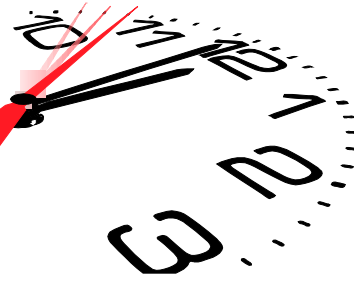




MINNESOTA STATEWIDE TRAUMA SYSTEM



Trauma Hospital Resource Manual

version 2013.2

Office of Rural Health and Primary Care

Mailing Address

P.O. Box 64882
St. Paul, MN 55164-0882

Courier Address

Golden Rule Building
85 East 7th Place, Suite 220
St. Paul, MN 55101

www.health.state.mn.us/traumasystem

Tammy Peterson, Designation Coordinator
(651) 201-5981
tammy.peterson@state.mn.us

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This manual contains a description of the designation process as well as examples of sample policies and forms to help you develop your hospital's trauma program.

Trauma Hospital Designation

Verification vs. Designation

For many years Minnesota has had level I and II-verified trauma hospitals located in population-dense areas. These hospitals were evaluated by the American College of Surgeons (ACS) that verified that they met at least the minimum criteria for a trauma hospital established by the ACS.

Until recently, Minnesota had no statewide criteria for trauma hospitals. In 2005 the Minnesota legislature passed a bill charging the commissioner of health to develop a statewide trauma system, including a process to designate hospitals as level I, II, III or IV trauma hospitals. The term "designation" is an official label that is assigned by a political authority. Designated trauma hospitals in Minnesota must demonstrate to the Commissioner of the Minnesota Department of Health (MDH) that they meet the state's criteria for a trauma hospital. The establishment of a trauma system in Minnesota was accomplished by [§144.602-144.608](#).

Designation Process

Level I and II trauma hospitals obtain designation in Minnesota by first obtaining verification by the ACS then applying to MDH to be recognized as a trauma hospital. The MDH currently accepts ACS level I, II or III verification as adequate evidence that a hospital meets the standards for a trauma hospital in Minnesota.

To obtain a level III designation, a hospital has two options. It may become verified by the ACS and then apply for designation subsequent to that, just as level I and II hospitals do, or it may apply for designation directly through the MDH trauma program. A hospital desiring to become a level IV trauma hospital may only achieve designation through the MDH Trauma Program.

Hospitals seeking designation as a level III or IV trauma hospital through the MDH trauma program must first establish a trauma program within their facility that meets the required criteria as set forth by the state. An application can be obtained from the MDH Trauma Program Web site. A second guidance document accompanies the application.

Once the application is complete, it is submitted to the MDH trauma program. Level III applicants will be contacted to schedule a site visit. Level IV applicants will be notified of the Commissioner's designation decision as soon as possible and a site visit will be scheduled within the three-year designation period.

During the site visit, MDH trauma program reviewers will tour the facility and evaluate the trauma program components.

If a trauma hospital experiences a change in their ability to meet the minimum required criteria at any time during the designation period, it must notify the State Trauma Advisory Council (STAC) immediately. This element is critical to the effectiveness of the statewide trauma program because it may require other regional hospitals and local EMS providers to adjust their operating guidelines.

Re-designation

Trauma hospital designation in Minnesota is valid for three years, during which time the facility must apply for and complete the re-designation process, or be awaiting the site visit or site visit results. Trauma hospitals should apply for re-designation six months before their expiration date. An existing designation may be provisionally extended up to 18 months if the hospital applied for re-designation in a timely manner and is either scheduled for a site visit, awaiting the results of the visit or responding to deficiencies identified during the visit.

(See [§144.605, sub. 2.](#))

The re-designation site visits will focus on three areas: 1) compliance with the designation criteria, 2) progress made toward strengthening the weaknesses identified during prior site visits and 3) identifying how the system can collaboratively support the ongoing and future needs of the hospital's trauma care commitment. Specific suggestions for improvement will, again, have an educational focus. The visits are intended to be constructive, not punitive.

Hospital Organization

Before becoming designated, a formal trauma program must be established within the hospital. In addition to developing policies and protocols that address trauma team deployment, emergent transfers and performance improvement, the hospital board and medical staff must demonstrate a commitment to providing trauma care commensurate with the standards published by MDH. Support for a hospital's participation in the statewide trauma system is demonstrated when both the board of directors and the medical staff resolve to provide the resources necessary to attain and sustain designation. ([See Appendix A: Sample Hospital Board Resolution](#) and [Appendix B: Sample Medical Staff Resolution.](#))

The hospital's trauma program will require both a medical director/advisor which is a physician who will provide clinical oversight for the program and a manager/coordinator which is usually a nurse who will be responsible for the administrative functions of the trauma program. ([See Appendix C: Sample Trauma Program Medical Director Job Description](#) and [Appendix D: Sample Trauma Program Manager/Coordinator Job Description.](#))

The trauma program must be integrated into the hospital's organizational structure, appearing on the organizational chart. The position of the trauma program should be such that the medical director and program manager/coordinator have sufficient authority to effect change across several departments. ([See Appendix E: Suggested Position of Trauma Program.](#))

Trauma Team Activation

A clear procedure for assembling the team that will provide immediate resuscitation to the seriously injured patient is vital to the efficient functioning of a trauma hospital. This procedure should specify when the team must be assembled, who is to respond and how they are to be notified. The policy should build upon existing facility-specific internal operating procedures, staffing resources and established state minimum criteria. (See [Appendix F: Sample Single-Tier Trauma Team Activation Protocol](#) and [Appendix G: Sample Multi-Tier Trauma Team Activation Protocol.](#))

Documentation of the patient's resuscitation can be easily accomplished with the use of a trauma flow sheet. A comprehensive flow sheet can also be used to easily identify data

elements in the patient's chart that are required for trauma and SCI/TBI reporting (through the registry) or for performance improvement (PI) activities. (See [Appendix I: Trauma Resuscitation Record](#). [Registry, TBI/SCI and PI elements are shaded to help facilitate data abstraction.])

Hospitals must work with their emergency medical services (EMS) providers to establish and train with protocols designed to quickly identify seriously injured patients and route them directly to appropriate trauma hospitals. It is expected that the hospital trauma team will be activated upon notice by EMS. It is up to the individual hospital to determine if EMS personnel will activate the team or if EMS will consult with the emergency department provider, who will then establish the need for activation. Continued work with the EMS professionals in your area will help to control over and under triaging.

Transfer

A well-functioning trauma system is able to not only treat seriously injured trauma patients effectively and efficiently, but it is able to recognize the need to transfer patients to the trauma hospital that can best provide the resources that patient needs in a timely manner. To this end, level I, II, III and IV designations do not reflect the quality of care provided in those hospitals, but rather the resources available. Improved outcomes are closely associated with the time it takes for a facility to determine the need for and to accomplish the transfer.

Trauma hospitals must establish procedures that direct the process for quickly and efficiently transferring a trauma patient to definitive care. Policy elements include anatomical and physiological criteria that if met, will immediately initiate transfer. (See [Appendix J: Suggested Criteria for Consideration of Transfer](#) and [Appendix K: Sample Trauma Transfer Protocol](#).)

Ambulance service personnel, with the guidance of medical direction and in cooperation with their local hospitals, may establish a process to request aero medical transport to meet them at the emergency department. The establishment of a close working relationship with local EMS providers will contribute to the development of an efficient transfer process.

Transfer agreements must be established and maintained with trauma hospitals capable of caring for patients with major trauma, severe burns and acute spinal cord injuries. An agreement with a second burn facility must also be maintained. (See [Appendix L: Transfer Agreement Examples](#).) Receiving trauma hospitals may provide the transfer agreement for the referring hospital.

Performance Improvement

Every hospital in Minnesota is expected to measure, evaluate and improve their performance with respect to numerous objectives in health care from patient care standards to fiscal solvency to materials management. A successful performance improvement process is designed to identify weaknesses within an organization that prevent the organization from providing the optimal care it is capable of providing.

The process used to facilitate performance improvement may be referred to by other names, such as quality assurance or continuous quality improvement. Regardless of by what means your facility employs, it is important that there be a process in place to provide an intentional process, or loop, to continuously identify shortcomings in patient care, determine the likely

cause, employ a plan to correct it, then evaluate whether or not the shortcoming has been resolved, thus “closing the loop.” A PI program will assist your facility to constantly improve itself by identifying and confronting problems within the institution. The process can be applied to virtually any element of performance within the hospital.

Structures

While the required PI components must be in place in a trauma hospital, the structure is left to the discretion of the facility and will depend on the facility size and available resources. It is anticipated that hospitals have an existing PI structure in place. The trauma program PI activities ideally are incorporated into that structure. The description of the PI process contained herein is not meant to be prescriptive, but illustrative. It is understood that facilities will accomplish PI in a variety of ways. Trauma hospitals are expected to be able to demonstrate the effectiveness of their program.

The trauma program should have a standing trauma PI team, usually made up of the trauma program manager/coordinator, the trauma program medical director and possibly the trauma program registrar. All information and reports pertaining to trauma program performance are funneled through this team. The data is then either used by the team to address system concerns or referred to one or more PI committees to address patient care concerns.

Both system and patient care-related issues can be identified via several methods.

- Chart abstraction
- Emails
- Hallway conversations
- Hospital information/database systems/registries
- Individual patient charts
- Multidisciplinary committee meetings
- Patient relations inquiries/complaints
- Personal observations
- Rounds
- Staff reports

Reports from staff can be generated via a PI tracking form. (See [Appendix M: Trauma PI Tracking Form](#).)

Morbidity and Mortality Review Committee

The trauma program PI requirements include the establishment of a morbidity and mortality review committee, which is analogous to a physician peer review committee. Its purpose is to provide for review of physician performance. Membership on this committee should be physicians from several disciplines and may include non-physicians (such as nurse practitioners [NPs] or physician assistants [PAs]), at the discretion of the trauma program and hospital administration. The format and activities of this committee are left largely to the discretion of the hospital. Physicians may not review their own care.

The morbidity and mortality review committee should meet regularly and review the physician care from patient charts, focusing on cases wherein problems, shortcomings, weaknesses or concerns have been identified by the trauma program PI team. If the committee identifies provider-related problems, they should recommend a corrective action plan; if they identify system-related concerns they should forward their findings to the trauma PI team.

This committee is also responsible to review all trauma deaths in the facility and classify them as non-preventable, potentially preventable or preventable. (See [Appendix N: Definitions of Trauma Death Classifications](#).)

Multidisciplinary Trauma Review

Unlike the morbidity and mortality review committee, membership of the multidisciplinary trauma review committee is not limited to physician providers. The participants in this review are both clinical and non-clinical representatives from all disciplines involved in the care of the trauma patient. Potential participants may be:

- Administrators
- Department managers
- Emergency department nurses
- Emergency department providers
- EMS staff
- Financial management
- Floor nurses
- ICU/PACU staff nurses
- Laboratory technicians
- Operating room nurses
- Patient relations personnel
- Radiologists
- Radiology technicians
- Rehabilitation professionals
- Risk management staff
- Social services staff
- Surgeons

The trauma PI team should identify the cases for presentation to this committee. Again, the focus should be on problematic cases or educational opportunities presented by particular cases.

Filters

In addition to system problems and weakness, the team also seeks to identify occurrences of significant events. These events are represented by PI filters. Each filter reflects either an area of patient care that the trauma program would like to scrupulously observe, a standard of care that the facility has established for itself or an ideal expectation of the industry. These are essentially characteristics of system performance or patient care that automatically prompt the process of evaluating that element of the system or care of the patient to determine whether or not it met the standards defined by the industry or the hospital. The primary mechanism in which the trauma program will assess its performance is through the use of these filters.

The Minnesota Statewide Trauma Plan requires that the filters listed in Table 1 be perpetually included in the hospital's PI process.

Table 1

Audit filter	Level III	Level IV
Trauma care provided by physicians who do not meet the educational requirement of the plan (e.g., ATLS or CALS)	√	√
Trauma transfers	√	√
Trauma deaths	√	√
ED provider non-compliance with on-call response times	√	√
Trauma patients admitted to non-surgeons	√	√
General surgeon non-compliance with on-call response times	√	
Trauma care provided by NPs/PAs		√

It is anticipated that each hospital will also select its own filters to monitor. The filters will change constantly as the facility's need to evaluate various elements of the trauma program changes. Some filters may be watched for six months while others may need to be watched for years

before enough cases have been through the hospital and enough data has been collected to effectively assess the system's performance. Examples of filters commonly used include:

- Abdominal, thoracic or vascular surgery >24 hours after admission
- Absent hourly charting
- C-spine injury missed on initial evaluation
- EMS report not in patient chart
- EMS scene time >20 minutes
- GCS \leq 8 left emergency department w/out an airway
- Glasgow Coma Scale \leq 8, no endotracheal tube or surgical airway
- Head CT >2 hours after admission with GCS <14
- Laparotomy >1 hour w/ abdominal injuries and systolic blood pressure <90
- Massive blood transfusion (>3 units)
- Non-fixation of femoral diaphyseal fracture in adult
- Open fracture to OR >8 hours after admission
- Over triaged/trauma team activated unnecessarily
- Re-intubated within 24 hours of extubation
- Transferred out; length of stay >2 hours
- Under-triaged/trauma team not activated when criteria met
- Unscheduled return to the OR.

There is no ideal way to quickly and easily identify patients who are characterized by filters. Although some patients will be identified by querying the registry, most will have to be identified by abstracting the information from the patient record manually. The process of abstracting a chart may be assisted by employing the use of a trauma flow sheet to document the resuscitation. (See [Appendix I: Trauma Resuscitation Record](#).) Many performance elements can be easily identified by abstracting this single record. Additionally, filters can be captured with the use of a tracking worksheet (see [Appendix O: Trauma PI Filter Tracking Worksheet](#)). A worksheet is completed on every major trauma patient by abstracting the chart. If filters are identified, the chart is routed to the trauma PI team for review.

The Performance Improvement Loop

Performance improvement can be thought of as a continuous loop of activity surrounding a given issue. The three distinct phases of the PI loop are 1) recognition of the issue 2) corrective action and 3) evaluation of the result. (See [Appendix P: Trauma PI Flowchart](#).)

Recognition of the Issue

Enough data must be collected to identify a system or patient care issue. This may be a single occurrence of an event that is reported by a staff member or PI committee or it may be a recurrence of a similar or same event several times, which is discovered by chart abstraction or by a registry query.

For example: The trauma PI team routinely evaluates all trauma patients transferred. (To identify these patients, they might use the trauma registry to create an ad hoc report.) An expectation established by the hospital is that a trauma patient's condition is accurately assessed and the patient transferred to definitive care within two hours. The team discovers that 20 percent of these transfers occurred >2 hours after arrival.

The team then reviews the identified cases with the charge of determining why the patients' treatment did not meet the standard of care established by the facility. They may discover that,

given the circumstances of the individual patients, the cases were managed as well as they could have been. However, the committee may identify a problem with a protocol, an individual provider or a system policy that contributed to the shortcomings.

