Critical Care Transport Standards

Version 1.0

Association of Critical Care Transport

www.ACCTforPatients.org

ACCT FOR PATIENTS

Dedication

Suzanne Wedel, MD

These Standards and the ongoing project are dedicated to Dr. Suzanne Wedel, a gifted physician, scientist, leader, and healer. Suzanne's passion for excellence and advocacy for patients inspired and led the work to develop these Standards. Suzanne continually taught and reminded us to always put patients first and at the center of the medical enterprise. Her rigorous and continuing commitment to a safer, better, and measured critical care medical system for each patient is a touchstone for us all as we undertake care and the gift of service.

Executive Summary

With the continued regionalization of health care, changes in health care reimbursement, and the advancements in clinical therapies, the Association of Critical Care Transport (ACCT) anticipates that the need for critical care transport (CCT) will continue to increase. Yet, there are currently no agreed-upon consensus national standards or even international standards for critical care inter-hospital transport.

What constitutes critical care transport standards? A patchwork of efforts has attempted to address the different segments of patient transport. Regulators have promulgated licensing and regulation at the jurisdictional level; the European Committee for Standardization (CEN) has published ambulance vehicle standards; professional societies such as the American Academy of Pediatrics have published best practices and recommendations, and accrediting organizations such as the Commission on the Accreditation of Medical Transport Systems (CAMTS) and the European Air Medical Institute (EURAMI) have developed voluntary accreditation standards.

This lack of a unified CCT standard allows wide variation in practice, education, available medical therapies, vehicle requirements, and clinical documentation. Most importantly, the lack of standardization presents risks to patients that are often not transparent to referring and receiving clinicians, or to patients, their families, nor the public (e.g., failure to recognize or intervene on compromised critical patients due to inexperienced and/or ill-equipped clinicians). As the need for high acuity CCT increases, patients and clinicians alike will benefit from standards of practice.

Through a multi-year interactive process, ACCT has developed a set of recommended clinical standards for inter-hospital CCT. The recommendations, which are presented in the Appendices, have been conceived and written to apply to *all* modes of transport

In developing these recommended standards, ACCT first distinguishes between primary emergency scene response and inter-hospital transport. Secondly, ACCT recognizes the wide spectrum of patient

acuity in transport. Not every patient requires the highest level of critical care during transport, nor does every agency need to provide, within its mission, every potential therapy to every patient regardless of age and complexity. Transport, clinical providers and agencies, however, must be transparent and clear on the scope of mission they are prepared to undertake for any emergent, unscheduled, inter-hospital transfer.

Too often, inter-hospital transport is a black hole between referring and receiving centers lacking in consistent standards, quality, outcome metrics, documentation, and reporting to oversight agencies. Appropriate and effective CCT reduces morbidity and downstream in-patient cost. The failure or inability to initiate critical acute medical interventions increases the risk of mortality for patients. Consistent, transparent, and agreed upon standards protect vulnerable patients and reduce liability risk for clinicians responsible for inter-hospital transfer decisions. At a minimum, CCT teams should maintain continuity or improve the level of patient care on every transport between hospitals.

CCT is a distinct specialty in the provision of out-of-hospital care. CCT provides additional resources necessary for patients who are clinically unstable or have the potential for life threatening clinical instability and who require more advanced and specialized provider knowledge, training, and experience, as well as diagnostic and interventional capabilities, equipment and therapeutics. Both the CCT agency and CCT clinical providers must have sufficient capabilities to meet both the expected and potential medical needs of critical care patients at referral hospitals and during transport.

The choice of transport modality—ground, fixed wing or rotor wing—is based on multiple factors including patient acuity and medical condition, need for time sensitive, definitive care, out-of- hospital time, (e.g., aortic dissection, ST elevation myocardial infarction, or traumatic event) and logistical considerations, including distance and weather. Accordingly, critical care transport patients may be transported by any vehicle modality depending on the individual circumstances present at the time. The choice of a particular vehicle modality does not infer that a transport is or is not a critical care transport.

