to transfer the patient to a higher level of care for consideration of endovascular repair. The patient was intubated in the ED and a strategy of permissive hypotension was performed, however the SBP was kept < 100 mm Hg, but he heart rate was allowed to fluctuate between 110 and 120.

**PI:** There was only a cursory primary review. This was the TMD patient and he stayed at the bedside and facilitated the transfer and monitored vital signs. No issues were identified by the PIPS team.

**Comments:** Appropriate consultation and transfer. Beta-blockade was not utilized during this patient’s ED stay and when asked the TMD felt the BP was low enough without it, but was not sure what the effect the tachycardia could have on the transection. There was no discussion about the management of the patient in the PIPS record.

**22. Adverse Outcome**  
**ISS: 20**

This case involves a young male who fell from his horse and then the horse fell on him. He was initially contacted by EMS and was transported, arriving as a level 2 activation 20 minutes later. His initial complaint was right chest pain and throughout his EMS course he had an oxygen saturation reading of 84%, which gradually improved to 97% on oxygen. The emergency physician and trauma surgeon were present upon the patient’s arrival. The patient had an initial portable chest x-ray, which demonstrated multiple right-sided rib fractures and the subsequent CT scan of the head, neck, chest, abdomen, and pelvis, which was significant for six right rib fractures, pulmonary contusion, liver laceration, and pancreatic contusion. The patient was stable throughout his ED course and was admitted to the SICU. On HD#5 the patient had decreasing oxygen saturations, so he was intubated electively by anesthesia. On HD#8 the patient self-extubated, and was re-intubated by the emergency physician. The patient’s hospital course was prolonged, but he was eventually discharged on HD#17 with intact neurologic function.

**Hospital PI:** The PI process identified a number of areas for improvement, including nursing documentation in the ED, sedation of patients who are agitated and not responding to conventional medications, and the potential for a delayed complication of a colonic stricture.
Was the Trauma PI Activity Appropriate? Yes

Reviewer’s Comments: The PI on this patient was excellent. All of the issues identified by the reviewer in this case were also identified by the trauma coordinator in a manner that was temporally close to the incidents. There is excellent evidence of feedback and loop closure, including in-service sessions for the nurses regarding alternative medications for sedation and treatment of alcohol withdrawal. The reviewer’s only criticism is the paucity of documentation by the physician staff in a very complicated patient with a prolonged inpatient course.

23. Subdural/Epidural

ISS: 26

This case involves an elderly male who was found down by EMS with a GCS of 3. The EMS personnel transported the patient, and arrived 8 minutes later. There was no evidence of trauma, so the patient was not called out as a trauma alert. Shortly after arrival to the ED the patient was intubated and a head CT was obtained, which showed a large subdural hematoma with shift and a probable CVA. After the patient returned from CT, anticoagulation reversal was instituted and trauma surgery and neurosurgery were consulted and the patient was admitted to the SICU. Ultimately the family opted to withdraw support and the patient expired on HD#4.

Hospital PI: The case was reviewed and the care was determined to be appropriate. The primary issue identified was incomplete ED nurse documentation of the mechanism of trauma and the level of activation.

Was the Trauma PI Activity Appropriate? Yes

Reviewer’s Comments: There were no care issues identified by the reviewer in this case, but the nursing documentation in the ED was not complete. The TPM identified this issue and feedback was given to the nursing staff with suggestions for improvement, all of which were excellent.

24. Anticipated Mortality with Opportunities for Improvement

ISS: 41

This case involves a middle-aged female who was a victim of a motorcycle versus auto accident. She was found underneath the car, cyanotic with altered mental status and evidence of pelvis and chest trauma. EMS transported the patient, and arrived at the ED 7 minutes later. The patient was a level 1 activation and the emergency physician and trauma surgeon were present at the patient’s arrival. The patient was intubated by the emergency physician shortly after arrival and was given IVF for hypotension, which was transient. The FAST exam was normal and the patient was taken to the CT scan, where she arrested. She was brought back to the ED with plans to take her emergently to the OR, but she arrested again and was unable to be resuscitated. An autopsy was performed, which identified many significant and lethal injuries including a transected aorta, multiple solid organ injuries, and multiple fractures.

Hospital PI: Multiple issues were identified during the PI of this case, although the outcome of the case would not have been altered. Specifically, issues related to acute vascular emergencies and a discussion was documented regarding how to expedite their care and who is responsible for performing the angiogram in these cases. The stakeholders in these discussions were contacted and consensus was reached.