For example:

- The committee discovers that the patients were transferred days after admission to their hometown hospitals after their conditions had stabilized. Therefore, there is no corrective action necessary.
- The committee finds that the transfers were initiated >2 hours after arrival when earlier CTs initially read by emergency department providers were reviewed by radiologists and found to reveal abnormalities requiring transfer to a facility with more resources.

Corrective Action

The problem can now be classified as disease-related, system-related or provider-related and referred, if necessary, to any another appropriate person or committee for review. Corrective action may be unnecessary or may consist of education, protocol revision, practitioner counseling, etc. The team should develop a corrective plan, consulting any in-house and out-of-hospital resources as necessary.

For example, the committee may recommend:

- Implementing a continuing education program for the emergency department providers to improve their CT scan interpretation capabilities.
- Making educational or reference resources available for interpreting CT scans to the emergency department providers.
- Employing the use of an off-site, 24-hour radiology service.

Evaluation of the Result

Once the corrective action is in place, the trauma program again collects data and the team determines whether or not the action corrected the problem. If it did, the loop is closed and the issue is resolved. If not, the committee revisits the case and repeats the PI process again.

Trauma Diversion

On rare occasions, critical resources needed to care for seriously injured patients become unavailable at one hospital due to an unusually great demand for those resources, a mechanical plant failure preventing the use of those resources or other event that renders resources unavailable or inaccessible. (More isolated hospitals that are a significant distance from their neighboring hospitals may not be able to safely divert trauma patients simply because of high patient volumes.) In such cases it is important that trauma hospitals have a contingency plan to divert trauma patients to a nearby facility. (See [Appendix Q: Sample Level III Trauma Diversion Protocol](#) and [Appendix R: Sample Level IV Trauma Diversion Protocol](#).)

The decision to divert trauma patients should be carefully considered. It should only occur if, in the judgment of the lead medical staff person, it would be in the patient's best interest to be transported to a different facility rather than attempting to accomplish the resuscitation in an environment lacking critical resources. Trauma hospitals should track both the number of times the facility goes on divert and the number of patients diverted. (See [Appendix S: Trauma Divert Tracking Log](#).)

Trauma Registry

The collection and use of data is of paramount importance to a successful trauma program: locally, statewide and nationally. A trauma registry is established primarily to ensure quality of care, but it has a secondary benefit of providing data for the surveillance of morbidity and mortality. Trauma hospitals are required to submit a number of data points to the Minnesota Statewide Trauma System. Additionally, each hospital can design a unique data set to collect and analyze to further their PI objectives. (See [Appendix T: Trauma Registry Inclusion Criteria](#).)

There are several commercial registries available for purchase. However, the state trauma system has established a Web-based trauma registry, MNTrauma, which is available for use by every hospital in the state at no cost. Trauma hospitals utilizing their own registries can submit data to the state trauma system without duplicating data entry.

The function and purpose of the statewide trauma registry is threefold:

- To facilitate simple and accurate trauma data reporting to the state trauma program.
- To assist trauma hospitals in identifying patients who match their filter characteristics via the report-generating features.
- To collect and report the state-required TBI/SCI data, eliminating the need to duplicate data submission to MDH.

The state trauma system will submit your trauma data to the National Trauma Registry (NTR) on your behalf.

To begin using the Web-based registry:

1. Contact MDH information technology staff (Curtis Fraser: curtis.fraser@health.state.mn.us) to obtain a user name and password.
2. Go to <http://www.health.state.mn.us/MNtrauma>.
3. Log on!

Technical assistance for MNTrauma is available through the MDH trauma program.

Injury Prevention

While the vast majority of a hospital's trauma resources are committed to managing the injured patient, injury prevention cannot be ignored. A trauma hospital's injury prevention program may most effectively be incorporated into existing outreach activities. Ideally, prevention activities will be driven by epidemiological data for the community.

Steps to Implementing a Prevention Activity

Recognize opportunities: Seek out existing public venues for your prevention activities such as school or church fairs and community events such as national night out.

Identify a desired outcome: The goal of the prevention activity may be to reduce the occurrence of a particular injury, raise awareness of a threat or hazard, increase knowledge of a subject or alter behaviors or attitudes.

Identify the target audience: Begin by determining what message you would like to communicate and who the recipients of that message should be. This may be driven by injury data—such as frequency, severity or location of a particular traumatic event within the

community—where the audience is specific or by forum opportunity, such as a community fair, where the target audience is diverse.

Develop objectives: Describe the actions necessary to achieve the desired outcomes of the prevention activity. Consider staff and material resources needed, as well as program evaluation tools.

Develop strategies for reaching the targeted audience: Adults, adolescents and children all have different learning styles. By defining the target audience, the curriculum can be customized. For example, characters (such as Traumaroo™) appeal to children from ages 3 to 7. Children older than 7 relate well to video and slide presentations. Teenagers are most engaged when the forum allows them to voice their own viewpoints and opinions.

Obtain staff and funding for the activity: Do not limit yourself to hospital staff. Often, the goals of other community organizations coordinate well with injury prevention goals of the hospital. Consider the age and cultural dynamics of both the audience and the presenters. Sometimes coordinating the two can improve the effectiveness of the message. Trauma survivors or their family members can be powerful spokespeople. Funding may come from within the facility or from foundations, businesses, civic groups and government agencies.

Evaluate the effectiveness of the activity: Although effectiveness can be assessed by determining the number of people reached or by surveying program participants, ideally, effectiveness should be *measured* by evaluating whether or not the activity actually accomplished the desired outcome. Outcome evaluation should measure progress toward the goal of decreasing injury occurrence or changing the knowledge, attitude or behaviors of the target audience. Techniques may include data collection, surveying and direct observation.

Examples of prevention activities include:

- Bicycle helmet campaigns
- Bicycle rodeos
- Blood pressure screening
- Car seat clinics
- Domestic violence awareness
- Fall prevention
- Firearm safety
- Health fairs
- Intoxicated driving campaigns
- Posters/pamphlet publication
- Red light running campaigns

Required Equipment

Trauma hospitals must have certain equipment capabilities for all ages of trauma patients. See [Appendix U: Level III Equipment Checklist](#) and [Appendix V: Level IV Equipment Checklist](#) for a checklist that can be used to verify the existence of the minimum required equipment in your facility. In order to assist trauma hospitals to care for children more effectively, the Emergency Medical Services for Children Resource Center of Minnesota (MN-EMSC) has recommended the equipment listed in [Appendix W: Recommended Pediatric Equipment Capabilities Checklist](#).

Individualized Consultation

If at any time you have questions about the trauma program and its requirements, contact MDH Trauma Program staff. The designation coordinator exists largely to answer your questions,

provide you with support, consult with your facility regarding trauma hospital designation and assist you with the establishment and development of your trauma program. Contact the designation coordinator for:

- Application preview
- Assistance establishing or developing a PI or injury prevention program
- Documentation evaluation
- Examples of program policies, forms, tools
- Guidance regarding the existence or establishment of required criteria
- One-on-one consultation/guidance
- Pre-site visit consultation
- Telephone and in-person technical advice
- Web-based registry training

The MDH trauma program is always eager to hear your feedback. If you have recommendations for resources that can be provided in this manual or elsewhere, please contact program staff.

We rely on you to tell us what you need!

Online Resources

Organizations

Minnesota Statewide Trauma System
<http://www.health.state.mn.us/traumasystem>

American Academy of Orthopedic Surgeons
<http://www.aaos.org/>

American Association for the Surgery of Trauma
<http://www.aast.org>

American College of Emergency Physicians
<http://www.acep.org/>

American College of Surgeons, Trauma Program
<http://www.facs.org/trauma>

Brain Injury Association of America
<http://www.biausa.org/>

Eastern Association for the Surgery of Trauma
<http://www.east.org/>

Emergency Nurses Association
<http://www.ena.org/>

National Highway Traffic Safety Administration
<http://www.nhtsa.gov/>

Society of Critical Care Medicine
<http://www.sccm.org/Pages/default.aspx>

Society of Trauma Nurses
<http://www.traumanursesoc.org/>

Toward Zero Deaths
<http://prekk003-tzd.cts-dev.software.umn.edu/>

Trauma.org
<http://www.trauma.org/>

Western Trauma Association
<http://westerntrauma.org/>

Publications/Resources

American Academy of Experts in Traumatic Stress
<http://www.aaets.org/>

American College of Surgeons Trauma Publications
https://web2.facs.org/timssnet464/acspub/frontpage.cfm?product_class=trauma

American Trauma Society
<http://www.amtrauma.org/>

Eastern Association for the Surgery of Trauma, Practice Management Guidelines
<http://www.east.org/resources/treatment-guidelines>

Gift from Within (Survivors of Trauma and Victimization)
<http://www.giftfromwithin.org/>

Minnesota CALS Program
<https://calsprogram.org/>

National Trauma Data Bank
<http://www.facs.org/trauma/ntdb.html>

Society of Critical Care Medicine Publications
<http://www.sccm.org/>

Western Trauma Association, Algorithms
<http://westerntrauma.org/algorithms/algorithms.html>

Pediatrics

American Academy of Pediatrics
<http://www.aap.org/>

Children's Safety Network
<http://www.childrenssafetynetwork.org/>

Emergency Medical Services for Children (Minnesota)
<http://www.emscmn.org/>

Emergency Medical Services for Children (National)
<http://www.ems-c.org/>

National Child Traumatic Stress Network
<http://www.nctsn.org>

Prevention

Helmets R Us
<http://www.helmetsrus.net>

I Keep Safe (internet safety for kids)
<http://ikeepsafe.org/>

National Center for Injury Prevention and Control
<http://www.cdc.gov/ncipc/>

National Highway Traffic Safety Administration
<http://www.nhtsa.dot.gov/>

Risk Watch
<http://www.riskwatch.org/teacher.html>

Safety Belt Safe U.S.A.
<http://www.carseat.org/>

Appendix A: Sample Hospital Board Resolution

WHEREAS, traumatic injury is the leading cause of death for Minnesotans between the ages of 1 and 44 years; and

WHEREAS, [HOSPITAL] strives to provide optimal trauma care; and

WHEREAS, treatment at a trauma hospital that participates in a standardized system of trauma care can significantly increase the chance of survival for victims of serious trauma; and

WHEREAS, participation in the Minnesota Statewide Trauma System will result in an organized and timely response to patients' needs, a more immediate determination of patients' definitive care requirements, improved patient care through the development of the hospital's performance improvement program and an assurance that those caring for trauma patients are educationally prepared:

THEREFORE; BE IT RESOLVED that the board of directors of [HOSPITAL] resolve to provide the resources necessary to achieve and sustain a level [III or IV] trauma hospital designation.

IN WITNESS THEREOF, I have hereunto subscribed my name this 1st day of August, 2007.

Chairman of the Board

Appendix B: Sample Medical Staff Resolution

WHEREAS, traumatic injury is the leading cause of death for Minnesotans between the ages of 1 and 44 years; and

WHEREAS, [HOSPITAL] strives to provide optimal trauma care; and

WHEREAS, treatment at a trauma hospital that participates in a standardized system of trauma care can significantly increase the chance of survival for victims of serious trauma; and

WHEREAS, participation in the Minnesota Statewide Trauma System will result in an organized and timely response to patients' needs, a more immediate determination of patients' definitive care requirements, improved patient care through the development of the hospital's performance improvement program and an assurance that those caring for trauma patients are educationally prepared:

THEREFORE; BE IT RESOLVED that the medical staff of [HOSPITAL] resolves to support the hospital's trauma program and to provide trauma care commensurate with the standards published by the Minnesota Statewide Trauma System for level [III or IV] trauma hospitals.

IN WITNESS THEREOF, I have hereunto subscribed my name this 1st day of August, 2007.

Chief of Staff

Appendix C: Sample Trauma Program Medical Director Job Description

Job Title: Trauma Program Medical Director

Reports to: Chief of Medical Staff

Qualifications:

1. Board certified in Family Medicine, Emergency Medicine, Internal Medicine or General Surgery.
2. Member in good standing of the hospital medical staff.
3. Currently licensed to practice medicine in Minnesota.
4. Currently certified in Advanced Trauma Life Support (ATLS) or Comprehensive Advanced Life Support (CALLS).
5. Three years clinical experience in emergency/trauma care.
6. Two years administrative experience.
7. Ability to establish and maintain effective interpersonal relationships.
8. Ability to accept and implement change.
9. Ability to problem solving make decisions.
10. Demonstrated history of positive collegial relations with colleagues, support staff, hospital-based providers, administrators and patients.

Nature and Scope: The Trauma Medical Director is responsible for the ongoing development, growth and oversight/authority of the Trauma Program. He/she must be able to demonstrate effective interpersonal skills and an understanding of the interdependent roles of various allied health professions. The Trauma Medical Director is responsible for promoting high standards of practice through development of trauma policies, protocols and practice guidelines; participating in rigorous performance improvement monitoring; resident and staff education and trauma research. He/she has authority to act on all trauma performance improvement and administrative issues and critically review trauma deaths and complications that occur within the hospital. Decisions affecting the care of trauma patients will not be made without the knowledge, input and approval of the Trauma Medical Director.

Principal Duties and Responsibilities:

Administration:

- Participate in the research, development and writing of trauma policies, protocols and practice guidelines.
- Implement all trauma program policies and procedures as they pertain to patient care.
- Organize, direct and integrate the trauma program with all other departments and services within the hospital.
- Promote a cooperative and collaborative working environment among the clinical disciplines involved in trauma care.
- Maintain an effective working relationship with the medical staff, trauma service staff, administration and other departments.
- Provide advice and direction in recommending privileges for the trauma service.
- Participate in trauma program marketing activities.
- Establish a physician case management process that fosters cost-effective, high quality patient care.
- Assesses need for equipment, supplies, budget

- Assist the Trauma Program Coordinator in developing and meeting the trauma program budgetary goals.
- Oversee, participate in and develop projects that ensure the cost-effectiveness of care provided by physicians and hospital.

Program Initiatives:

- Lead efforts to develop and maintain a trauma center.
- Collaborate with the Trauma Program Coordinator to establish trauma program goals and objectives consistent with those of the hospital and ensure that those of the trauma program are being met.
- Develop and provide input on the development and maintenance of practice guidelines, policies and methodologies for medical/surgical trauma care.
- Participate in site review by regulatory agencies.
- Organize, direct and implement departmental practices to assure continued compliance with applicable laws including the guidelines established by the Statewide Trauma System and the Joint Commission on Accreditation of Hospitals.
- Demonstrate positive interpersonal relationship with colleagues, referral MDs, hospital personnel, and patients/families in order to achieve maximum operational effectiveness and customer satisfaction.
- Assure transfer agreements in place and in good standing; maintain relationship with receiving facilities, foster collaborative relationship.
- Make appropriate referrals for specialty services and communicate regularly with referring physician as appropriate.
- Assume clinical responsibility for all trauma patients.
- Ensure that adequate attending physician availability is provided to render care to trauma patients.
- Ensure establishment of physician/surgeon call schedules for all trauma care, excluding those who do not meet educational and credentialing requirements.
- Provide trauma care leadership and consultation for emergency, surgery and intensive care unit departments.
- Participate in regional and statewide activities affecting the trauma program.
- Attend local and national meetings and conferences to remain current regarding issues relevant to the performance of duties.
- Demonstrate consistent, efficient, cost effective and quality trauma care at all times.
- Participate in trauma patient/family satisfaction projects as developed by hospital.