The level of medical care required to transport a critical care patient includes but is not limited to:

- an expert level of critical care provider knowledge, experience, and skills utilizing evidence-based critical care guidelines appropriate to the medical needs of such patients;

- a patient care environment commensurate with the critical care interventions provided, including the necessary equipment, medications and supplies;
- the ability to address the added environmental and logistical challenges and stressors of transport;
- initiating, maintaining, and potentially improving the continuity of tertiary or quaternary hospital care during transport; and,
- a vehicle (ground, fixed wing, or rotor wing) equipped to support the delivery of medical care to critical care patients during transport (e.g. inverter power, range, oxygen duration, and full patient access).

In May 2012, the Association of Critical Care Transport (ACCT) Standards Committee initiated a work group to address the standards gap and create a model definition of critical care transport. The work group comprised of critical care physicians, nurses, paramedics, respiratory therapists, and hospital / transport agency administrators adopted by consensus a definition of critical care transport and an initial framework of standards.

Definition of *Critical Care Transport*:

The provision of medical care by a ***critical care transport team*** to a ***patient requiring critical care transport*** by a ***critical care transport agency*** such that the failure to assess/recognize resuscitation needs and urgently initiate and maintain acute medical diagnostics and/or interventions, pharmacological interventions, or technologies would likely result in sudden, clinically significant or life threatening deterioration in the patient's condition. These capabilities exceed those of an Advanced Life Support EMS unit (subject to the corresponding definitions below). Ideally, CCT extends a majority of the critical care capabilities of the tertiary receiving facility to the patient, is initiated at patient contact, and is provided throughout the transport.

Definition of Patient Requiring *Critical Care Transport*:

A patient requiring CCT has a critical illness or injury that acutely impairs one or more vital organ systems such that there is a high probability of imminent or life threatening deterioration in the patient's condition during transport. Examples of vital organ system failure that may contribute to morbidity or mortality include, but are not limited to: central nervous system failure, circulatory failure, shock, renal, hepatic, metabolic, and/or respiratory failure.

Definition of *Critical Care Transport Team*:

CCT services are delivered by a CCT team consisting of at least two clinical personnel who possess a scope of practice, education, training, experience, and requisite decision making skills to assess and support a highly complex patient active or potential vital organ system failure and/or to, at minimum, prevent further life threatening deterioration of the patient's condition during transport.

Definition of *Critical Care Transport Agency:*

The critical care transport agency must have essential systems and oversight in place to meet the medical needs of critical care patients evidenced by licensing, credentialing, and physician oversight. The agency must be licensed and/or credentialed to operate in the state in which it is based and at the highest clinical level established in the state. The agency has physician medical oversight consistent with the acuity and conditions of the critical care patients transported. This may be a combination of medical directors or a physician team supplemented by the addition of consulting specialists. Such appropriate medical oversight includes an actively practicing physician with competency in critical care transport medicine and board certification in a specialty relevant to the provider agency mission, or experience in critical care transport medicine consistent with the types, acuity and severity of patients transported.

The agency also has structured physician-directed clinical quality management and clinical performance improvement programs that are consistent with the conditions of critical care patients the organization cares. The agency must demonstrate continuous process improvement for providing patient care that requires active involvement by a physician medical director to ensure quality and adherence to appropriate standards. The process improvement system also must include reporting requirements related to quality assurance, utilization review, outcomes, proficiency measures and patient safety.

With these core definitions as starting points, the ACCT standards group has worked to detail what is needed within the entire scope of CCT. The following appendices work through the layers of CCT and are the latest iteration of recommended standards, as adopted by ACCT's Board of Directors in March, 2016.