Was the Trauma PI Activity Appropriate? No

Reviewer’s Comments: While there were no ED or trauma surgery care issues with this case and the ultimate outcome of the case would not have been affected, there were EMS issues that should have been addressed. Despite identifying an unstable pelvic injury, the paramedics did not apply a pelvic binder. They additionally did not intubate this critically
ill patient in the field. It is the reviewer’s opinion that these issues should have been
brought to the attention of the EMS providers.

25. Pelvic-Femur Fracture  ISS: 34
This case involves a middle-aged driver of a dump truck that rolled over, trapping his left
leg. He also complained of chest and shoulder pain, and numbness to his leg. EMS
transported the patient, with prolonged scene time due to a difficult extrication. The
patient was called out as a level 2 activation at after the patient returned from the CT
scanner and was found to have multiple left-sided rib fractures, pulmonary contusion,
iliac crest fracture, pelvic fracture, clavicle fracture and gluteal hematoma with
extravasation. After being paged, the trauma surgeon arrived. The patient had an
angiography performed, which failed to show active extravasation, so embolism was not
performed. The patient was admitted to the SICU. His inpatient hospital course was
complicated by development of a left-sided hemothorax requiring chest tube placement
and a subsequent pneumothorax after the chest tube was removed, which required a
thoracic vent. He was ultimately discharged to home on HD#11.

Hospital PI: The hospital PI process identified documentation of I and O’s on the
inpatient service as an opportunity for improvement.

Was the Trauma PI Activity Appropriate? No
Reviewer’s Comments: There were significant issues with recognition of the seriousness
of this patient’s condition in the ED, with a level 2 alert only being called after the
patient’s injuries were identified. The reviewer felt that this patient had a number of
injuries that should have been suspected or identified during the emergency physician’s
initial assessment that would have prompted a more expeditious level 2 activation. This
case was identified by the reviewer as a high-risk case.

26. Pediatric Patient  ISS: 4
This case involves a grade-school aged female who fell and landed on a pole that
penetrated her perineum and inferior vagina. EMS contacted the patient, transported her,
and arrived to the ED 15 minutes later. The patient had no other identified trauma,
maintained stable vital signs, and was transported non-emergently. OB/gyn was consulted
and they took the patient to the OR, where she was found to have a 3rd degree perineal
laceration that was repaired. She had an uneventful hospital course.

Hospital PI: No issues were identified and the patient was not seen by the trauma
service.

Was the Trauma PI Activity Appropriate? Yes
Reviewer’s Comments: There are no care issues with this case and there were no
indications for involving the trauma service.

27. Pediatric Patient  ISS: 5
This case involves a child who fell off a swing, striking his head on the ground. There
was no loss of consciousness, but the parents drove the patient to the ED because he was
not acting normally. The emergency physician saw him and ordered a CT scan of the
head. It showed a small amount of subarachnoid hemorrhage, which prompted a level 2
activation. The patient was admitted and observed overnight with a repeat CT scan of the
head showing no progression of the subarachnoid hemorrhage, so he was discharged.

Hospital PI: No quality issues were identified.

Was the Trauma PI Activity Appropriate? Yes
Reviewer’s Comments: The reviewer found no patient care issues in this case.
28. Anticipated Mortality with Opportunities for Improvement ISS: 57
This case involves a young male who was the unrestrained passenger in a highway speed motor vehicle accident. The patient was initially contacted by a ground ambulance crew who found him with altered mental status, a near amputation of his arm, an open right femur fracture, and lacerations to his chest and abdomen. A helicopter crew was called to the scene. They intubated the patient, placed a tourniquet in the right arm, and transported the patient to the site survey hospital as a level 1 activation. En route the patient received 3,200 cc of intravenous fluid, but had falling blood pressures (lowest recording 86/50) and increasing heart rate (highest 130 BPM). The emergency physician and trauma surgeon were present for the patient’s arrival. He was hemodynamically unstable with an oxygen saturation of 42%, which prompted placement of bilateral chest tubes. The patient had extensive thoracic, abdominal, and musculoskeletal injuries and care was withdrawn on HD#3 after brain death was determined.

Hospital PI: Multiple issues were identified by the PI process, specifically prehospital right main stem intubation, tension pneumothorax with significant hypoxia upon ED arrival, issues with patient labels and stickers, and issues with the monitors in the ED to read plain films.