Performance Improvement:

- Determine and implement PI activities appropriate to the trauma program.
- Oversee the trauma PI program and participate in other quality initiatives that deal with the care of injured patients.
- Review and investigate all trauma PI inquiries in collaboration with the Trauma Program Coordinator and refer to the appropriate committees.
- Monitor compliance with trauma treatment guidelines, policies and protocols.
- Assure that the quality and appropriateness of patient care are monitored and evaluated and that appropriate actions based on findings are taken on a consistent basis.
- Report quality of care issues promptly to appropriate individuals, including Trauma Program Coordinator and hospital administration.
- Identify and correct deficiencies in trauma care policies, guidelines and protocols.

- Consult with appropriate medical staff and administration regarding quality care issues and adverse outcomes; identify areas to improve patient care.
- Assure that continuum of care is maintained.
- Identify representatives from various disciplines appropriate to participate in PI activities.
- Coordinate, schedule and facilitate the PI peer review process.
- Chair the Morbidity and Mortality Committee meeting and the Multidisciplinary Trauma Conference.
- Review all trauma-related peer review and initiate action as necessary.
- Assist the Trauma Program Coordinator in evaluating the effectiveness of corrective actions resulting from PI processes.
- Assume responsibility for the accuracy and validity of trauma statistics.

Clinical Education:

- Support the requirements for trauma CME by participating and assisting in the education and training of hospital personnel physicians and specialists.
- Provide education for hospital staff regarding trauma program policies and appropriate medical practices.

Community Outreach:

- Maintain relations with community organization and legislative bodies whose activities relate to trauma care and injury prevention
- Participate in hospital outreach activities as may be requested by administration.
- Develop and participate in trauma community education and injury prevention activities.
- Function as a liaison to other hospitals within the region.

Knowledge and Skill:

- Lead the hospital in program development.
- Oversee the clinical practice of medical staff.
- Analyze and interpret complicated information.
- Determines a course of action based on research, data, standards of care and general guidelines/protocols.
- Communicate effectively with a wide variety of intra- and inter-facility staff and administration using both oral and written communication.
- Possess critical thinking, analytical, teaching/coaching and research skills.

Appendix D: Sample Trauma Program Manager/Coordinator Job Description

Job Title: Trauma Program Coordinator

Reports to: Director of Nursing

Qualifications:

1. Bachelor's degree
2. Currently licensed as registered nurse in Minnesota.
3. Currently certified in TNCC, CALS, CATN or ATCN.
4. Three years clinical experience in trauma/emergency care.
5. Ability to establish and maintain effective interpersonal relationships.
6. Ability to accept and implement change.
7. Ability to problem solving make decisions.
8. Possession of critical thinking, analytical, teaching/coaching and research skills.

Nature and scope: The Trauma Program Coordinator (TPC) is responsible for developing, implementing and maintaining a cost-effective system of care for trauma patients and their families throughout the continuum of care. The TPC works both independently and in collaboration with the trauma program medical director and other members of the health care team and the management staff. The TPC is self-directed and self-motivating, plans and conducts work with minimal direction, and reports the progress of work to the director of nursing.

Principal Duties and Responsibilities:

Administration:

- Support and adhere to hospital policies, procedures, philosophy and mission.
- Produce and manage the trauma program budget.
- Interpret and implement policies and procedures; make recommendations for revisions; assist with updating policies and procedures.
- Participate in the development and planning of goals and objectives related to trauma care.
- Coordinate with the medical director, hospital administration and clinicians to assess the need for policies, procedures and protocols relating to the care of trauma patients.
- Develop policies and procedures based on current literature, input from clinicians and other sources such as information from patient care evaluations.
- Represent the Trauma Program on various hospital and community committees to enhance and foster optimal trauma care management.
- Participate in the budget process: anticipate trends, future needs of the trauma program.
- Work with a broad array of department to resolve inefficiencies and reduce costs
- Supervise adherence to hospital policies and procedures and standards through observation, medical record review, staff feedbacks and other appropriate sources.
- Serves as a liaison to administration, representing the Trauma Program on various hospital and community committees to enhance and foster a fiscally sound Trauma Program.
- Monitor trauma care financial reimbursement issues.

Program Initiatives:

- Implements program initiatives.
- Monitor and maintain compliance with statewide trauma system regulatory requirements.

- Coordinate preparation for statewide trauma system designation site visit.
- Develop and foster collaborative relationships with all hospital departments to facilitate and support quality trauma care.
- Participate in state and regional trauma care activities
- Monitor national and statewide trends in trauma care.
- Respond to trauma team activations that occur during work hours; function in what ever role necessary to assist the team in the care of the patient.
- Serve as a resource for the hospital staff regarding trauma care issues.
- Plan and implement strategies for ongoing trauma program development and improvement.
- Monitor state and national trends in trauma care.
- Collaborate with trauma program medical director, physicians and other health care professionals to provide clinical and system oversight for the care of trauma patients, ensuring the provision of efficient, quality, cost-effective care.

Performance Improvement:

- Assess and improve departmental performance.
- Maintains quality control programs and participates in the organization's overall quality control program.
- Monitor performance of hospital staff involved with the care of trauma patients.
- Monitor trauma patient outcomes; evaluate for trends.
- Coordinate with physicians, nurses, other in-hospital staff and outside providers to evaluate and address specific patient care issues.
- Participate in case review.
- Assist the trauma program medical director and hospital administration in the development, implementation and evaluation of a quality plan which is multi disciplinary and patient-outcomes focused.
- Serve as the coordinator for the identification, investigation, reporting and follow up of incidents and quality issues throughout the program while maintaining confidentiality.
- Monitors the trauma team's availability and compliance with policies and standards.
- Develop and monitor the trauma PI program in collaboration with the trauma program medical director.
- Coordinate and schedule the morbidity and mortality committee and multidisciplinary review meetings.
- Assists in data collection related to the trauma patient.
- Analyze registry data on the trauma patient population; identify trends for strategic planning and performance improvement.
- Manage registry data: collect, analyze and trend.
- Supervise the collecting, coding, scoring and developing of processes for validation of data entered into the registry.
- Ensure accurate data entry into the trauma registry.
- Ensures the maintenance of the trauma registry in collaboration with the trauma registrar.
- Ensure the periodic reporting of trauma data to the state trauma program.
- Facilitate the measurement of selected outcomes for the trauma patient population.

Clinical Education:

- Plan, coordinate and evaluate trauma-related educational programs for nursing staff.

- Monitor physician and nurse compliance with the educational requirements of the trauma program.
- Ensure staffs involved in the care of trauma patients meet educational requirements of the trauma program.
- Develop, coordinate and implement orientation, nursing education, and in-service programs related to care and management of trauma patients.
- Seek and pursue opportunities for internal and external trauma-related educational programs for hospital staff.

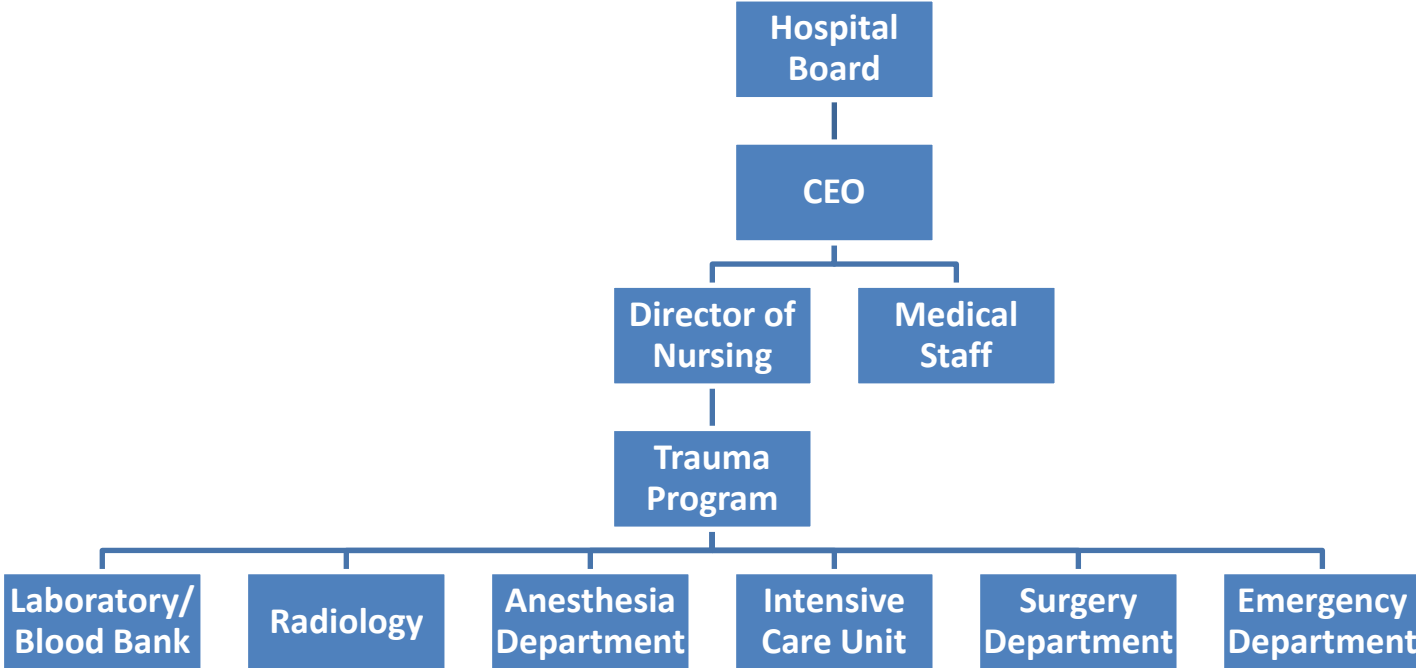
Community Outreach:

- Coordinate and oversee the development and implementation of an injury prevention program.
- Direct community trauma education and prevention programs by developing, implementing and evaluating programs for targeted populations in the community related to injury prevention and other topics identified through needs assessment of the community.
- Develop and implement strategies for communication, education and feedback for EMS systems in the catchment area.
- Identify opportunities for injury prevention programming in the local communities.
- Plan, coordinate and collaborate with community representatives to accomplish injury prevention activities.
- Evaluate the impact of injury prevention activities.
- Seek and pursue opportunities for internal and external trauma-related educational programs for hospital staff, patients, families and the community.

Knowledge and Skill:

- Analyze and interpret complicated information.
- Determines a course of action based on research, data, standards of care and general guidelines/protocols.
- Communicate effectively with a wide variety of intra- and inter-facility staff and administration using both oral and written communication.

Appendix E: Suggested Position of Trauma Program



Appendix F: Sample Single-Tier Trauma Team Activation (TTA) Protocol

Purpose:

A team must be rapidly assembled to provide for the initial evaluation and resuscitation of major trauma patients in an organized and efficient manner.

Policy:

The team is a multi-disciplinary panel of professionals assembled in an organized fashion to perform the tasks necessary to efficiently resuscitate seriously injured patients.

1) The activation criteria are as follows:

Activate trauma team upon realization that any of the following patient conditions exists, either upon arrival of the patient or notification by EMS.

Adult or pediatric trauma patient and presenting with:

- Altered level of consciousness secondary to trauma: GCS ≤ 13 or less than "V" on AVPU scale
- Respiratory distress, airway compromise, intubation or respiratory rate outside of acceptable range:
 - Adult RR < 10 or > 30
 - Child RR

Age	RR
≥ 6	< 10 or > 30
2-5	< 10 or > 40
12-24 months	< 10 or > 50
0-12 months	< 20 or > 60

- Shock, evidence of diminished perfusion, transient hypotensive episode or vital signs outside of acceptable range:
 - Adult BP < 90 or HR > 120
 - Child capillary refill < 2 seconds or

Age	BP	HR
≥ 6	< 90	< 60 or > 140
2-5	< 80	< 60 or > 160
12-24 months	< 75	< 70 or > 180
0-12 months	< 70	< 80 or > 180

- Suspected cardiac or major vessel injury
- Penetrating wound to the head, neck, chest or abdomen
- Suspected severe orthopedic injuries:
 - Pelvic fracture
 - Unstable facial fracture
 - Femur fracture
 - Open long bone fracture
 - More than one proximal long bone fracture
 - Knee dislocation
- Burns:
 - $> 20\%$ TBSA
 - Facial burns
 - Suspected inhalation burn
 - Burns with concomitant trauma

- Traumatic paralysis or focal neurological signs/symptoms (i.e., numbness, tingling)
- Pregnancy >20 weeks with vaginal bleeding or contractions
- Aeromedical launched by EMS
- Provider discretion; consider for:
 - Multiple injuries (two or more systems) or severe single system injury
 - Co-morbid factors:
 - Anti-coagulant therapy
 - Age <5 or >55 years old
 - Multiple co-morbidities

Mechanism of Injury

- Fall:
 - >15 feet
 - > 65 years old and fall from elevation or down stairs
 - Pediatric <10 years old: >2x patient's height
- Death in same passenger compartment
- Extrication time >20 minutes (i.e., time spent accomplishing the extrication)
- Ejection from auto
- Motorcycle, snowmobile or ATV crash with separation of rider
- Bicyclist struck by auto with separation of rider
- Pedestrian struck and thrown by auto

2) Trauma team members:

- Emergency department provider (e.g., physician, nurse practitioner or physician assistant)
- Two emergency department RNs
- Nursing assistant or EMT
- Laboratory technician
- Radiology technician
- Health Unit Coordinator (HUC)

The individual roles of the team members are subject to change based on the needs of the patient and resources available during the resuscitation. Below is a guideline. The provider leading the resuscitation may modify the duties of any team member if in the best interest of the patient.

Emergency Department Provider:

- Perform primary and secondary survey.
- Perform or delegate airway management.
- Perform procedures as needed such as chest tube insertion, central venous access, ultrasound exam.
- Order appropriate lab and radiographs.
- Responsible for all medications and fluids given.
- Make triage and transfer decisions.
- Determine the need for and mode of inter-facility transfer (air vs. ground) early in resuscitation course.
- Communicate directly with receiving physician at trauma hospital regarding transfer.
- Document case (complete trauma flow sheet, dictate emergency department note).
- Complete and sign patient transfer form.