Although the six standards are presented in separate appendices, and each one focuses on a particular element of CCT, they should be considered as a whole. The initial appendices detail:

Appendix 1. Scope of Practice and clinical capability of providers
Appendix 2. Minimum medical equipment, technology, and formulary
Appendix 3. Minimum vehicle configuration and equipment necessary to support patient care
Appendix 4. Documentation Standards
Appendix 5: "Always and Never Event" quality measures in critical care transport
Appendix 6: Recommended metrics for critical care transport (in process)
Appendix 7: Standards References
Appendix 8: Definitions

Most importantly, these recommendations should not be considered all-inclusive, as the critical care and emergency medical transport industry is among the most dynamic areas of medicine. These initial recommendations are part of a continuing evolutionary process in a dynamic healthcare environment to improve care and transport for patients with time sensitive and critical illness or injury. Additional appendices for Medical Oversight and additional Quality, process and outcome metrics are in development. Further, ACCT expects to continually review, refine, and add standards using a tri-annual review schedule.

Reference Documents:

Appendix 1: Critical Care Transport Scope of Practice

Background

Scope of practice can be identified by three categories. To be within a scope of practice, the requirements for practicing a skill or profession must satisfy all three criteria:

- **Education and training** — Has the provider been educated academically or on-the-job and have documentation proving education to do the procedure or treatment in question?
- **Governing body** — Does the state, district, province or federal governmental agency that oversees the skill or profession allow (or not explicitly disallow) the item in question?
- **Institution** — Does the institution allow a provider or the provider's profession to perform the skill in question?

A precursor to the development of these standards included a compilation and review of state Rules and protocols for air medical transport. The Rules vary widely in scope, breadth, and construct. While a number of states have defined some level of scope of practice and reference national accreditation standards, only one state, Massachusetts, was identified to have a comprehensive rules process defining critical care. Upon evaluation of state-defined scope of practice for members of CCT teams, most were found not to have defined **CCT specific** scopes of practice, leading to wide variations in standards of care. Furthermore, scopes of practice vary in states that have working definitions.

Medical transport professional associations such as Air & Surface Transport Nurses Association (ASTNA) and International Association of Flight & Critical Care Paramedics (IAFCCP) have documented what the scope of practice for a flight nurse or flight paramedic may be, but do not provide a unified CCT scope of practice. Neither do these individual Associations address physician level intervention or continuity of care, though these are commonly addressed outside of North America.

The "silos" that separate many professions, job functions and disciplines contribute to inconsistency in definitions. This lack of consistency leads to delivery of safe and effective patient care. Consequently, confused and inaccurate expectations of scope of practice by requesting hospital clinicians can potentially lead to inappropriate team selection and poor patient outcomes.

ACCT believes CCT is a specialty that draws upon the skill sets traditionally held by multiple disciplines. CCT providers may have formal training as registered nurses (RN), advanced practice registered nurses (APRN), paramedics, physicians, physician assistants (PA), or registered respiratory therapists (RRT);

however, formalized civilian medical education does not sufficiently prepare any one discipline to care for these patients in the transport environment. Therefore, for the future of CCT, ACCT believes that it is in the best interest of critically ill or injured patients to be transported by personnel specially trained in CCT.

The scope of practice for a CCT provider is well beyond the scope of a field paramedic, as defined in the National Highway Traffic Safety Administration (NHTSA) National EMS Scope of Practice Model as well as beyond the typical training received by a tertiary hospital RN, a setting that has the support of countless specialty personnel on staff. The Critical Care Transport Agency (CCTA) and its medical director have the responsibility of ensuring all of their providers are well trained, well equipped, and competent in the scope of practice they intend to provide.

1. Scope of Practice

1.1. Critical Care Transport Agency

1.1.1. The CCTA must have essential systems and oversight to meet the needs of critical care patients. This should include medical direction, education, training, and quality processes.

1.1.2. The CCTA must be licensed and/or credentialed to operate in the state in which it is based and at the highest applicable clinical level offered by the state.