Was the Trauma PI Activity Appropriate? Yes
Reviewer’s Comments: The discussion, documentation, and feedback through the PI process was excellent. A number of issues were identified, both large and small, and all of them were addressed and brought to resolution. In particular, the communication and feedback to the prehospital providers was excellent. The reviewer found no issues that ultimately impacted the outcome of this patient.

29. Splenic injury ISS: 17
Description: This case involves a young male who was ejected from a rollover accident where the other occupant was pronounced dead on scene. The patient was initially contacted by ground EMS providers who transferred care to a helicopter crew for transport. The helicopter arrived 38 minutes after the accident, departed, and arrived at the site survey hospital. He was seen by the emergency physician on arrival, who ordered CT scans of the head, neck, chest abdomen, and pelvis. The patient was upgraded to a level 2 activation and the trauma surgeon was documented to be present at that time. Imaging revealed that the patient had a liver laceration, splenic laceration, sternal fracture, and multiple spinal transverse process fractures. The patient was admitted to the SICU. Orthopaedics was consulted and the patient had an uneventful inpatient course and was discharged on HD#3.

Hospital PI: The PI process identified issues with documentation in the ED and feedback was given to the nurse director.

Was the Trauma PI Activity Appropriate? No
Reviewer’s Comments: The reviewer identified issues with not recognizing the severity of this patient’s mechanism and injuries by the ED staff. Specifically, the patient was ejected, the other occupant died on scene, and the accident was the result of a highway speed accident. It is recommended that triage criteria be reconsidered to more appropriate identify the potential for significant injuries from the prehospital setting.

30. Non-Surgical Admission ISS: 14
Description: This case involves an older male who was drinking and fell down 10 stairs. He was initially seen at an outside facility and referred to the site of the trauma site
survey when he was found to have 2\textsuperscript{nd} and 6\textsuperscript{th} rib fractures. Trauma surgery was consulted and based on his multiple concomitant medical problems; he was admitted to the medical service.

**Hospital PI:** No care issues were identified.

**Was the Trauma PI Activity Appropriate?** Yes

**Reviewer’s Comments:** The reviewer found that admitting this patient to a medical service, despite his acute trauma, was the correct course of action. There were no sequelae from his trauma, but his multiple medical issues posed issues for his inpatient care.

### 31. Thoracic-Cardiac

ISS: 24

This case involves a middle-aged male who was trimming a tree when he thinks he was struck by a tree branch and fell from the ladder. EMS arrived on scene, transported the patient, and arrived at the location of site survey hospital 13 minutes later. Their assessment found him to have a GCS of 14 and multiple areas of tenderness. He was seen by the emergency physician who ordered CT scans and plain radiographs that demonstrated a large hemo-pneumothorax, multiple rib fractures (2\textsuperscript{nd}-10\textsuperscript{th}), multiple stable spine fractures, and a tibia and fibula fracture. Trauma surgery was consulted on a delayed basis and they placed a chest tube, sutured the patient’s lacerations, and admitted him to the SICU. During his hospital admission, orthopaedics and neurosurgery were consulted, pain control and pulmonary toilet were provided, and the patient was fitted with a Miami brace. He was discharged to rehab on HD#12.

**Hospital PI:** The primary issue discussed pertained to difficulty fitting the Miami brace. There was excellent documentation of the issue and the communication with the supplier.

**Was the Trauma PI Activity Appropriate?** No

**Reviewer’s Comments:** The reviewer found that there were significant issues related to under triage and failure of the emergency physician to recognize the severity of the patient’s injuries and physical exam findings that could have led to a more prompt Level 922 activation and trauma surgery consultation. While there were no identified adverse sequelae from the delay in diagnosis, this was identified as a high-risk case.

### 32. Death Anticipated with Opportunity for Improvement ISS 29

This is a young female involved in a MVC and was in extremis, and was a scene EMS transport with a less than 20 min scene time. Clinically she was unstable with rapid pulse and non-palpable blood pressure. With a GCS of 8, a BVM was placed and EMS was unable to establish PIV. The patient was a level I activation, she was moaning with hypertensive vitals, GCS 13, however, she deteriorated quickly upon arrival to ED and CPR with ACLS protocol was initiated. She was intubated with RSI immediately on arrival, PIV and cordis was placed. She was fluid bolused and MTF protocol initiated with 7 units of packed cells administered. The patient had a large open chest wall wound and at that point the wound was enlarged and open cardiac massage was initiated. A pelvis fracture was identified and a binder was placed. The FAST was positive and she was transported to OR in 45 minutes for an exploratory laparotomy and cross clamp of the aorta. No cardiac or pulmonary injuries were found, the exploratory lap was negative however noted expanding retroperitoneal area. Multiple units of colloids were infused the patient remained unstable and expired in the OR. Diagnoses, traumatic arrest, open thorax, stable rami pubis fracture, and retroperitoneal bleed.