Emergency Department Nurses

- Prepare trauma room before the patient arrival.
- Place X-ray trauma blocks on the gurney.
- Assist EMS with transfer from EMS gurney to trauma bed.
- Attach BP, cardiac and oximetry monitors to the patient.
- Obtain initial vital signs and report out loud to emergency department provider. (BP, HR, RR, SpO₂ and temp (Core temp if hypothermia is considered)).
- Maintain and monitor all intravenous lines. Obtain fluid resuscitation orders and IV rate from emergency department provider. Report to recorder (at end of emergency department course) total IV intake and urine output.
- Set up fluid and blood warmer. Start blood transfusion as ordered.
- Remain at patient bedside throughout the emergency department course.
- Assist with equipment preparation before the patient arrives.
- Assist with transfer from the EMS gurney to the trauma bed.
- Assist in removing patient's clothing.
- Draw up and label airway drugs (succinylcholine, Etomidate, etc.). Be prepared to administer drugs as ordered by the emergency department provider.
- Obtain IV access if needed. (If primary IV is done, place 2nd IV and draw bloods).
- Inserts Foley catheter when authorized by the emergency department provider.
- Set up chest tube drainage system if needed.
- Assist emergency department provider with procedures as needed.
- Administer tetanus booster and antibiotics when ordered by emergency department provider.
- Initially document emergency department course by filling out the trauma resuscitation record.
- Record vital signs initially and every 5 minutes; make sure that provider in charge is aware of any significant changes in the patient's status.
- Accompany patient out of department for any diagnostic procedures.
- Control traffic in the trauma room; attentive to patient's privacy, e.g., keep curtains closed, keep other patients and family members away from traffic areas.
- Communicate with family.
- Escort family members to trauma room and attend them when appropriate.

Nursing Assistant or EMT

- Assist with transfer from the EMS gurney to the trauma bed.
- Assist in removing patient's clothing; covers patient immediately with warm blankets.
- Assist with intubation: provide in-line cervical spine immobilization or Sellick's maneuver as directed.
- Assist with procedures as needed.
- Assist with transport of patient to X-ray.
- Check airway equipment before the patient's arrival. (i.e., suction, laryngoscopes, ambu bag, O₂)
- Maintain oxygen; insure SpO₂ unit functions properly; assist ventilation with BVM as necessary and as directed by emergency department provider.

Laboratory Technician

- Obtain pre-labeled blood tubes from trauma room; attach ID bracelet to patient.

- Obtain syringes from IV start (by RN) or perform venipuncture to obtain blood for trauma battery.
- Determine availability of blood; bring O negative blood to trauma room immediately if requested.
- Run phase 1 and phase 2 labs. (see below)
- Obtain urine from Foley insertion and run UA on all patients. Run urine HCG on all females in reproductive age group.
- Run ABGs.
- Insure type specific blood is available in blood bank.
- Perform ECG if requested.

Radiology Technician

- Respond immediately to trauma team activation page; transfer portable x-ray machine to trauma room, insure enough film plates for basic trauma radiographs (e.g., lateral c-spine, chest, pelvis).
- Place chest plate on trauma cart under backboard before patient arrives.
- Determine radiographic priorities per physician in charge.
- Ensure at least 2 additional aprons are in trauma room and available for emergency department staff.
- Develop films and immediately take them to the trauma room.
- Inquire if CT will be needed; call in/notify CT tech to prepare for emergency scan.
- Copy radiographs if patient will be transferred; ensure originals accompany the patient.

Health Unit Coordinator (HUC)

- Activate trauma team upon notification of TTA for the field; confirm all team members have arrived. Record arrival times.
- Determine if additional medical staff will be needed.
- Contact receiving trauma hospital as directed by emergency department provider.
- Assemble and copy all documentation for transport team, e.g., chart, labs, x-ray.
- Direct family members to family support person.
- Prepare patient transfer forms and obtain emergency department provider signature if patient is transferred.
- Request security to secure the helicopter landing pad.
- Meet family members; escort them to the family consultation room.
- Offer to contact others, e.g., family, friends, or clergy.
- Authorize food services to provide refreshments to family members as necessary.
- If the patient is transferred, ensure that family members have transportation and directions to receiving facility.

3) Procedure:

1. The emergency department nurse, emergency department provider or EMS becomes aware of a patient meeting TTA criteria and instructs HUC to call a TTA. Call a TTA upon receipt of notification that the incoming patient's condition meets the TTA criteria. Do not wait for the patient to arrive in the emergency department before activating the team.
2. The HUC pages overhead "*Trauma Team Stat, [ETA],*" a total of 3 times.
3. Team members assemble in the emergency department immediately.
4. The emergency department provider team leader briefs the team on the condition of the patient and begins to assign duties.

5. The team leader should immediately consider the need to transfer the patient and activate the trauma transfer protocol, if indicated.

4) Guiding Principles:

- The trauma lab panels are typically:
 - Phase 1
 - Alcohol
 - CBC w/ differential
 - Electrolytes
 - PT/INR
 - PTT
 - Type and screen
 - Phase 2
 - Arterial blood gases
 - Pregnancy test (serum or urine) on all females in reproductive age group
 - UA
 - Urine tox. screen
- Personal Protective Equipment (PPE) should be worn by all personnel who work directly with the patient.
 - Gowns
 - Gloves
 - Masks to include eye shields
 - Shoe covers, surgical caps
 - Lead aprons
- Keep talking and noise to a minimum. Discuss the patient's condition only behind closed doors and after ensuring a private environment.
- Keep doors and curtains closed. Vigilantly maintain the patient's privacy. Encourage other patients and family members to stay in their cubicles during the resuscitation.
- Ensure that the patient is informed of procedures before they are performed. Continuously ascertain the patient's comfort level (e.g., pain, temperature).
- Verbally acknowledge orders; inform the source when the request has been completed; when giving orders, ensure their receipt.
- Stand in an area removed from the patient until called upon or dismissed, if not directly involved in patient care.
- Select proximal sites for peripheral IVs, when possible; they may need to be converted to rapid infusion catheters.
- Vacate the room when X-rays are being taken unless fitted with a lead apron.
- Place the patient's clothing and belongings into labeled bags as soon as possible.

Appendix G: Sample Multi-Tier Trauma Team Activation (TTA) Protocol

Purpose:

A team must be rapidly assembled to provide for the initial evaluation and resuscitation of major trauma patients in an organized and efficient manner.

Policy:

The team is a multi-disciplinary panel of professionals assembled in an organized fashion to perform the tasks necessary to efficiently resuscitate seriously injured patients.

1. The activation criteria are as follows:

Tier-1 activation: Activate the Tier-1 Trauma Team upon realization that any of the following patient conditions exists, either upon arrival of the patient or notification by EMS.

Adult or pediatric trauma patient and presenting with:

- Altered level of consciousness secondary to trauma: GCS ≤ 10 or less than "V" on AVPU scale
- Respiratory distress, airway compromise, intubation or respiratory rate outside of acceptable range:
 - Adult RR < 10 or > 30
 - Child RR

Age	RR
≥ 6	< 10 or > 30
2-5	< 10 or > 40
12-24 months	< 10 or > 50
0-12 months	< 20 or > 60

- Shock, evidence of diminished perfusion, transient hypotensive episode or vital signs outside of acceptable range:
 - Adult BP < 90 or HR > 120
 - Child capillary refill < 2 seconds or

Age	BP	HR
≥ 6	< 90	< 60 or > 140
2-5	< 80	< 60 or > 160
12-24 months	< 75	< 70 or > 180
0-12 months	< 70	< 80 or > 180

- Suspected cardiac or major vessel injury
- Penetrating wound to the head, neck, chest or abdomen
- Suspected severe orthopedic injuries:
 - Pelvic fracture
 - Unstable facial fracture
 - More than one proximal long bone fracture
- Burns with concomitant trauma
- Pregnancy > 20 weeks with vaginal bleeding or contractions
- Aeromedical launched by EMS
- Provider discretion

Mechanism of Injury

- Fall:
 - > 15 feet

- > 65 years old and fall from elevation or down stairs
- Pediatric <10 years old: >2x patient's height
- Ejection from auto
- Pedestrian struck and thrown by auto

Tier-2 activation: Activate the Tier-2 Trauma Team upon realization that any of the following conditions exist, either upon arrival of the patient or notification by EMS.

Adult or pediatric trauma patient and presenting with:

- GCS >10 and <14 secondary to trauma
- Suspected severe orthopedic injuries:
 - Femur fracture
 - Open long bone fracture
 - Knee dislocation
- Burns:
 - >20% TBSA
 - Facial burns
 - Suspected inhalation burn
- Traumatic paralysis or focal neurological signs/symptoms (i.e., numbness, tingling)
- Provider discretion; consider for:
 - Multiple injuries (two or more systems) or severe single system injury
 - Co-morbid factors:
 - Anti-coagulant therapy
 - Age <5 or >55 years old
 - Multiple co-morbidities

Mechanism of Injury

- Death in same passenger compartment
- Extrication time >20 minutes (i.e., time spent accomplishing the extrication)
- Motorcycle, snowmobile or ATV crash with separation of rider
- Bicyclist struck by auto with separation of rider

2) For each tier of activation, the trauma team members are:

a) Tier-1 activation

- Emergency physician* (present within 15 minutes of patient's arrival)
- General surgeon (present within 30 minutes of patient's arrival)
- Two emergency department RNs*
- Nursing supervisor
- Emergency department tech or EMT
- Respiratory therapy
- Anesthesia
- Laboratory technician
- Radiology technician
- Emergency department HUC
- Security
- Social services or chaplain

*Note one physician and two RNs per critical patient

b) Tier-2 activation

- i) Emergency physician* (present within 15 minutes of patient's arrival)

- ii) Two emergency department RNs*
- iii) Nursing supervisor
- iv) Emergency department tech or EMT
- v) Radiology technician
- vi) Laboratory technician
- vii) Emergency department HUC
- viii) Security

*Note one physician and two RNs per critical patient

The individual roles of the team members are subject to change based on the needs of the patient and resources available during the resuscitation. Below is a guideline. The physician leading the resuscitation may modify the duties of any team member if in the best interest of the patient.

Emergency physician and general surgeon

- Perform primary and secondary survey.
- Perform or delegate airway management.
- Perform procedures as needed such as chest tube insertion, central venous access, ultrasound exam.
- Order appropriate lab and radiographs.
- Responsible for all medications and fluids given.
- Make triage and transfer decisions.
- Determine mode of inter-facility transfer (air vs. ground).
- Communicate directly with receiving physician at trauma hospital regarding transfer.
- Document case (complete trauma flow sheet, dictate emergency department note).
- Complete and sign patient transfer form.
- Coordinate priorities when more than one critical patient in the emergency department.

Emergency Department Nurses

- Prepare trauma room before the patient arrival.
- Place X-ray trauma blocks on the gurney.
- Assist EMS with transfer from EMS gurney to trauma bed.
- Attach BP, cardiac and oximetry monitors to the patient.
- Obtain initial vital signs and report out loud to emergency department physician and critical care nurse. (BP, HR, RR, SpO₂ and temp (core temp if hypothermia is considered)).
- Maintain and monitor all intravenous lines. Obtain fluid resuscitation orders and IV rate from emergency department physician. Report to recorder total IV intake and urine output at end of emergency department course.
- Set up fluid and blood warmer. Start blood transfusion as ordered.
- Remain at patient's bedside throughout the emergency department course.
- Remove patient's clothing.
- Draw up and label airway drugs (succinylcholine, Etomidate, etc.). Be prepared to administer drugs as ordered by the emergency department physician.
- Obtain IV access if needed. (If primary IV is done, place second IV and draw bloods)
- Insert Foley catheter when authorized by the emergency department physician.
- Set up chest tube drainage system if needed.
- Assist physician with procedures as needed.
- Administer tetanus booster and antibiotics when ordered by emergency department physician.

- Initially document emergency department course by filling out the trauma resuscitation record.
- Record vital signs initially and every five minutes; make sure that physician in charge is aware of any significant changes in the patient's status.
- Accompany patient out of department for any diagnostic procedures.
- Accompany patient to ICU, report off to ICU staff.

Nursing Supervisor

- Assess staffing needs; delegate additional nursing staff as required to attend trauma patient or others in the emergency department.
- Ensure all team members are wearing appropriate protective equipment (see below).
- Monitor activities of the trauma team.
- Control traffic in the trauma room; attentive to patient's privacy, e.g., keep curtains closed, keep other patients and family members away from traffic areas.
- Assist others with equipment and procedures as needed.
- Communicate with family in collaboration with family support staff member.
- Escort family members to trauma room and attend them when appropriate.

Emergency Department Technician (or EMT)

- Assist with transfer from the EMS gurney to the trauma bed.
- Assist in removing patient's clothing; cover patient immediately with warm blankets.
- Assist with intubation: provide in line cervical spine immobilization or Sellick's maneuver as directed.
- Assist with procedures as needed.
- Assist with transport of patient to CT scanner.

Respiratory Therapist (When not available a paramedic may take the place of RT.)

- Check airway equipment before the patient's arrival (e.g., suction, laryngoscopes, ambu bag, O₂).
- Maintain oxygen; ensure SpO₂ unit functions properly; assist ventilation with BVM as necessary and as directed by emergency department physician.
- Assist with intubation; perform Sellick's maneuver after paralytic is given; ensure that in-line cervical spine immobilization is delegated for the intubation.
- Check tube placement after intubation with esophageal detector device, attach end tidal CO₂ monitor and secure ET tube.
- Ventilate patient; set up transport ventilator if necessary.
- Monitor end tidal CO₂ and SpO₂.
- Draw ABGs if requested.

Anesthesia (CRNA or MDA)

- Initially assist with airway management as directed by physician in charge.
- Assist with vascular access (peripheral or central).
- Assist with ventilation if respiratory therapy unavailable (if RT not in house).
- Serve as team leader for an individual patient when emergency department physician unavailable.
- Place NG or OG tube as directed by physician in charge.

Laboratory Technician

- Obtain pre-labeled blood tubes from trauma room; attach ID bracelet to patient.
- Obtain syringes from IV start (by RN) or perform venipuncture to obtain blood for trauma battery.

- Determine availability of blood; bring O negative blood to trauma room immediately if requested.
- Run phase 1 and phase 2 labs (see below).
- Obtain urine from Foley insertion and run UA on all patients. Run urine HCG on all females in reproductive age group.
- Run ABGs.
- Ensure type specific blood is available in blood bank.
- Perform ECG if requested.

Radiology Technician

- Respond immediately to trauma team activation page; transfer portable X-ray machine to trauma room, ensure enough film plates for basic trauma radiographs (e.g., lateral c-spine, chest and pelvis).
- Place chest plate on trauma cart under backboard before patient arrives.
- Obtain radiographic priorities from physician in charge.
- Ensure at least two additional aprons are in trauma room and available for emergency department staff.
- Develop films and immediately take them to the trauma room.
- Inquire if CT will be needed; call in/notify CT tech to prepare for emergency scan.
- Copy radiographs if patient will be transferred; ensure originals accompany the patient.

Health Unit Coordinator (HUC)

- Activate trauma team upon notification of TTA; confirm all team members have arrived and record arrival times.
- Determine if additional medical staff will be needed.
- Contact receiving trauma hospital as directed by emergency department physician.
- Assemble and copy all documentation for transport team, e.g., trauma flow sheet, chart, labs, X-ray.
- Direct family members to family support person.
- Prepare patient transfer forms and obtain emergency department physician signature if patient is transferred.

Security

- Assist with procedures during resuscitation.
- Secure helicopter landing pad and assist flight crew with equipment.
- Assist with transportation of the patient to CT or helipad as needed.

