

**Performance Improvement Guidelines for
North Carolina Trauma Centers**

**Property of North Carolina Committee on Trauma
Performance Improvement Sub-committee
of the American College of Surgeons**

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I. Purpose

The purpose of this manual is to outline for North Carolina trauma centers, site team reviewers and those establishing trauma centers, guidelines for the development and maintenance of a performance improvement program in North Carolina.

This document identifies definitions, tools and models as examples for such a program. Some variation between centers will be noted due to issues/problems that are specific for those institutions. The trauma centers are responsible for identifying their specific performance program and demonstrating evidence of ongoing review of the trauma Performance Improvement (PI) plan. The program should be reviewed on an annual basis and updated as needed based on the evolving needs of a center's program.

II. Performance Improvement

Performance Improvement is a term recommended by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) to describe the continuous evaluation of a trauma system and trauma providers through structured review of the process of care as well as the outcome. Performance Improvement is demonstrated when a problem that is identified is evaluated through a documented action plan linking the resolution steps. Those steps include assessment, identification of root cause, development of a plan, and the evaluation and monitoring of results. When a defined threshold is met, closure is addressed and documented as such.

III. Acknowledgement

This plan was developed by the following members of the PI subcommittee of the North Carolina Committee on Trauma:

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Sources for the information included: Resources for Optimal Care of the Injured Patient:1999 (American College of Surgeons Committee on Trauma-ACS-COT); The Trauma Performance Improvement- a How To Handbook (PI Subcommittee on the ACS-COT); the JCAHO; and other trauma centers' plans. This guide is a supplement to the ACS Trauma Performance Handbook. Therefore, new centers should utilize the two guides together.

IV. Responsibility/Authority

The director/chief of the hospital trauma service has the responsibility for the performance improvement program. The authority for the trauma peer review program must come from existing quality and peer review structures within the hospital. The location of the trauma program in the organizational structure of the hospital must be such that it can interact with at least equal authority with other departments. The trauma director must be empowered to address issues that involve multiple departments, so that program development and performance improvement can occur expeditiously. Adequate administrative support, as well as defined lines of authority, must be in place to guarantee the comprehensive evaluation of all aspects of trauma care.

V. Definitions

1. **Brief Review**: A brief review of patient care/record must include, at a minimum, collection of data and input into the registry, and review of that information by either the Trauma Registrar, Trauma Program Manager (TPM) and/or Trauma Medical Director (TMD). Patients that may need only brief review include patients admitted to trauma and non-trauma services that have no delays in care, no unexpected complications, no errors in care and/or do not die; transfers that occur within 6 hours of injury, and /or patients admitted for 24 hours or less and are discharged alive.
2. **Clinical Management Guidelines**: Systematically developed, evidence-based approaches designed to assist in clinical management decision making which reflects the continuum of care.
3. **Closing the Loop**: The process or outcome has been measured after implementation of the corrective action plan, and improvement has been demonstrated and documented.
4. **Corrective Action Plan**: A structured effort to improve performance that has been identified through the PI process as sub-optimal.
5. **Complication**: Any event that deviates from an anticipated recovery from illness or surgery. The North Carolina Trauma Registry has a standard list of complications that are routinely collected and reviewed.
6. **Credentialing**: Approval of a physician (credentialed provider) as a member of the trauma team, based on a review of the individual's training and experience by the trauma service director and the appropriate service chief. Physician Assistants and Certified Registered Nurse Anesthetists are also considered credentialed providers through