**PI:** Issues identified of malfunction pager. Pager had failed to notify simultaneous team members including the trauma surgeon, and lack of understanding how to activate a
manual paging in the ED. Trauma surgeon responded 16 minutes post arrival. Additionally, identified the lack of platelets available for the MTF protocol and OR staff not administering platelet in a MTF protocol. Minutes noted discussion and questioned regarding non-clamping of aorta in ED.

**Comments:** Demonstrated robust minutes and time line of events and addressing pager system. Evidence of ongoing education and systems process with MTF process. In depth discussion of operative management or cause of death was not addressed. Reviewer discussed with attending the suspected probable lethal injuries, noted unknown due to no autopsy. Questioned if suspected IVC injury? The committee consensus was blunt force and retroperitoneal injury. EMS runs form available and complete. The ongoing tracking and trending and individual review of MTF process and colloids given continues. Consistent administration of the sequence of colloid continues to be an issue.

### 33. Death with Opportunity for Improvement ISS 59

This is a middle-aged male who was a pedestrian struck by multiple vehicles. He was an EMS scene transport within 20 minutes with hypotensive vitals which progress to a traumatic arrest in the field. He was intubated and one IV established and CPR with ACLS initiated at the scene.

On arrival, he was a level 1 activation with the trauma surgeon present. The GCS was 3, hypotensive vital signs returned and the FAST was positive. The patient remained unstable with intermittent CPR with ACLS protocol. MTF was initiated timely. Emergent injuries were addressed, a chest tube was placed and he was taken to the OR in 1 hour. An exploratory laparotomy was performed with a splenectomy, nephrectomy and mesenteric repair. The patient was managed in a damage control mode with a packed open abdomen and continuing in intermittent CPR in OR. MTF continued with a total of 32 UPC, 24 FFP, 4 platelets and 30 units of cryoprecipitate. He was transferred to ICU in 1.5 hrs. With coagulopathy and acidotic. MTF continued with warming of the patient and supportive drips infused. The patient continued to decline and expired within hours in the ICU. Injuries include large liver laceration, large spleen laceration, kidney laceration, an expanding retroperitoneal bleed and multiple limb fractures.

**PI:** Minutes demonstrated of discussion of the case. Issue identified is lack of manual blood pressure cuffs available in the ED. Demonstrated loop closure of additional BP cuffs.

**Comments:** Level 2 and level 3 review PI process demonstrated, minutes robust in discussion of case. Solid organ grading not documented. Trauma flow sheet documentation complete with warming of patient and fluid noted. EMS documentation complete. Extended ED dwell time was not noted assumed due to the unstable patient and unable to transport to OR earlier. Care was addressed in an expedited manner in the OR.

### 34. Death Without Opportunity For Improvement ISS 27

This is an elderly male MVC driver with one victim DOS with entrapment time of > 20 min. The patient was an air transport with flight time < 20 min, GCS 15 with intermittent hypotension. He was a level 1 activation, with the trauma surgeon on arrival. With intermittent hypotensive episodes in ED, he received one unit of blood however initial Hgb was stable. The FAST exam was positive for free air and bilateral open femur FX, with non-palpable pulse bilateral. He was transported to the CT in 45 minutes postarrival and to the ICU 1 hour post arrival. Images identified small SDH. The patient continued to decline with elevated myoglobin levels, BD – 6 and 4 unit blood given. Unthawed FFP
and a stat ECHO was ordered however were not completed due to the patient experience dysrhythmia, with cardiac arrest and expired in ICU within one hour of arrival.

**PI:** Minutes identified delay of splints applied in the ED due to tractions not available. PI documentation provided evidence of purchase and placing of extra splints in the ED. Discussion surrounded death due to disease related and probable MI.

**Comments:** Care was performed timely. CT transition appears to be a slight delay. Orthopaedics present in ED to stabilize femur fractures and vascular evaluation was not evident. Attending discussed case via phone with ortho. Reviewer question if vascular could have had a role in the vascular assessment as well. Neurosurgeon was consulted via a phone conversation and noted would see the patient in the ICU. Nursing flow sheet and EMS run form complete. H& P well documented with plan of care and critical thinking evident. This was a lethal injury in the elder population with lack of cardiac reserve.