Family Support Person (Social Services, Chaplain or Nursing Supervisor)

- Meet family members; escort them to the family consultation room.
- Offer to contact others, e.g., family, friends or clergy.
- For pediatric resuscitations, accompany parents into the trauma room; attend them continuously.
- Authorize food services to provide refreshments to family members as necessary.
- If the patient is transferred, ensure that family members have transportation and directions to receiving facility.
- In the case of patient's death, assist with contacting funeral service.

Back up physicians (non-emergency department physician called in to assist with multiple casualties)

- Assist with procedures as delegated by the physician in charge.

- Assume responsibility for additional trauma patients or other emergency department patients as directed by physician in charge.
- Inform physician in charge of findings, patient progress; consult regarding treatment/triage/transfer plans.

3) Procedure:

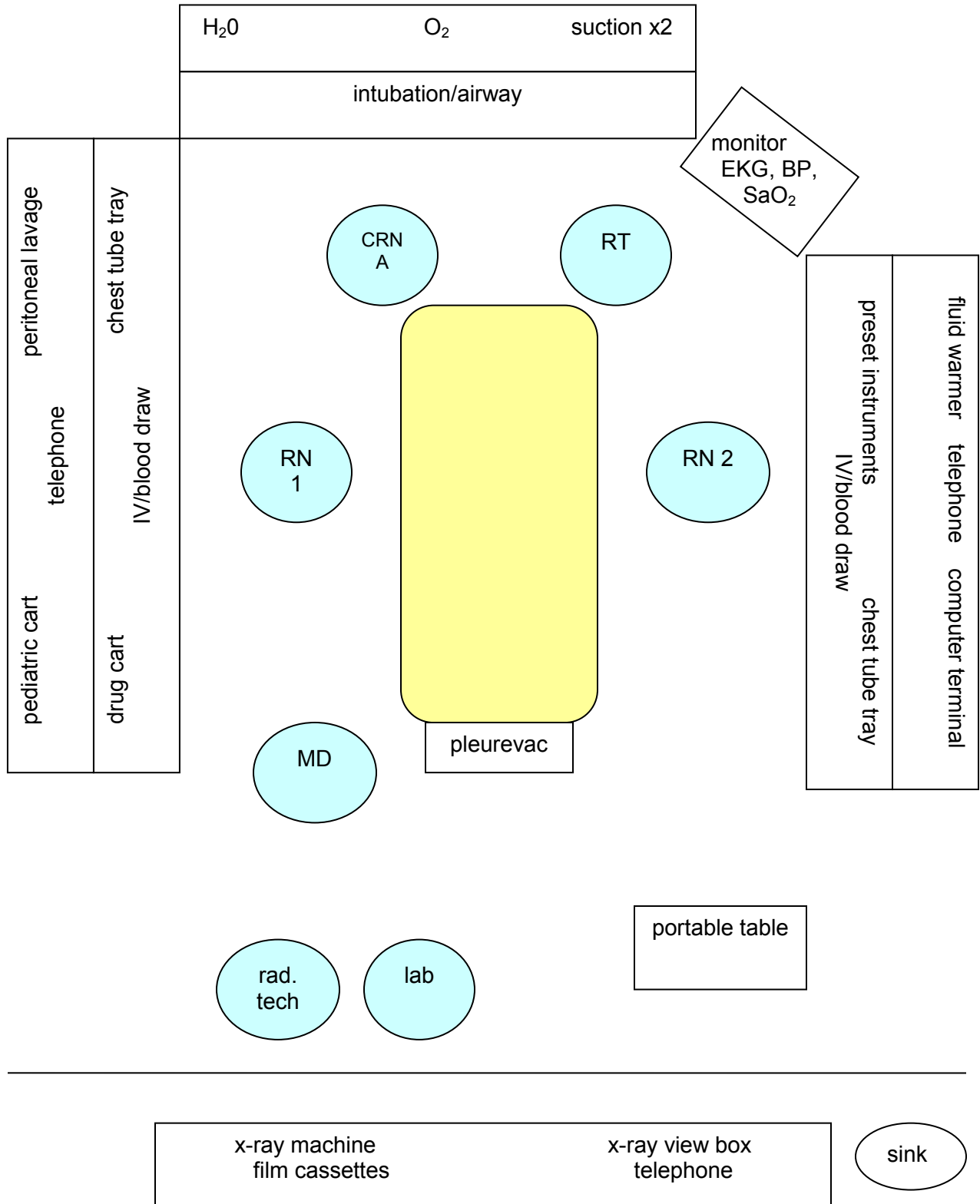
1. The emergency department nurse, emergency department physician or EMS becomes aware of a patient meeting TTA criteria and instructs HUC to call a tier 1 or 2 TTA. Call a TTA upon receipt of notification that the incoming patient's condition meets the TTA criteria. Do not wait for the patient to arrive in the emergency department before activating the team.
2. The HUC pages overhead "Tier [1 or 2] Trauma Team Stat, [ETA]," a total of 3 times.
3. Team members assemble in the emergency department immediately.
4. The physician team leader briefs the team on the condition of the patient and begins to assign duties.
5. The physician team leader should immediately consider the need to transfer the patient and activate the trauma transfer protocol, if indicated.

4) Guiding Principles:

- The trauma lab panels are typically:
 - Phase 1
 - Alcohol
 - CBC w/ differential
 - Electrolytes
 - PT/INR
 - PTT
 - Type and screen
 - Phase 2
 - Arterial blood gases
 - Pregnancy test (serum or urine) on all females in reproductive age group
 - UA
 - Urine tox. screen
- Personal Protective Equipment (PPE) should be worn by all personnel who work directly with the patient.
 - Gowns
 - Gloves
 - Masks to include eye shields
 - Shoe covers, surgical caps
 - Lead aprons
- Keep talking and noise to a minimum. Discuss the patient's condition only behind closed doors and after ensuring a private environment.
- Keep doors and curtains closed. Vigilantly maintain the patient's privacy. Encourage other patients and family members to stay in their cubicles during the resuscitation.
- Ensure that the patient is informed of procedures before they are performed. Continuously ascertain the patient's comfort level (e.g., pain, temperature).
- Verbally acknowledge orders; inform the source when the request has been completed; when giving orders, ensure their receipt.
- Stand in an area removed from the patient until called upon or dismissed, if not directly involved in patient care.

- Select proximal sites for peripheral IVs, when possible; they may need to be converted to rapid infusion catheters.
- Vacate the room when X-rays are being taken unless fitted with a lead apron.
- Place the patient's clothing and belongings into labeled bags as soon as possible.

Appendix H: Sample Trauma Bay Configuration

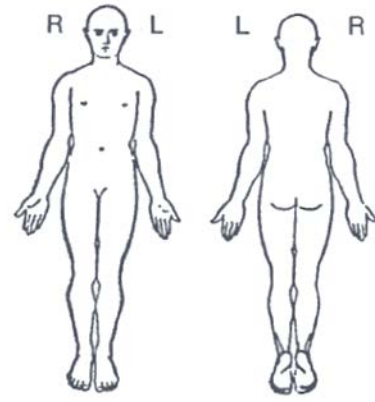


Appendix I: Trauma Resuscitation Record

Patient Tag/Sticker		Patient Name _____			Admit Date / /																	
					Arrival Time :																	
Trauma Team Notification/Arrival																						
Trauma Team Activated? <input type="checkbox"/> Yes <input type="checkbox"/> No Time: :																						
Date of Birth		Name		Time called	Time arrived	Present upon Pt arrival?																
Gender		Trauma Surgeon		:	:	<input type="checkbox"/> Yes <input type="checkbox"/> No																
Medical Record #		ED Physician		:	:	<input type="checkbox"/> Yes <input type="checkbox"/> No																
		Anesthesia		:	:	<input type="checkbox"/> Yes <input type="checkbox"/> No																
				:	:	<input type="checkbox"/> Yes <input type="checkbox"/> No																
Arrived via: <input type="checkbox"/> Ambulance <input type="checkbox"/> Helicopter <input type="checkbox"/> Police <input type="checkbox"/> Self <input type="checkbox"/> Transfer from: <input type="checkbox"/> EMS report in Pt chart		Pre-hospital Interventions Airway: <input type="checkbox"/> Oral <input type="checkbox"/> Nasal <input type="checkbox"/> Intubated <input type="checkbox"/> O ₂ <input type="checkbox"/> IV size _____ site _____ <input type="checkbox"/> IV #2 size _____ site _____ <input type="checkbox"/> Blood sugar _____ mg/dl <input type="checkbox"/> CPR <input type="checkbox"/> LBB <input type="checkbox"/> C collar <input type="checkbox"/> MAST <input type="checkbox"/> Splint type _____ location _____ Meds: <input type="checkbox"/> Morphine _____ mg <input type="checkbox"/> Versed _____ mg <input type="checkbox"/> _____ mg		Pt. Medications <input type="checkbox"/> unknown		Past History <input type="checkbox"/> unknown last tetanus _____ last P.O. _____																
Mechanism of Injury																						
Motor Vehicle Involved: <input type="checkbox"/> Auto <input type="checkbox"/> Light truck <input type="checkbox"/> Heavy truck <input type="checkbox"/> Motorcycle <input type="checkbox"/> ATV <input type="checkbox"/> Bicycle <input type="checkbox"/> Pedestrian <input type="checkbox"/> Watercraft <input type="checkbox"/> Sporting _____ <input type="checkbox"/>		Patient was: <input type="checkbox"/> Driver <input type="checkbox"/> Passenger-front <input type="checkbox"/> Passenger-back <input type="checkbox"/> Pedestrian struck by auto <input type="checkbox"/> Bicyclist struck by auto <input type="checkbox"/> Unknown		<input type="checkbox"/> Seatbelt <input type="checkbox"/> Airbag <input type="checkbox"/> Child seat <input type="checkbox"/> Helmet <input type="checkbox"/> Ejected <input type="checkbox"/> Extrication <input type="checkbox"/> Death of another occupant		Fall/Jump Approx. height: Landing surface: <input type="checkbox"/> Grass/dirt/earth <input type="checkbox"/> Stone <input type="checkbox"/> Concrete/brick <input type="checkbox"/> Tile/wood <input type="checkbox"/> Carpet <input type="checkbox"/> Water <input type="checkbox"/>																
				<input type="checkbox"/> Flame <input type="checkbox"/> Steam <input type="checkbox"/> Chemical <input type="checkbox"/> Radiation <input type="checkbox"/> Inhalation <input type="checkbox"/> Electrical voltage: _____		Penetrating <input type="checkbox"/> GSW caliber _____ distance _____ <input type="checkbox"/> Stab blade length _____ <input type="checkbox"/> Self inflicted <input type="checkbox"/> Impalement																
Primary Survey and Preliminary Interventions					Initial ED Vital Signs																	
Airway <input type="checkbox"/> Patent/talking <input type="checkbox"/> Clear <input type="checkbox"/> Partially obstructed <input type="checkbox"/> Completely obstructed <input type="checkbox"/> Breathing assisted <input type="checkbox"/> Intubated <input type="checkbox"/> EOA/Combitube		<input type="checkbox"/> Jaw thrust <input type="checkbox"/> Suction <input type="checkbox"/> Foreign object removal/laryngoscopy <input type="checkbox"/> Oral airway <input type="checkbox"/> Nasal airway <input type="checkbox"/> Combitube/LMA time: _____:_____:_____		<input type="checkbox"/> Intubation <input type="checkbox"/> RSI tube size _____ time: _____:_____:_____ cm @ _____ #attempts: _____ <input type="checkbox"/> Confirmed by: <input type="checkbox"/> End tidal CO ₂ <input type="checkbox"/> Aspirator <input type="checkbox"/> CXR		Time: _____:_____:_____																
Breathing <input type="checkbox"/> Spontaneous <input type="checkbox"/> Labored <input type="checkbox"/> Agonal <input type="checkbox"/> No effort Trachea: <input type="checkbox"/> Midline <input type="checkbox"/> Deviated <input type="checkbox"/> R <input type="checkbox"/> L Chest wall symmetry: <input type="checkbox"/> Symmetrical <input type="checkbox"/> Asymmetrical		Lung sounds: L R <input type="checkbox"/> Present <input type="checkbox"/> Clear <input type="checkbox"/> Diminished <input type="checkbox"/> Absent <input type="checkbox"/> Rales <input type="checkbox"/> Rhonchi <input type="checkbox"/> Wheezes		Assisted: <input type="checkbox"/> BVM <input type="checkbox"/> Ventilator Vent. Rate _____ Supplemental O ₂ <input type="checkbox"/> Mask <input type="checkbox"/> NC _____ l/m start _____:_____:_____ stop _____:_____:_____		BP: _____/_____ Pulse: _____/min Resp.: _____/min Temp.: _____° C site _____ SaO ₂ : _____% Blood Glucose _____ mg/dl Est. weight: _____ kg																
Circulation Skin: <input type="checkbox"/> Warm <input type="checkbox"/> Pink <input type="checkbox"/> Cool <input type="checkbox"/> Pale <input type="checkbox"/> Hot <input type="checkbox"/> Flushed <input type="checkbox"/> Dry <input type="checkbox"/> Ashen <input type="checkbox"/> Moist <input type="checkbox"/> Cyanotic <input type="checkbox"/> Diaphoretic		Pulse: <input type="checkbox"/> Central pulse present <input type="checkbox"/> Peripheral pulse present <input type="checkbox"/> No pulse <input type="checkbox"/> Strong <input type="checkbox"/> Thready Capillary refill _____ sec.		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Time</th> <th>IVs: Site</th> <th>Size</th> </tr> </thead> <tbody> <tr> <td>_____:</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____:</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____:</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____:</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table> <input type="checkbox"/> Warm IV fluids		Time	IVs: Site	Size	_____:	_____	_____	_____:	_____	_____	_____:	_____	_____	_____:	_____	_____	<input type="checkbox"/> Warm blankets <input type="checkbox"/> Warming lights <input type="checkbox"/> Direct pressure bleeding control: site _____	
Time	IVs: Site	Size																				
_____:	_____	_____																				
_____:	_____	_____																				
_____:	_____	_____																				
_____:	_____	_____																				
Glasgow Coma Scale (GCS)					Pupils																	
Disability Eye Opening <input type="checkbox"/> 4 Spontaneous <input type="checkbox"/> 3 To Verbal <input type="checkbox"/> 2 To Pain <input type="checkbox"/> 1 None		Verbal <input type="checkbox"/> 5 Oriented <input type="checkbox"/> 4 Confused <input type="checkbox"/> 3 Inappropriate response <input type="checkbox"/> 2 Incomprehensible <input type="checkbox"/> 1 None/intubated		Motor <input type="checkbox"/> 6 Obeys <input type="checkbox"/> 5 Localizes pain <input type="checkbox"/> 4 Withdraws from pain <input type="checkbox"/> 3 Flexor posturing <input type="checkbox"/> 2 Extensor posturing <input type="checkbox"/> 1 None/chemically paralyzed		<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> L <input type="checkbox"/> Brisk <input type="checkbox"/> Sluggish <input type="checkbox"/> Non-reactive _____ mm </td> <td style="width: 50%; vertical-align: top;"> R <input type="checkbox"/> Brisk <input type="checkbox"/> Sluggish <input type="checkbox"/> Non-reactive _____ mm </td> </tr> </table>		L <input type="checkbox"/> Brisk <input type="checkbox"/> Sluggish <input type="checkbox"/> Non-reactive _____ mm	R <input type="checkbox"/> Brisk <input type="checkbox"/> Sluggish <input type="checkbox"/> Non-reactive _____ mm													
L <input type="checkbox"/> Brisk <input type="checkbox"/> Sluggish <input type="checkbox"/> Non-reactive _____ mm	R <input type="checkbox"/> Brisk <input type="checkbox"/> Sluggish <input type="checkbox"/> Non-reactive _____ mm																					