- the hospital medical staff and are subject to review by the Trauma Peer Review Committee.
7. Disease Related: An event or complication that is an expected sequela of a disease, injury, or illness.
 8. Discretionary Filters: Audit criteria that may be used to evaluate trauma programs and/or patient care issues (see attachment).
 9. Full Review: A full review of a patient record/care includes evaluation of care provided from the pre-hospital period at least through patient discharge. The review must include any complications, either expected or unexpected, delays in care and patient outcomes. If the patient dies, a determination must be made as to whether the death was preventable, possibly preventable or non-preventable. This review must be documented in writing and submitted to the Trauma Medical Director for final evaluation. All patients that die must have a full review. If the patient has been cared for exclusively by a non-trauma service physician, that death review may be conducted by the off-service PI committee, to include the same death judgement and appropriateness of care. Patients who must also undergo a full review include the following: those that are transferred greater than 6 hours after injury; patients that are re-admitted for the same injury or missed injury; and patients with unexpected outcome.
 10. NTRACS - National Trauma Registry of the American College of Surgeons (ACS). A commercial software package for collection, storage, analysis and reporting of trauma patient information on an individual hospital level. Some “blinded” information may be shared with state and national registries. This data must be sent to the state quarterly. (NOTE: all designated trauma centers or those applying for designation must use the state approved software program that, at this time, is NTRACS.)
 11. Morbidity: Any deviation from normal health that may be a result of a complication or may be pre-existing.
 12. Non-discretionary filters: Audit criteria that are state mandated and utilized to evaluate the trauma program/patient care and that must be demonstrated at each site visit. (See attached list of filters.)
 13. Non-preventable: An event or complication that is sequela of a procedure, disease, illness, or injury for which reasonable and appropriate preventable steps have been taken.
 14. Outcome: Results of patient care from the patient, provider and/or society perspective.
 15. Performance Improvement (steps in): sequence of events that lead to the resolution of a performance improvement problem.
 16. Preventable: An event or complication that is sequela of a procedure, disease, illness, or injury that could have been prevented.

17. Process: Elements of care that relate to the system or structure in which the care is delivered.
18. Potentially Preventable: An event or complication that is sequela of a procedure, disease, illness, or injury that has potential to be prevented.
19. Provider-Related: An event or complication resulting from care provided by pre-hospital personnel, technicians, nurses or physicians that leads to delays or errors in technique, treatment or communication. Example: Failure to intubate by protocol or due to a delayed or missed diagnosis.
20. System-Related: An event or complication not specifically related to a provider or disease but to a system. Example: OR room not available in a timely manner.
21. Trauma Registry: North Carolina computerized data collection system utilizing the ACS NTRACS database. Data points and their definitions are standardized by the Trauma Registry Committee to ensure that data are collected uniformly throughout the state. Each institution may use custom data points.
22. Value: A performance improvement equation designed to reflect both quality and cost, presented as the quality of the process plus the quality of the outcome, divided by the cost. Value can be increased by improving the outcome or quality of process or by decreasing the cost. However, a modest increase in cost that significantly improves quality can also add value.

VI. Personnel

Hospital

1. **Trauma Director**: Responsible for the leadership of a trauma Performance Improvement program at the individual institution. Directs the peer review process and the multidisciplinary review process. May delegate this or part of this to other trauma team members.
2. **Trauma Coordinator/ Program Manager**: Shares responsibility for the PI program with the director. Administers the daily operations of the program: handles problems/issues; identifies trends; and maintains documentation of the PI process.
3. **Trauma Registrar**: Responsible for abstracting, assessing for trends, and entering data into the registry. May be involved in studies. May complete monthly PI reports alone or in conjunction with the director and or manager.
4. **Clinical Nurse Specialist/Nurse Practitioner/Trauma Case Manager**: An RN with expert trauma experience, frequently Masters prepared, that facilitates the patient continuum. Assists the manager, director and registrar in identifying problems and trends.
5. **Physician Extender/Physician Assistant**: Assists in the care of the trauma/injury patient under the direct supervision of a physician.

State

1. **North Carolina Trauma Registry Director** (Director of Research and Communications): Collects, maintains, trends, and reports state trauma registry data. These data are assembled from all hospitals that maintain the trauma registry in North Carolina. This person is responsible for maintaining confidentiality in data and reporting.
2. **Hospitals Specialist**: Member of the staff of the North Carolina Office of Emergency Medical Services who serves as the liaison with the trauma centers in North Carolina. Guides in the interpretation of rules and regulations for the trauma centers. Directs the NC review process.
3. **EMS Medical Director**: Under contract to the North Carolina Office of Emergency Medical Services, serves as a consultant with the Hospitals Specialist in the North Carolina trauma system program, which includes PI.