**35. Pediatric ISS 4**
This was a young boy who fell off a chair in school and was transported via the parents to the ED. He was seen timely in the ED with a GCS 15 and stable vitals. CT ordered and to CT 38 minutes post order. Trauma surgeon consulted post CT results of a frontal skull fracture. The patient was transferred to pediatric general medical unit med floor in four hours and was discharged home in 1 day.

**PI:** This case was reviewed due to fall out of screening indicators of “LOS in ED > 4 hours” and “delay of trauma notification > 3 hour.” Level 1 and level 2 review with assessment of timeline and rationale of care was well documented.

**Comments:** Care was adequate and managed appropriate. Plan of care evident.

**36. SDH/SAH ISS 26**
This is a middle-aged male pedestrian who was struck and who was transported via EMS within 20 min with established PIV, BVM with adequate oxygenation and a fix, and dilated pupil.

This was a level 1 activation, the trauma surgeon was present shortly after arrival. The patient was intubated immediately and transferred to the CT timely. Findings were a moderate SDH bilateral with mid- line shift, SAH, hemorrhagic contusions, and diffuse axonal with moderate brain stem hemorrhage. He was transferred to ICU in 45 minutes. The neurosurgeon was consulted with an ICP placed in the ICU one post admission and standard TBI management measures initiated. Due to increased ICP pressures a craniotomy was performed on hospital day one. He had a lengthy hospital course with complications to include sinusitis and aspirate pneumonia. He progressed to skilled nursing facility in a comatose state. LOS 18 days

**PI:** Case was a level I review noted lack of ED temperature documentation. Demonstrated PI process of addressing to ED leadership. No other care issues identified

**Comments:** Care appropriate, timely TBI management and neurosurgeon response. In general the reviewer noted difficulty identifying sub specialty notification and response times in the chart documentation.

**37. Pelvis ISS 9**
This is a young female MVC with positive ETOH transported via EMS within a 20-minute timeframe. She was a level 2 activation due to mechanism. She was seen in ED with stable vital signs GCS 15, evaluated by ED physician with a femur fracture and seen by trauma surgeon within 90 min per criteria std post CT results. Orthopaedics was
consulted, evaluated and traction placed in the ED. IM nailing was performed in the AM on the day of admission. ED dwell time approximately 3 hours.

Care uneventful and LOS 4 days

**PI:** Level I review identified issue of missing components of nursing documentation.

Demonstrated PI of addressing issues with ED management.

**Comments:** care appropriate.

**38. Non-surgeon Admit**

**ISS-9**


**PI:** None. Aggregate surveillance report of all admits to non-surgical service reviewed. Each undergo a Level I review and Level II if significant mechanism of injury or diagnosis.

**Comment:** Adequate. Recommend adding ISS to surveillance report

**39. Spleen/Liver**

**ISS-29**

This was a middle-aged unhelmeted male in motorcycle crash, ejected. c/o neck, back, & LUQ pain. EMS VS: 126/68-97-18-15 at 100% pOx. Immobilized with collar/backboard, 20 min transport time. ED VS: 99.5-83/55-65-16, GCS-15; 98% pOx. ED eval with + FAST documented. Level I trauma team activation 27 min after ED arrival. Criteria: SBP < 90 and mechanism. Trauma surgeon arrives 11 min after notified. Pt had brief hypotensive episode treated with 2L crystalloid bolus. CT done in ED then admitted to SICU. ED LOS: 2:45. Dx: Lt rib fractures x7 with flail, Gr IV Spleen laceration, basilar skull fracture, Lt clavicle & scapula fracture. All treated non-op. Pneumothorax treated with pulmonary toilet. Pt DC to Acute Rehab on HD-6 with activity restrictions and 2 week follow up.

**PI:** Level I review noted with no issues identified.

**Comments:** Level I activation criteria met but team not activated upon ED arrival.

**40. Femur/Pelvis**

**ISS-14**


**PI:** OFI identified when patient transported to Rad Oncology. Out of hospital x 8 hrs unaccompanied. Documentation noted meetings with EMS & Rad Onc staff to revise procedure with prenotification to reduce wait time and for EMS to stay with patient. Four successive transports showed an average time out of hospital at 20 minutes.