MR#

Secondary Survey	
Head	<input type="checkbox"/> Pain/tenderness Drainage from: <input type="checkbox"/> ears <input type="checkbox"/> nose <input type="checkbox"/> mouth
Neck	<input type="checkbox"/> Pain/tenderness <input type="checkbox"/> JVD
Chest	<input type="checkbox"/> Pain/tenderness <input type="checkbox"/> Dyspnea <input type="checkbox"/> Deformity <input type="checkbox"/> Paradoxical expansion
Abdomen	<input type="checkbox"/> Pain <input type="checkbox"/> Tender <input type="checkbox"/> Rigid <input type="checkbox"/> Bowel sounds present <input type="checkbox"/> Soft <input type="checkbox"/> Guarded <input type="checkbox"/> Distended <input type="checkbox"/> Bowel sounds absent Emesis/gastrocult: <input type="checkbox"/> + <input type="checkbox"/> -
Pelvis/Genital	<input type="checkbox"/> Pain/tenderness Pelvis: <input type="checkbox"/> stable <input type="checkbox"/> unstable <input type="checkbox"/> Blood at the meatus Rectal tone: <input type="checkbox"/> present <input type="checkbox"/> absent Hemocult: <input type="checkbox"/> + <input type="checkbox"/> -
Extremities	<input type="checkbox"/> Pain/tenderness <input type="checkbox"/> CMS intact x4 <input type="checkbox"/> Moves all extremities <input type="checkbox"/> Extremities warm and pink
Back	<input type="checkbox"/> Pain/tenderness <input type="checkbox"/> Deformity



Ongoing Monitoring

Time	:	:	:	:	:	:	:	:	:	:	:	:
BP	/	/	/	/	/	/	/	/	/	/	/	/
Pulse												
Resp.												
SaO2	%	%	%	%	%	%	%	%	%	%	%	%
GCS												
Temp.	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
EKG												
ETCO₂												
Pain scale	/10	/10	/10	/10	/10	/10	/10	/10	/10	/10	/10	/10

Medications

Drug/Procedure	Dose	Route	Start Time	End Time	Administered by	Response
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved
			:	:		<input type="checkbox"/> no change <input type="checkbox"/> improved

Fluid In/Blood Products

Solution/Blood Product	Time hung	Size	Blood unit #	Time d/c'ed	Amount infused
	:	ml		:	ml
	:	ml		:	ml
	:	ml		:	ml
	:	ml		:	ml
	:	ml		:	ml
	:	ml		:	ml
	:	ml		:	ml
	:	ml		:	ml
	:	ml		:	ml
	:	ml		:	ml
	:	ml		:	ml

MR#

Procedures					
Procedure	Time	By	Detail		
<input type="checkbox"/> Cast/splint	:				
<input type="checkbox"/> Central line	:				
<input type="checkbox"/> Chest tube R	:				
<input type="checkbox"/> Chest tube L	:				
<input type="checkbox"/> Cricothyrotomy	:				
<input type="checkbox"/> Defib/Cardiovert	:				
<input type="checkbox"/> Foley	:				
<input type="checkbox"/> Intraosseous	:				
<input type="checkbox"/> Needle thoracotomy	:				
<input type="checkbox"/> OG/NGT	:				
<input type="checkbox"/> RSI	:				
<input type="checkbox"/> Suture	:				
<input type="checkbox"/>	:				
<input type="checkbox"/>	:				
<input type="checkbox"/>	:				
Laboratory		Radiology			
Lab	Time Ordered	X-ray	Time Ordered	CT	Time Ordered
<input type="checkbox"/> BAC	:	<input type="checkbox"/> CXR	:	<input type="checkbox"/> Abdomen	:
<input type="checkbox"/> CBC	:	<input type="checkbox"/> Pelvis	:	<input type="checkbox"/> Chest	:
<input type="checkbox"/> Electrolytes	:	<input type="checkbox"/> Skull	:	<input type="checkbox"/> Head	:
<input type="checkbox"/> Glucose	:	<input type="checkbox"/> spine-Cervical	:	<input type="checkbox"/> Neck	:
<input type="checkbox"/> hCG	:	<input type="checkbox"/> spine- Lumb/Sac	:	<input type="checkbox"/> Pelvis	:
<input type="checkbox"/> Hgb	:	<input type="checkbox"/> spine- Thoracic	:	<input type="checkbox"/> Spine	:
<input type="checkbox"/> PT/INR	:	<input type="checkbox"/>	:	<input type="checkbox"/>	:
<input type="checkbox"/> PTT	:	<input type="checkbox"/>	:	<input type="checkbox"/>	:
<input type="checkbox"/> pH	:	<input type="checkbox"/>	:	Ultrasound	Time Ordered
<input type="checkbox"/> Tox. screen	:	<input type="checkbox"/>	:	<input type="checkbox"/> FAST exam	:
<input type="checkbox"/> Type and screen	:	<input type="checkbox"/>	:	<input type="checkbox"/>	:
<input type="checkbox"/> UA	:	<input type="checkbox"/>	:	<input type="checkbox"/>	:
Patient Disposition					
<input type="checkbox"/> Admitted		<input type="checkbox"/> Transferred			
Pt left ED	:	Ordered	:	Transfer via:	Accompanying Pt:
Report called	:	Arrived	:	<input type="checkbox"/> Helicopter	<input type="checkbox"/> Copy of chart
Admitting service:		Pt left ED	:	_____	<input type="checkbox"/> EMS report
Admitting physician:		Transferred to:		<input type="checkbox"/> Ground	<input type="checkbox"/> X-rays/CTs
<input type="checkbox"/> Expired in ED	:	Referral hospital notified	:	_____	<input type="checkbox"/> Lab report
					<input type="checkbox"/> RN _____
Patient Information					
SSN	Address			Apt. #	
Telephone Number	City		State/Province	Postal Code	
Ethnicity <input type="checkbox"/> Hispanic/Latino <input type="checkbox"/> Non-Hispanic/Latino <input type="checkbox"/> Unknown	Race <input type="checkbox"/> White <input type="checkbox"/> Black <input type="checkbox"/> Asian <input type="checkbox"/> Unknown		<input type="checkbox"/> American Indian/Alaskan Native <input type="checkbox"/> Native Hawaiian/Pacific Islander <input type="checkbox"/> Other		Pay Source <input type="checkbox"/> Medicare <input type="checkbox"/> Uninsured <input type="checkbox"/> Other _____ <input type="checkbox"/> Unknown

Appendix J: Suggested Criteria for Consideration of Transfer

Central Nervous System

- Penetrating injury/open fracture, with or without cerebrospinal fluid leak
- Depressed skull fracture
- GCS <14 or deterioration
- Spinal cord injury or major vertebral injury

Chest

- Major chest wall injury or pulmonary contusion
- Wide mediastinum or other signs suggesting great vessel injury
- Cardiac injury
- Patients who may require prolonged ventilation

Pelvis/Abdomen

- Unstable pelvic ring disruption
- Pelvic fracture with shock or other evidences of continuing hemorrhage
- Open pelvic injury
- Solid organ injury

Major Extremity Injuries

- Fracture/dislocation with loss of distal pulses
- Open long-bone fractures
- Extremity ischemia

Multiple-System Injury

- Head injury combined with face, chest, abdominal, or pelvic injury
- Burns with associated injuries
- Multiple long-bone fractures
- Injury to more than two body regions

Co-morbid Factors

- Age >55 years
- Children \leq 5 years of age
- Cardiac or respiratory disease
- Insulin-dependent diabetes, morbid obesity
- Pregnancy
- Immunosuppression

Secondary Deterioration (Late Sequelae)

- Mechanical ventilation required
- Sepsis
- Single or multiple organ system failure (deterioration in central nervous, cardiac, pulmonary, hepatic, renal, or coagulation systems)
- Major tissue necrosis

American College of Surgeons, *Resources for Optimal Care of the Injured Patient: 1999*, p. 21.

Appendix K: Sample Trauma Transfer Protocol

Purpose:

Trauma patients who will be transferred out of this facility to a definitive care facility emergently must be identified early, assessed and treated quickly and transferred efficiently in order to provide them the best possible outcome.

Policy:

Patients to be transferred can often be identified before they arrive in the emergency department. Arrangements for emergent transfer can often begin the moment the emergency department staff is notified by EMS that they are en route with a major trauma patient. Other patients may require evaluation by the emergency department physician before the decision to transfer is made.

Once the decision to transfer has been made, it should not be delayed to obtain X rays, CT scans or laboratory results that do not immediately impact the resuscitation. At this point, the focus of the emergency department staff is on resuscitation and stabilization with the goal of minimizing the patient's length of stay in the emergency department.

Consideration should be given to whether the patient will be transferred via ground or air. Generally, seriously injured trauma patients should be transferred by air when possible. Consideration should be given to ground transport if the patient can be received by the definitive care facility sooner than if transported by air or if aero medical transfer is significantly delayed or unavailable for any reason.

Transport vehicles should be staffed by paramedics and/or nurses whenever possible. Trauma patients on whom invasive procedures have been performed or who have received medications must be transferred under the care of personnel who are adequately trained to manage their resulting condition. If necessary, a physician or nurse from this hospital may accompany the patient.

The following are conditions that should immediately activate emergency transfer procedures:

- Central Nervous System
 - Penetrating injury/open fracture with or without cerebrospinal fluid leak
 - Depressed skull fracture
 - GCS <11 or deteriorating mental status or lateralizing neurological signs
 - Spinal cord injury or major vertebral injury
- Chest
 - Major chest wall injury or pulmonary contusion
 - Wide mediastinum or other signs suggesting great vessel injury
 - Cardiac injury
- Pelvis/Abdomen
 - Pelvic fracture with shock or other evidences of continuing hemorrhage
 - Open pelvic injury
 - Unstable pelvic ring disruption
 - Major abdominal vascular injury
- Major Extremity Injuries
 - Fracture/dislocation with loss of distal pulses
- Multiple-System Injury
 - Head injury combined with face, chest, abdominal, or pelvic injury

- Burns with associated injuries
- Secondary Deterioration (Late Sequelae)
 - Single or multiple organ system failure (deterioration in central nervous, cardiac, pulmonary, hepatic, renal, or coagulation systems)
 - Major tissue necrosis

The following conditions should be considered for immediate transfer:

- Central Nervous System
 - GCS >10 and <14
- Chest
 - Patients who may require prolonged ventilation
 - >2 unilateral rib fractures
- Abdomen
 - Solid organ injury
- Major Extremity Injuries
 - Open long-bone fractures
 - Extremity ischemia
 - Multiple long-bone fractures
- Multiple-System Injury
 - Injury to more than two body regions
- Co-morbid Factors
 - Age >55 years
 - Children \leq 5 years of age
 - Cardiac or respiratory disease
 - Insulin-dependent diabetes
 - Morbid obesity
 - Pregnancy
 - Immunosuppression
- Secondary Deterioration (Late Sequelae)
 - Mechanical ventilation required
 - Sepsis

Procedure:

Before patient arrival:

1. After becoming aware that a trauma patient is en route who likely will require emergent transfer, the emergency department staff activates the trauma team and notifies the emergency department physician of the likelihood of transfer. Ascertain from EMS if they have already ordered aero medical transportation.
2. The physician identifies the appropriate mode of transfer (i.e., aero medical vs. ground) and qualifications of transferring personnel.
3. HUC contacts the appropriate aero medical and/or ground transportation, obtains ETA:
 - [INSERT CONTACT INFORMATION]
 - [INSERT CONTACT INFORMATION]
 - [INSERT CONTACT INFORMATION]

After patient arrival:

1. The physician identifies and contacts the receiving facility, and requests the receiving physician to accept the transfer. The two should discuss the current physiological status of the patient and the optimal timing of transfer.
2. Before transfer, the physician should:

- Ensure chest tubes are placed in the presence of pneumothorax.
 - Ensure at least two IV lines are established.
 - Consider securing the airway with an endotracheal tube, LMA or surgical airway if GCS <11.
 - Consider sending additional blood, equipment and supplies (medications, fluids, etc.) that the patient may need en route if not available in the transporting vehicle.
3. The HUC copies of all available documentation to accompany the patient:
- EMS report
 - Resuscitation record
 - X rays, CT scans
 - Lab results

Appendix L: Transfer Agreement Example

This agreement is made and entered into by and between YOUR FACILITY NAME, CITY, STATE, a nonprofit corporation (hereinafter called "YOUR FACILITY") and RECEIVING FACILITY NAME, CITY, STATE, a nonprofit corporation, (hereinafter called "RECEIVING FACILITY"):

WHEREAS, both YOUR FACILITY and RECEIVING FACILITY desire, by both means of this Agreement, to assist physicians and the parties hereto in the treatment of trauma patients (e.g., burn, traumatic brain injuries, spinal cord injuries, pediatrics); and whereas the parties specifically wish to facilitate: (a) the timely transfer of patients and information necessary or useful in the care and treatment of trauma patients transferred, (b) the continuity of the care and treatment appropriate to the needs of trauma patients, and (c) the utilization of knowledge and other resources of both facilities in a coordinated and cooperative manner to improve the professional health care of trauma patients.

IT IS, THEREFORE, AGREED by and between the parties as follows:

1. PATIENT TRANSFER: The need for transfer of a patient from YOUR FACILITY to RECEIVING FACILITY shall be determined and recommended by the patient's attending physician in such physician's own medical judgment. When a transfer is recommended as medically appropriate, a trauma patient at YOUR FACILITY shall be transferred and admitted to RECEIVING FACILITY as promptly as possible under the circumstances, provided that beds and other appropriate resources are available. Acceptance of the patient by RECEIVING FACILITY will be made pursuant to admission policies and procedures of RECEIVING FACILITY.
2. YOUR FACILITY agrees that it shall:
 - a. Notify RECEIVING FACILITY as far in advance as possible of transfer of a trauma patient.
 - b. Transfer to RECEIVING FACILITY the personal effects, including money and valuables and information relating to same.
 - c. Make every effort within its resources to stabilize the patient to avoid all immediate threats to life and limbs. If stabilization is not possible, YOUR FACILITY shall either establish that the transfer is the result of an informed written request of the patient or his or her surrogate or shall have obtained a written certification from a physician or other qualified medical person in consultation with a physician that the medical benefits expected from the transfer outweigh the increased risk of transfer.
 - d. Affect the transfer to RECEIVING FACILITY through qualified personnel and appropriate transportation equipment, including the use of necessary and medically appropriate life support measures.
3. YOUR FACILITY agrees to transmit with each patient at the time of transfer, or in the case of emergency, as promptly as possible thereafter, pertinent medical information and records necessary to continue the patient's treatment and to provide identifying and other information.
4. RECEIVING FACILITY agrees to state where the patient is to be delivered and agrees to provide information about the type of resources it has available.