Local

1. EMS Nurse Liaison: An RN who is a staff nurse of the emergency department who addresses issues/problems that may occur in the pre-hospital care environment.
2. EMS Director: Director of a local EMS agency. May facilitate addressing problems/issues that arise in the pre-hospital environment. Attends PI meetings.
3. EMS Medical Director: Medical Director of an EMS agency. Responsible for approving pre-hospital policies, procedures and protocols. Attends PI meetings.

VII. Meetings*

<p>Trauma Program Performance Committee Purpose: To address system and educational issues and to serve as the conduit for policy/procedure approval.</p>	<p>Multidisciplinary Peer Review Purpose: To discuss multi-disciplinary cases not resolved in other forums, quality of care clinical decisions and patient management.</p>
Independent from, but coordinated with, hospital PI	Independent from, but coordinated with, department PI
Administratively driven	MD driven
Members usually include those such as ED, ICU and trauma floor(s) nurse managers or their designees; trauma physicians; reps from EMS, radiology, flight team, PT, OT, Speech; ED Medical Director or designee; OR director; hospital department head (administrative level superior to the Trauma Program Manager and Trauma Program Medical Director) above Trauma Program Mgr. for the trauma service; Registrar; & trauma team members	Members: Physicians taking trauma call, representative(s) from Orthopaedics, Neurosurgery, Emergency Medicine, Anesthesiology, Radiology, as well as the TNC or TPM and other physicians as the particular case(s) requires
Facilitated by: TNC, TPM	Facilitated by: Trauma Medical Director or designee within trauma service
Meetings: no less than quarterly	Meetings: no less than quarterly
Attendance: 50% at a minimum by service/department	Attendance: 50% at a minimum by service/department
Minutes: to hospital PI with clear documentation of problem resolution and /or plan	Minutes: Reported to Hospital PI Documentation of resolution and/or plan. It may be helpful to grade morbidities and determine the preventability of morbidities and mortalities. Credentialed provider-related issues, which are potentially preventable or preventable, should be integrated into the hospital-wide peer review process.
<p>Issues addressed:</p> <ul style="list-style-type: none"> ◆ Trended issues ◆ Global trauma system issues 	<p>Issues addressed:</p> <ul style="list-style-type: none"> ◆ Preventable and possibly preventable morbidity and mortality ◆ Inter-service system issues ◆ Sentinel events ◆
*Level III trauma centers may combine these two meetings	

VIII. Data Collection

1. Quality: It is important that collected data is:
 - a. Obtained in a timely manner, monitored, stored and transmitted to protect patient confidentiality.
 - b. Collected as per the NC state trauma registry definitions
2. Selection: The population to be monitored meets the NC Trauma Registry Inclusion Criteria (800-959.9) and trauma patients that meet observation criteria, (24-hour hospital stay) excluding 905-909 (late effects of injury), 910-924 (blisters, contusions, abrasions, and insect bites) and 930-939 (foreign bodies). The “trauma patient” is defined as a person who has sustained acute injury and by means of a standardized field triage criteria (anatomic, physiologic and mechanism of injury) is judged to be at significant risk of mortality or major morbidity. The data sources listed above will be used to develop a profile of care provided by the Trauma Center.
3. Sources of information may include:
 - a. Patient record
 - b. Patient rounds
 - c. Conferences
 - d. E Mail communications
 - e. Problem sheet communications
 - f. Patient complaints
 - g. Risk management reports
 - h. Hospital Information Systems

IX. Review

1. Types of Review:
 - a. Retrospective - implies abstraction from charts, conferences or registry information often analyzed days, weeks, months or years after patient care. Example - mortality review
 - b. Concurrent - implies that data is recorded and care analyzed in real time. Example: patient rounds
 - c. Trend Analysis: When issues/problems are identified as happening in greater frequency than expected or complications are occurring that are unexpected; a review of these trends must occur, to include an action plan and evaluation of action plan. Example: Aspiration pneumonia is occurring with more frequency in the ED and appears to be associated with aspiration of contrast material. A focused review and analysis of the issues leading to the problem needs to occur, a plan of action needs to be put in place and a follow up audit needs to demonstrate improvement of the problem.