**Comments:** Good follow through and results of process change.
41. Anticipated Mortality with OFI

This was an elderly male who sustained self-inflicted GSW to abdomen while home upon DC from hospital with new Dx: Liver failure. Transported by air following rendezvous with 1st responders. EMS VS: 124/88-79-14, GCS-15. Received fentanyl & zofran enroute. Level I trauma team activated upon arrival. FAST done+. MTP initiated intraop with 16 RBC/2 FFP/2 Cryo/1 Plt administered as well as ACLS meds. Procedures included: Ex Lap, lysis of adhesions, hepatorraphy x2, chole, small bowel resection, splenectomy. Due to coagulopathy, surgeon discussed condition with family who opted to pack and transfer to SICU to spend remaining time with patient. Pt expired on HD-1.

PI: Case reviewed in level 1, level 2, and discussed in M&M with trauma surgeons. Discussed the “15-minute rule” as related to timing of care; not meeting 1:1:1 MTP goal; wasting of thawed FFP; potential for damage control surgery and management of coagulopathy. Letters sent to Anesthesia for blood wasted and to ED for not having 2 large bore IVs established & GCS documentation discrepancy.

Comments: This case would have benefited from review in multidisciplinary PI committee with liaison participation.

42. ISS > 25

This was a young male unrestrained driver of truck rollover at 40 mph, partially ejected. EMS on scene 16 min with 10 min transport time. Level 2 trauma team activated 14 min after ED arrival. Criteria: ED physician discretion. Rapid response of trauma surgeon. ED LOS: 1 hr. Dx: Gr IV Spleen, Gr IV Kidney, and Gr II Liver lacerations; fracture Rt 1st rib and Lt ribs x 8; Lt. hemopneumothorax, complex pelvic fracture, L1-5 transverse process fxs, 15 cm diaphragm laceration. Pt admitted to SICU, chest tube inserted and planned angio embolization. Pt became unstable so taken emergently to OR for ExLap at which time the diaphragm injury found. Splenectomy & bilateral pelvis ORIF performed. Vaccinations administered at DC. Pt DC home on HD-7.

PI: Case reviewed in level 1, level 2, and surgical M&M. Initially reviewed for > 60 min to OR of unstable patient but found appropriate due to planned angio and appropriate decision to go to OR after becoming unstable. Letters to ED for lack of documentation, signature & rectal temp.

Comment: Delay of recognizing and activating team. Documentation of discussions of OFI adequate but could benefit from review by multidisciplinary PI.

43. Transfer Out

This was a young female fell from top bunk. Parents transported patient to ED after noting blood in ear. Head CT obtained. Nighthawk reported 1 hr later Dx: Temporal bone fracture. Level 2 trauma team activated upon CT results, 2 hrs after ED arrival. Criteria: Skull fracture. Rapid response of trauma surgeon. Trauma flow sheet initiated after team activated. Pt transferred to a children’s hospital 3:45 after ED arrival. Follow-up obtained from referring hospital. LOS 1 day.

PI: Not reviewed in trauma program. Radiology review noted discrepancy of missed sm pneumocephalus in temporal lobe. Trauma surgeon notified.

Comments: Team activation criteria based on CT findings result in delay in surgical consult.
44. Thoracic/Cardiac

Middle-aged male ejected from motorcycle crash in rural area. EMS noted road rash and suspected unstable pelvic fracture. Pt amnestic. 20g & 16g IVs started. Rendevous with air transport. EMS VS: 120/100-105-24, GCS-15 94% pOx. ED VS: 158/128-106-22, GCS-14 90% pOx. Level 2 trauma team activated 20 min after arrival. Criteria: O2 sats < 92 & GCS < 14. Surgeon arrived 23 min after notified. ED LOS: 1:45. Dx: Concussion, scalp/face laceration, Rt rib fractures 2-10, Rt pneumothorax with extensive subq emphysema neck to scrotum, clavicle fx, T12-L1 disc herniation with small epidural hematoma. Admitted to SICU. Injuries managed non-operatively. Managed pain, alcohol withdrawal, malnutrition and anemia. No blood transfusion. Pt desaturated on HD-8 CTA noted small pulmonary embolism. Treated with pulmonary support. DC to rehab on HD-14.

PI: No review on chart.
Comment: Trauma surgeon arrived 43 min after patient arrival. Met facility team criteria and response time. Physiologic criteria typically in level 1 criteria. Complication not noted or reviewed in PI.