5. Bills incurred with respect to services preformed by either party to the Agreement shall be collected by the party rendering such services directly from the patient, third party, and neither party shall have any liability to the other for such charges.
6. This agreement shall be effective from the date of execution and shall continue in effect indefinitely. Either party may terminate this agreement on thirty (30) days notice in writing to the other party. If either party shall have its license to operate revoked by the state, this Agreement shall terminate on the date such revocation becomes effective.
7. Each party to the Agreement shall be responsible for its own acts and omissions and those of their employees and contractors and shall not be responsible for the acts and omissions of the other institutions.
8. Nothing in this Agreement shall be construed as limiting the right of either to affiliate or contract with any hospital or nursing home on either a limited or general basis while this agreement is in effect.
9. Neither party shall use the name of the other in any promotional or advertising material unless review and written approval of the intended use shall first be obtained from the party whose name is to be used.
10. This agreement shall be governed by the laws of the State of Minnesota. Both parties agree to comply with the Emergency Medical Treatment and Active Labor Act of 1986, and the Health Insurance Portability and Accountability Act of 1996 and the rules now and hereafter promulgated thereunder.
11. This Agreement may be modified or amended from time to time by mutual agreement of the parties, and any such modification or amendment shall be attached to and become part of the Agreement.

YOUR FACILITY

RECEIVING FACILITY

SIGNED BY:

SIGNED BY:

DATE:

DATE:

Appendix M: Trauma PI Tracking Form

Demographics	Source of Information	Location of Issue
Date of report: Medical record #:	<input type="checkbox"/> Trauma program coordinator <input type="checkbox"/> Nurse manager <input type="checkbox"/> Staff nurse <input type="checkbox"/> Physician <input type="checkbox"/> Patient relations <input type="checkbox"/> Rounds <input type="checkbox"/> Multi-disciplinary conference <input type="checkbox"/> Registry <input type="checkbox"/> QA/QI chart audit <input type="checkbox"/>	<input type="checkbox"/> EMS <input type="checkbox"/> ED <input type="checkbox"/> OR <input type="checkbox"/> ICU/PACU <input type="checkbox"/> Floor <input type="checkbox"/> Radiology <input type="checkbox"/> Lab <input type="checkbox"/> Rehab <input type="checkbox"/>
Complication, problem or complaint:		
Date of review:		Reviewed by:
Determination: <input type="checkbox"/> system-related <input type="checkbox"/> disease-related <input type="checkbox"/> provider-related <input type="checkbox"/> unable to determine	Preventability: <input type="checkbox"/> non-preventable <input type="checkbox"/> potentially preventable <input type="checkbox"/> preventable <input type="checkbox"/> unable to determine	
Corrective action: <input type="checkbox"/> not necessary <input type="checkbox"/> guideline/protocol <input type="checkbox"/> resource enhancement <input type="checkbox"/> trend/track similar occurrences <input type="checkbox"/> counseling <input type="checkbox"/> privilege/credentialing review <input type="checkbox"/> education <input type="checkbox"/> peer review <input type="checkbox"/>		
Action Plan:		
Signature:		Date:

Adapted from American College of Surgeons, Resources for Optimal Care of the Injured Patient: 1999, p. 72.

Appendix N: Definitions of Trauma Death Classifications

A **non-preventable** death results from an event or complication that is a sequela of a procedure, disease, illness or injury for which reasonable and appropriate preventable steps have been taken.

For example, a gunshot wound to the head with a Glasgow Coma Scale (GCS) of 3 on arrival and subsequent death, posttraumatic pancreatitis, pneumonia, deep venous thrombosis (DVT), and so on, in patients who had appropriate preventative steps taken. Most deaths and morbidities fall into this category.

A **potentially preventable** death results from an event or complication that is a sequela of a procedure, disease, illness, or injury that has the potential to be prevented or substantially ameliorated.

For example, iatrogenic pneumothorax or wound dehiscence, wherein alternate techniques or judgments may have prevented the complication with some certainty. Such a choice is always a difficult call and requires determination from experienced trauma surgeons or a panel of physicians. An example of a potentially preventable mortality may be an elderly trauma patient with a severe head injury who develops a fatal arrhythmia from electrolyte abnormality. The arrhythmia may have been preventable, but it is unlikely that the death was; therefore, the death is deemed “potentially preventable.” A patient suffering a preventable morbidity who subsequently expires after being declared DNR (do not resuscitate) by family or advanced directive may be determined to be a potentially preventable mortality. There is no precision in these determinations; these are clinical judgments based on the best available evidence.

A **preventable death** results from an event or complication that is an expected or unexpected sequela of a procedure, disease, illness, or injury that could have been prevented or substantially ameliorated.

For example, a patient admitted with abdominal distention and shock who dies from a ruptured spleen two hours later while waiting for a surgeon. Death as a result of a missed epidural hematoma or esophageal intubation may be preventable. Preventable mortalities should be very unusual in a mature trauma system. A missed fracture resulting from failure to examine the patient may be a preventable morbidity.

Appendix O: Trauma PI Filter Tracking Worksheet

Patient name: _____ Admit date: _____

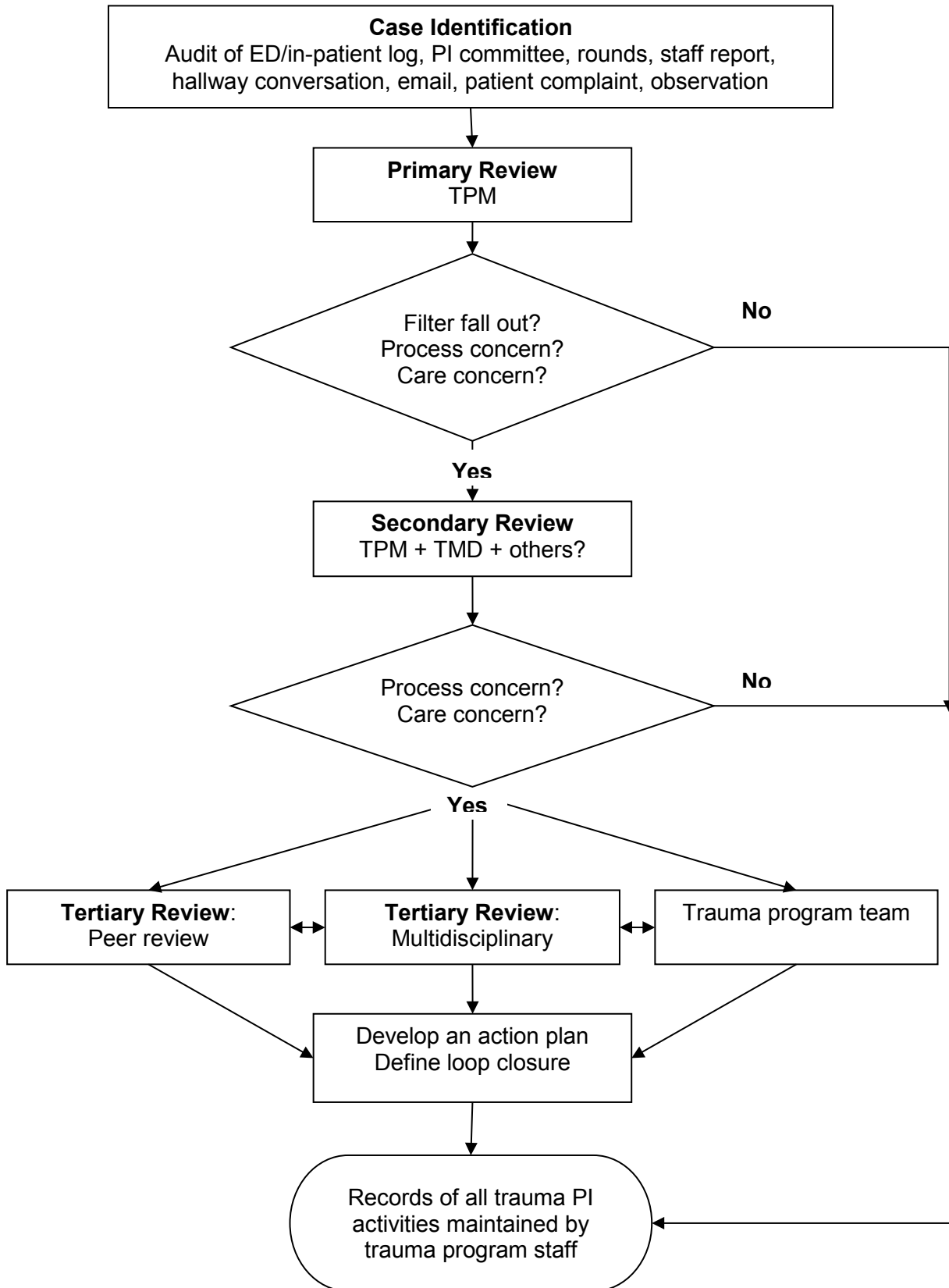
Medical record #: _____

Data Point	Yes	No	N/A
General surgeon arrival >30 minutes after patient arrival			
Emergency department provider arrival >15 minutes after EMS notification			
Admitted by non-surgeon			
Care provided by NP/PA			
Trauma care provided by physicians who did not meet the educational requirement (e.g., ATLS or CALS)			
Death			
Transferred			
Transfer out after > 60 minutes			
Under-triaged/trauma team not activated when criteria met			
IV lines smaller than 16 Ga.			
GCS ≤10 no endotracheal tube or surgical airway			
IV fluids not warmed			
Initial temperature not recorded			

Any chart that generated a “Yes” must be reviewed by trauma PI team.

<input type="checkbox"/> No improvement opportunities identified	
Comments:	
Signature: _____	Date: _____

Appendix P: Trauma PI Flowchart



Appendix Q: Sample Level III Trauma Diversion Protocol

Purpose:

Occasions may arise when one or more essential hospital resources are functioning at maximum capacity or otherwise unavailable and it is in the best interests of the trauma patient to be directed to an alternative facility for care.

Policy:

The need to go on “trauma divert” is a rare situation but might occur in the following circumstances:

- The emergency department is saturated; demand for critical patient care resources exceeds availability.
- Emergency department resources are fully committed due to an external disaster/multiple-casualty event.
- Emergency department resources are unavailable due to an internal disaster or catastrophic mechanical failure.
- All available trauma surgeons are in the operating room.
- The operating room is functioning at maximum capacity; no surgical suites are expected to become available within one hour.
- General surgeons are overwhelmed with cases.
- The general surgeon is physically unable to operate.

In such rare cases the surgeon in collaboration with the emergency department physician may make the decision to divert trauma patients for a short period of time. The need to remain on divert status should be reviewed at least hourly to provide for the shortest possible time on divert.

The diversion of trauma patients only pertains to incoming ambulance patients and not to walk-in patients. A patient incoming via ambulance while on “trauma divert” will be accepted if the EMS provider and monitoring physician determine that the patient is experiencing a condition such that transport to the next closest appropriate trauma hospital could reasonably result in increased morbidity or death. “Trauma divert” status is a request to EMS personnel to transport the patient to another facility. The patient or EMS personnel may decline the request to divert provided they have been properly apprised of the potential for delayed treatment affecting the care of the patient.

Ambulance patients who have arrived on hospital property will be admitted to the emergency department and evaluated by a physician regardless of the hospital’s diversion status.

Procedure:

Going on divert:

1. The surgeon on call and the emergency department physician will collaborate and decide on the need to go on “trauma divert.” They will notify the emergency department charge nurse.
2. The charge nurse notifies the following of trauma divert status:
 - a. Emergency department nursing staff
 - b. ICU nursing staff
 - c. EMS dispatch center(s) (e.g. sheriff departments); request EMS personnel to call hospital early with patient information
 - d. [NEIGHBORING HOSPITAL(S)]

3. The emergency department charge nurse begins a “Trauma Divert Tracking Log.”

When contacted by EMS with information regarding a seriously injured trauma patient, the emergency department staff person taking report notifies the EMS crew that the hospital is on trauma divert and immediately puts the crew in contact with the emergency department physician. The physician will determine if the patient is to be seen in the emergency department or diverted to a nearby facility. The decision whether or not to divert must be accomplished very quickly in order to minimize the amount of time the patient spends in transit.

Going off divert:

1. The surgeon and emergency physician who initiated the closure must:
 - a. Continuously evaluate the need to remain on trauma divert.
 - b. Make the decision as to when the hospital is no longer on trauma divert.
 - c. Notify the emergency department charge nurse when no longer on trauma divert.
2. The charge nurse notifies:
 - a. Emergency department nursing staff
 - b. ICU nursing staff
 - c. EMS dispatch center
 - d. [NEIGHBORING HOSPITAL(S)]
3. The emergency department charge nurse completes the “Trauma Divert Tracking Log” and forwards it to the trauma program manager.

Appendix R: Sample Level IV Trauma Diversion Protocol

Purpose:

Occasions may arise when one or more essential hospital resources are functioning at maximum capacity or otherwise unavailable and it is in the best interests of the trauma patient to be directed to an alternative facility for care.

Policy:

The need to go on “trauma divert” is a rare situation but might occur in the following circumstances:

- The emergency department is saturated; demand for critical patient care resources exceeds availability.
- Emergency department resources are fully committed due to an external disaster/multiple-casualty event.
- Emergency department resources are unavailable due to an internal disaster or catastrophic mechanical failure.

In such rare cases, the emergency department physician may make the decision to divert trauma patients for a short period of time. The need to remain on divert status should be reviewed at least hourly to provide for the shortest possible time on divert.

The diversion of trauma patients only pertains to incoming ambulance patients and not to walk-in patients. A patient incoming via ambulance while on “trauma divert” will be accepted if the EMS provider and monitoring physician determine that the patient is experiencing a condition such that transport to the next closest appropriate trauma hospital could reasonably result in increased morbidity or death. “Trauma divert” status is a request to EMS personnel to transport the patient to another facility. The patient or EMS personnel may decline the request to divert provided they have been properly apprised of the potential for delayed treatment affecting the care of the patient.

Ambulance patients who have arrived on hospital property will be admitted to the emergency department and evaluated by a physician regardless of the hospital’s diversion status.

Procedure:

Going on divert:

1. The emergency department physician will decide on the need to go on “trauma divert.” The physician will notify the emergency department charge nurse.
2. The HUC notifies the following of trauma divert status:
 - a. Emergency department nursing staff
 - a. EMS dispatch center(s) (e.g. sheriff departments); request EMS personnel to call hospital early with patient information
 - b. [NEIGHBORING HOSPITAL(S)]
3. The emergency department charge nurse begins a “Trauma Divert Tracking Log.”