- d. Periodic Audits: Audits that occur in a time frame defined by the trauma program administrators which may or may not be initiated due to problems identified. These may be just “checks” in the system. Example: Trauma Surgeon response time is a mandatory filter that must be reported at the site visit. In order to ensure compliance and document that response time is at 80% or better, a periodic audit through NTRACS should be run. If a trend is identified regarding response times then a more focused review and action plan will be developed.
- e. Focused Audits: a review of a filter or problem that has been identified as an issue. Example: Trauma Surgeon response time is run periodically. If it was discovered that the times were greater than 20 minutes or that the problem was lack of documentation of times; a more focused review and action plan would be completed
- f. Process monitors: a review that looks at the process in which care is provided. Examples include:
 - 1) Compliance with guidelines, protocols, and pathways
 - 2) Appropriateness of pre-hospital and ED triage
 - 3) Delay in assessment diagnosis, technique, or treatment
 - 4) Error in judgement, communication, or treatment
 - 5) Appropriateness and legibility of documentation
 - 6) Timeliness and availability of x-ray reports
 - 7) Timely participation of subspecialties
 - 8) Availability of operating suite, acute and subacute
 - 9) Timeliness of rehabilitation
 - 10) Availability of family services
 - 11) Insurance carrier denials
 - 12) Consistency of outpatient follow up
- g. Outcome monitors: evaluates the care from an outcome perspective. Examples include:
 - 1) Mortality
 - 2) Morbidity
 - 3) Length of stay
 - 4) Cost
 - 5) Quality of life
 - 6) Patient satisfaction

2. Minimum Performance Improvement Committee Meetings to complete reviews/issues:

- a. Trauma program performance committee - a meeting held at least quarterly to address global trauma system issues including pre-hospital, interdepartmental issues, and inter-hospital issues that affect patient care. The committee addresses system process

- issues, keeps minutes, attendance (to include department affiliation) and works to correct overall program deficiencies to optimize patient care. (See meeting list for additional information.)
- b. Multidisciplinary peer review - a meeting that is held at least quarterly to discuss and resolve patient management issues including preventable or possibly preventable morbidities and/or mortalities; to develop and approve clinical management guidelines; and to address complex system issues not resolved in other forums. The core panel that must attend this meeting includes the surgeons taking trauma call (as selected by the trauma medical director) who may be representatives of the group of trauma surgeons or may be all trauma surgeons; physician representatives from Orthopaedics, Neurosurgery, Emergency Medicine, Anesthesiology; and the Trauma Nurse Coordinator/Trauma Program Manager. The Trauma Medical Director may add others to this core group as deemed appropriate /needed for review. Information from this meeting, while confidential and protected by peer review, must be shared with other medical care providers involved in the specific case in an effort to improve patient care, prevent future delays or complications and/or provide education for the improvement of trauma care. Examples of relevant peer review include appropriateness and timeliness of care and evaluation of care priorities among specialists. This performance review must be done by those with similar credentials. When the trauma surgeon is the primary physician on a case, he/she should have his/her peer review completed by another physician. Credentialed provider-related issues, which are potentially preventable or preventable, should be integrated into the hospital-wide peer review process. Minutes should be taken, as well as attendance, to include department affiliation. (See meeting list for additional information.)
- c. Quality Indicators/Monitors: ND or non-discretionary data must be collected and a review performed. D or discretionary data must be collected, however review performed only if indicated by trending information. There may be valid reasons why an event occurs differently from the ideal expectation. Quality indicators/ monitors are statements of an ideal expectation. This fact should be documented in the medical record by the physicians involved in the patient's care and then noted during the PI review. (Outcome quality indicator) Example: open fracture to the OR within 8 hours. If the patient has a severe brain injury and the neurosurgeon does not feel this to be in the patient's best interest, a delay may be

made in operative intervention and documented as such in the patient record.

3. Steps in the Review Process:

- a. Identify the injury/trauma patient utilizing the ICD-9 codes (See the definition of a trauma/injury patient.)
- b. Data is collected by the trauma registrar on ALL patients within this ICD-9 code. The patient and the record are reviewed by the Trauma Registrar and/or TPM and/or Clinical Nurse Specialist.
- c. Issues/problems revolving around the care of the patient from pre-hospital through the discharge process are identified. Trauma performance improvement issues are identified in a number of different ways, through case management of the patient by the TPM and CNS; through referral from other sources including the management teams in the ED, ICU or floor; individual nurses; technicians or other staff members; physicians; pre-hospital team members; and/or risk managers. The TPM or TR may screen the patient records on a daily basis. They assess for any issues that may prompt review. Complications are identified throughout the patient's stay and documented in the registry. Trends of complications may be run periodically as dictated by the trauma center PI plan.
- d. The TPM reviews the issue/problem/complaint and attempts to resolve the issue if appropriate. The Trauma Program Medical Director is kept apprised of issues. Issues that are trends, cross departments, personnel/staffing issues, or system issues need to be addressed in the Trauma Program Performance meeting.
- e. Problems/issues that are identified as trends in system issues will be reviewed by the TPM and referred for discussion and resolution in the Trauma Program Performance Committee.
- f. Any problem/issue that is identified as a sentinel event (see JCAHO definition) must be referred, per hospital policy, to risk management and administration for evaluation.
- g. Problems/issues that are identified as credentialed provider-related are referred to the department chair or designee of the specific department or the multi-disciplinary peer review committee for discussion and resolution with documentation of closure. Problems/issues that are referred to other departments must have clear written documentation back to the trauma program of resolution/closure of the issues.
- h. All admitted injury patients will go through some level of review which may be as brief as the data collection and brief case review by the TPM/TR to the full PI process.

Brief review	Full Review
Non-trauma service admits to be reviewed by admitting service. If admitting service does not have a PI process in place, PI must be done by the trauma service.	Deaths. Deaths of patients that are cared for by non-trauma surgeons must have a full review and written report back to the trauma program.
All other admitted trauma not included in full review process	Transfers from initial institution > 6 hours
Transfer from initial institution < 6 hours	Re-admit for same injury problems or missed injury
24 hour observation patients with no complications	Unexpected outcomes (as defined by the institution)

- i. In addition to the review of specific patients, the PI plan should include periodic audits, focused audits and trend analysis. These are institution specific and are normally based on evaluation of the program by the trauma medical director and Trauma Program Manager/Coordinator.
- j. Complications, as identified by review of the trauma registry, can be monitored through trend analysis. If it is noted that a certain complication is occurring more frequently than expected, then an audit and full review are warranted.
- k. Evaluation of patients that are called a trauma should be reviewed for appropriateness of “call”. This evaluation may be done utilizing injury severity scores. An example would be patients with ISS > 15 not called a trauma first tier.
- l. Mortality should be evaluated utilizing ISS scores. An example would be review of deaths with ISS scores < 15 compared to deaths of patients with ISS > 15.
- m. Documentation and review of times and reasons for trauma-related diversion of patients from the scene or referring hospital.

X. Initial Trauma Center Designation - PI Plan

1. During a site review, trauma centers applying for initial designation must demonstrate that all the non-discretionary areas are monitored.
2. Outcomes of those monitors/indicators must be documented with a clear plan of action including re-evaluation of the action plan.
3. Identified discretionary filters must have been evaluated during the 6 months preceding the site visit. Identification of chosen filters will be based on assessment by the Trauma Medical Director, Trauma Program

Manager and trauma team utilizing the registry and identified risk areas for the individual center. This evaluation may be as simple as a registry review of complications and trends of these. If problems have been identified, an action plan must be demonstrated with re-evaluation of that plan.