When contacted by EMS with information regarding a seriously injured trauma patient, the emergency department staff person taking report notifies the EMS crew that the hospital is on trauma divert and immediately puts the crew in contact with the emergency department physician. The physician will determine if the patient is to be seen in the emergency department or diverted to a nearby facility. The decision whether or not to divert must be accomplished very quickly in order to minimize the amount of time the patient spends in transit.

Going off divert:

1. The emergency physician who initiated the closure must:
 - a. Continuously evaluate the need to remain on trauma divert.
 - b. Make the decision as to when the hospital is no longer on trauma divert.
 - c. Notify the emergency department charge nurse when no longer on trauma divert.
2. The charge nurse notifies:
 - a. Emergency department nursing staff
 - b. EMS dispatch center
 - c. [NEIGHBORING HOSPITAL(S)]
3. The emergency department charge nurse completes the "Trauma Divert Tracking Log" and forwards it to the trauma program manager.

Appendix S: Trauma Divert Tracking Log

Complete one form each time the hospital goes on divert.

On divert Date: _____ Time: _____ Determining physician(s): _____

Off divert Date: _____ Time: _____ Determining physician(s): _____
--

Diverted patients

No patients diverted

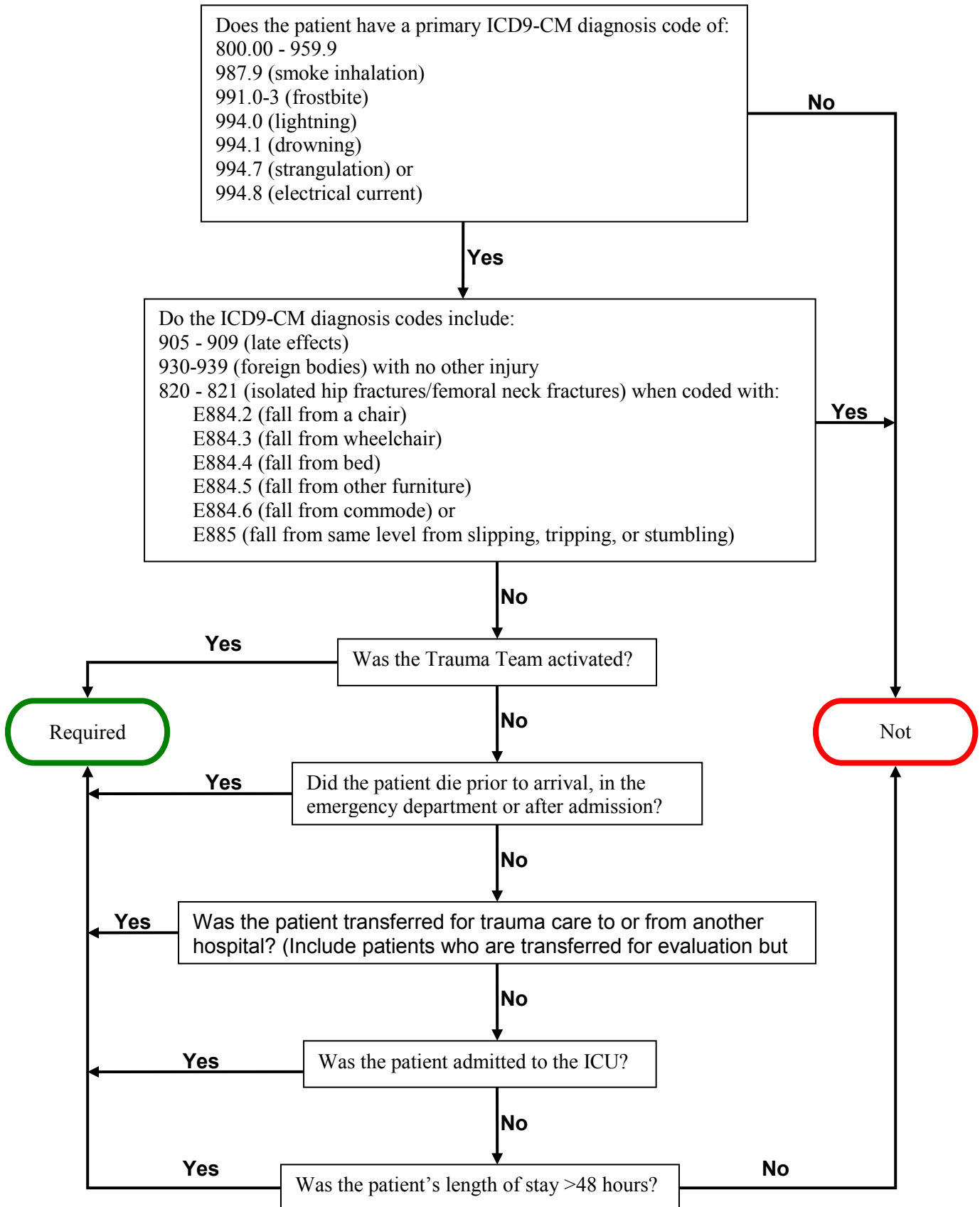
Date/Time: _____
Ambulance Service: _____
Chief Complaint: _____
Diversion destination: _____

Date/Time: _____
Ambulance Service: _____
Chief Complaint: _____
Diversion destination: _____

Date/Time: _____
Ambulance Service: _____
Chief Complaint: _____
Diversion destination: _____

Forward this form to the trauma program manager.

Appendix T: Trauma Registry Inclusion Criteria



Appendix U: Level III Equipment Checklist

Emergency Department

Equipment	Infant	Child	Adult
Airway control and ventilation equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pulse oximetry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Suction devices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electrocardiograph/oscilloscope/defibrillator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standard IV fluids and administration sets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mechanism for IV flow-rate control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Large bore IV catheters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IO sets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supplies for surgical airway	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supplies for throacostomy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drugs necessary for emergency care	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nasal gastric/oral gastric tubes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spinal immobilization boards and c-collars	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pediatric length-based resuscitation tape	<input type="checkbox"/>	<input type="checkbox"/>	
Thermal control for patients and fluids/blood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rapid infuser system (e.g., pressure bag)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
End-tidal CO ₂ detector	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication with EMS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Operating Room

Equipment	Infant	Child	Adult
Thermal control for patients and fluids/blood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
X-ray capabilities in including C-arm intensifier	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rapid infuser system (e.g., pressure bag)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Post Anesthetic Recovery (ICU acceptable)

Equipment	Infant	Child	Adult
Equipment for monitoring and resuscitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pulse oximetry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thermal control for patients and fluids/blood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Intensive Care Unit

Equipment	Infant	Child	Adult
Equipment for monitoring and resuscitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ventilator (transport ventilator not sufficient)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Radiological Services

Equipment	Infant	Child	Adult
Computed tomography	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Clinical Laboratory Services

Equipment	Infant	Child	Adult
Standard analysis of blood, urine and other body fluids including micro sampling, when appropriate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blood typing and cross matching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coagulation studies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comprehensive blood bank or access to community blood bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blood gas and pH determination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Microbiology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix V: Level IV Equipment Checklist

Emergency Department

Equipment	Infant	Child	Adult
Airway control and ventilation equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pulse oximetry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Suction devices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electrocardiograph/oscilloscope/defibrillator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standard IV fluids and administration sets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mechanism for IV flow-rate control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Large bore IV catheters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IO sets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supplies for surgical airway	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supplies for thoracostomy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drugs necessary for emergency care	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nasal gastric/oral gastric tubes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spinal immobilization boards and C-collars	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pediatric length-based resuscitation tape	<input type="checkbox"/>	<input type="checkbox"/>	
Thermal control for patients and fluids/blood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rapid infuser system (e.g., pressure bag)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
End-tidal CO ₂ detector	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication with EMS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Clinical Laboratory Services

Equipment	Infant	Child	Adult
Standard analysis of blood, urine and other body fluids including micro sampling, when appropriate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comprehensive blood bank or access to community blood bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Operating Room (if OR services available)

Equipment	Infant	Child	Adult
Thermal control for patients and fluids/blood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix W: Recommended Pediatric Equipment Checklist

The equipment in this appendix is NOT REQUIRED. Rather, it is recommended by Minnesota Emergency Medical Services for Children and is provided for your reference.

Monitoring

Equipment	Yes	No
Defibrillator (0-400J) capability with pediatric paddles (4.5 cm)	<input type="checkbox"/>	<input type="checkbox"/>
Pediatric monitor electrodes	<input type="checkbox"/>	<input type="checkbox"/>
Pulse oximeter (with sensors sizes newborn through adult)	<input type="checkbox"/>	<input type="checkbox"/>
Thermometer/rectal probe*	<input type="checkbox"/>	<input type="checkbox"/>
Blood pressure cuffs—neonatal, infant child, adult and thigh cuff	<input type="checkbox"/>	<input type="checkbox"/>
Method to monitor endotracheal tube and placement†	<input type="checkbox"/>	<input type="checkbox"/>

* Suitable for hypothermic and hyperthermic measurements with temperature capability from 25° to 44°.

† May be satisfied by a disposable ET CO² detector, bulb, or feeding tube methods for endotracheal tube placement.

Vascular Access

Equipment	Yes	No
Butterfly needles (19-25-gauge)	<input type="checkbox"/>	<input type="checkbox"/>
Catheter-over-needle devices (14 to 24 gauge)	<input type="checkbox"/>	<input type="checkbox"/>
Infusion device‡	<input type="checkbox"/>	<input type="checkbox"/>
Tubing for infusion device	<input type="checkbox"/>	<input type="checkbox"/>
Intraosseous needles (16 and 18 gauge)§	<input type="checkbox"/>	<input type="checkbox"/>
Arm boards – (infant, child)	<input type="checkbox"/>	<input type="checkbox"/>
Intravenous fluid/blood warmers	<input type="checkbox"/>	<input type="checkbox"/>
Umbilical vein catheters (sizes 3.5 Fr and 5 Fr)!!	<input type="checkbox"/>	<input type="checkbox"/>
Seldinger technique vascular access kit (with pediatric sizes 3, 4, 5, Fr catheters)	<input type="checkbox"/>	<input type="checkbox"/>

‡ To regulate rate and volume.

§ May be satisfied by standard bone marrow aspiration needles, 13- or 15- gauge.

!! Available within the hospital

Airway Management

Equipment	Yes	No
Clear oxygen masks (preterm, infant, child and adult sizes)	<input type="checkbox"/>	<input type="checkbox"/>
Non-breathing masks (infant, child and adult sizes)	<input type="checkbox"/>	<input type="checkbox"/>
Oral airways (sizes 00-5)	<input type="checkbox"/>	<input type="checkbox"/>
Nasopharyngeal airways (12 to 30 Fr.)	<input type="checkbox"/>	<input type="checkbox"/>
Bag-valve-mask resuscitator, self-inflating (450 and 1000 ml sizes)	<input type="checkbox"/>	<input type="checkbox"/>
Nasal cannulae (infant, child and adult sizes)	<input type="checkbox"/>	<input type="checkbox"/>
Endotracheal tubes: uncuffed (sizes 2.5 to 8.5) and cuffed (sizes 5.5 to 9)	<input type="checkbox"/>	<input type="checkbox"/>
Stylets (pediatric)	<input type="checkbox"/>	<input type="checkbox"/>
Laryngoscope handle (pediatric)	<input type="checkbox"/>	<input type="checkbox"/>
Laryngoscope blades, curved (sizes 2 and 3) and straight (1 to 3)	<input type="checkbox"/>	<input type="checkbox"/>
Magil forceps (pediatric)	<input type="checkbox"/>	<input type="checkbox"/>
Nasogastric tubes (sizes 6 to 14 Fr)	<input type="checkbox"/>	<input type="checkbox"/>
Suction catheters: flexible (sizes 5 to 16 Fr) and Yankauer suction tip	<input type="checkbox"/>	<input type="checkbox"/>
Chest tubes (sizes 8 to 40 Fr)	<input type="checkbox"/>	<input type="checkbox"/>
Tracheostomy tubes (sizes 00 to 6)¶		

¶ Ensure availability of pediatric sizes within the hospital

Resuscitation Medications

Equipment	Yes	No
Medication chart, tape, or other system to ensure ready access to information on proper per kilogram doses for resuscitation drugs and equipment sizes#		

System for estimating medication doses and supplies may use the length based method with color codes, or other predetermined weight (kilogram)/dose method.

Miscellaneous

Equipment	Yes	No
Infant and standard scales		
Infant formula and oral rehydrating solutions		
Heating source (infrared lamps or overhead warmer)		
Pediatric restraining devices		
Resuscitation board		

Specialized pediatric trays

Equipment	Yes	No
Lumbar puncture (spinal needle sizes 20-, 22-, and 25- gauge)		
Tube thoracotomy with water seal drainage capability		
Urinary catheterization with pediatric Foley catheters		
Obstetric pack		
Newborn kit – umbilical vessel cannulation supplies, meconium aspirator		
Venous cut down		
Surgical airway kit‡‡		

‡‡ May include any of the following items: tracheostomy tray, cricothyrotomy tray, ETJV (needle jet).

Fracture management

Equipment	Yes	No
Cervical immobilization equipment (sizes child to adult)§§		
Extremity splints		
Femur splints (child and adult sizes)		

§§ Many types of cervical immobilization devices are available. These include wedges and collars. The type of device chosen depends on local preference and policies and procedures. Whatever device is chosen should be stocked in sizes to fit infants, children, adolescents and adults. The use of sandbags to meet this requirement is discouraged because they may cause injury if the patient has to be turned.

American Academy of Pediatrics, *Care of Children in the Emergency Department: Guideline for Preparedness*.

Medications

Drug	Supplied	Quantity/container
atropine	pre-filled syringe	10 mL (0.1 mg/mL) 5 mL (0.1 mg/mL)
adenosine	vial	1 mL (1 mg/mL)
bretylum	pre-filled syringe ampule vial	10 mL (50 mg/mL) 10 mL (50 mg/mL) 20 mL (50 mg/mL)
calcium chloride	pre-filled syringe	10 mL (100 mg/mL=27.1mg elemental calcium)
dextrose (25% and 50%)	pre-filled syringe	10 mL
dopamine	vial	5 mL (40 mg/ml) 10 mL (40 mg/mL)
dobutamine	vial	10 mL (25 mg/mL) 20 mL (12.5 mg/mL)
epinephrine 1:1000	pre-filled syringe vial	1 mL, 2 mL 30 mL (1 mg/mL)
epinephrine 1:10,000	pre-filled syringe	10 mL (0.1 mg/mL) 3 mL (0.1 mg/mL)
isoproterenol	vial	5 mL (0.2 mg/mL)
Lidocaine	pre-filled syringe vial ampule	5 mg/mL, 10 mg/mL, 15 mg/mL, 20 mg/mL, 40 mg/mL, 100 mg/mL, 200 mg/mL 5 mL (20 mg/mL)
naloxone	vial	1 mL, 10 mL, (0.4 mg/ml) 2 mL (1 mg/mL)
sodium bicarbonate	pre-filled syringe	50 mL (8.4%) (1 mEq/mL) 10 mL (8.4%) (1 mEq/mL) 10 mL (4.2%) (0.5 mEq/mL)