XI. Renewal of a Trauma Center - PI Plan

1. During the site review, trauma centers applying for re-designation must demonstrate that all non-discretionary filters are monitored.
2. Outcomes of those monitors/indicators must be documented with a clear plan of action including re-evaluation of the action plan.
3. Discretionary filters/indicators will be selected by the individual trauma center based on the history of the trauma program (to include concerns identified in earlier state site visits) and on problems/issues identified during the PI process.
4. During the site review process, indicators may be found indicating the need for a focused review.

NTRACS Discretionary Monitors/Indicators

GCS < 8, no ET tube or surgical airway
Failed non-operative management of abdominal, thoracic, vascular or cranial surgery
GCS < 14 with no head CT
Failed non-operative management of GSW to abdomen
GCS < 8 with no ICP monitor
Reintubation within 48 hours of extubation
Initial treatment of open fracture > 8 hours from admit
Non-fixation of a femoral fracture in adult patient
Delay to OR for epidural or subdural
Transfer after 6 hours in the initial hospital

HOSPITAL

Esophageal intubation	Pericarditis
Extubation, unintentional	Pericardial effusion or tamponade
Mainstem intubation	Shock
Other airway	Other cardiovascular
Abscess	Anastomotic leak
ARDS	Bowel Injury – iatrogenic
Aspiration/Pneumonia	Dehiscence/evisceration
Atelectasis	Enterotomy-iatrogenic
Empyema	Fistula
Fat Emboli	Hemorrhage (lower GI)
Hemothorax	Hemorrhage (Upper GI)
Pneumonia	Ileus
Pneumothorax-Barotrauma	Peritonitis
Pneumothorax-Recurrent	Small bowel obstruction
Pneumothorax-Tension	Ulcer
Pulmonary edema	Other GI
Pulmonary embolus	Acalculous cholecystitis
Respiratory failure	Hepatitis
Upper airway obstruction	Liver failure
Pleural effusion	Pancreatic fistula
Other pulmonary	Pancreatitis
Arrhythmia	Splenic injury-iatrogenic
Cardiac arrest	Other hepatic/biliary
Cardiogenic shock	Coagulopathy-other
CHF	DIC
Transfusion complications	Orthopaedic wound infection
Hypothermia	Readmission
Delay in MD response	Delay in obtaining consultation
Error in judgment	Error in Technique

PRE-HOSPITAL

Aspiration
Esophageal intubation
Extubation (unintentional)
Mainstem intubation
Unable to intubate
Other airway
Inappropriate fluid management
Unable to start IV
Other pre-hospital fluid
No EMS form
Incomplete EMS form
Pre-hospital delay
Other Pre-hospital

Other hematologic	Other musculoskeletal
Cellulitis/trauma injury	Alcohol withdrawal
Fungal sepsis	Anoxic encephalopathy
Intra-abdominal abscess	Brain death – unexpected not associated with initial pathology
Line infection	DI
Necrotizing fasciitis	Meningitis
Sepsis like syndrome	Neuropraxia-iatrogenic
Septicemia	Non-operative subdural/epidural
Sinusitis	Progression of original neurologic insult-unexpected
Wound Infection	Seizure in hospital
Yeast infection	SIADH
Other Infection	Stroke – secondary to original injury
Renal failure	Ventriculitis-post surgical
Ureteral injury-iatrogenic	Other Neurologic
UTI-early	Anastomotic hemorrhage
UTI-late	DVT-lower
Other GU	DVT-upper
Compartment syndrome	Embolus-non-pulmonary
Decubitus-minor	Gangrene
Decubitus-blister	Graft infection
Decubitus-open sore	Thrombosis
Decubitus-deep	Other vascular
Loss of reduction/fixation	Psychiatric-result of present injury
Nonunion	MI
Osteomyelitis	Drug complication
Anesthetic complication	Other miscellaneous
Post operative hemorrhage	Fluid and electrolyte complications
Error in Diagnosis	Monitoring complications related to device
Incomplete hospital record	