1.1.3. The CCTA has physician medical oversight consistent with the acuity and conditions of the critical care patients being transported. This may be a combination of medical directors or a physician team supplemented by the addition of consulting specialists. Such appropriate medical oversight includes an actively practicing physician who participates in the hiring process, orientation and training, quality and safety meetings. The medical director will have competency in CCT medicine and board certification in a specialty relevant to the provider agency mission, or have experience in CCT medicine consistent with the types, acuity and severity of patients transported. CCTA physicians involved with medical oversight should attend ongoing education and training that focuses on medical director responsibility in supervising, evaluating and ensuring high quality medical care is provided.

1.1.4. The CCTA has structured physician-directed clinical quality management and clinical performance improvement programs consistent with the condition of critical care patients being transported. These programs demonstrate a continuous process for improving care, including standards that require active involvement by physician medical directors. Medical directors ensure quality and adherence to appropriate

standards and reporting requirements related to quality assurance, utilization review, outcomes, proficiency measures, and patient safety.

1.2. Critical Care Transport Team

1.2.1. CCT teams must consist of at least two CCT providers, with the ability to provide acute medical interventions, pharmacology, and technological life support systems consistent with tertiary level care. Contemporary teams consist of various combinations of providers that include: RNs, APRNs, paramedics, physicians, PAs, and RRTs. CCT is recognized as medical care that is beyond the typical patient care delivered within the US 911 emergency system, which relies upon providers acting within the NHTSA EMS Scope of Practice Model, DOT HS 810 657, February 2007.

1.2.2. CCT providers will have documented competency and experience in the care and transport of critical care patients. All CCT team providers should be employed by or affiliated with the agency providing transport.

1.2.3. At least one CCT provider shall be licensed as an RN, APRN, physician, or PA with documented competency and experience in the **provision of critical care** in a tertiary critical care unit commensurate with the type and acuity of patients transported *and* receives training in the transport environment pursuant to the CCTA's policy. To the extent that a state, province, or country may develop credentialing for a CCT provider that includes other licensed caregivers who meet the qualification requirements in (1.1.2) above and that requires such caregivers to have the competency comparable to three full-time years in a tertiary critical care unit as a primary caregiver, such credentialing will be considered for meeting this requirement.

It is strongly recommended that transport providers have a minimum of 3700 hours of critical care patient contact or the equivalent in dynamic human patient simulator (HPS) training or a minimum of 5 years of experience caring for acutely ill or injured patients in a critical care environment.

1.2.4 At least one CCT provider has specialty certification in **Critical Care Transport** (e.g., Certified Flight Registered Nurse (CFRN), Certified Transport Registered Nurse (CTRN), Certified Neonatal and Pediatric Transport (CNPT), Flight Paramedic Certified (FP-C), Critical Care Paramedic Certified (CCP-C), or relevant physician specialty practice achieved through a validated exam administered by an independent entity not associated with a specific course or program of education. The agency should have a policy requiring eventual transport certification for every CCT provider.

1.2.5 When treating special patient populations (e.g. high-risk obstetric, pediatric, neonatal), additional clinical experience, training, equipment and technology must be incorporated into the team and its delivery of critical care as appropriate to the medical conditions of the patient.

1.2.6 A CCT team may be augmented by adding tertiary teams of specialty providers trained to deliver care to patients with highly specialized characteristics, equipment, or medical conditions. Such providers may be employed by an entity other than the CCTA but should meet the minimum requirements consistent with the applicable tertiary care standard for the patient being transported (e.g., Extracorporeal Membrane Oxygenation (ECMO), Neonatal Intensive Care Unit (NICU) Pediatric Intensive Care Unit, (PICU), or High Risk Obstetrics (HROB).

1.3. Critical Care Transport Provider Qualifications and Training

1.3.1. CCT Provider Qualifications

1.3.1.1. The CCT provider shall be licensed, credentialed, or certified as required by the state, province, country regulator as a paramedic, RN, RRT, APRN, PA or physician. The CCT provider functions under his or her license and assumes responsibility for the care provided.

1.3.1.2. Pre-hire, the **non-paramedic** CCT provider will have a minimum of three years of full-time experience of caring for critically ill or injured patients in a critical care environment. The candidate's clinical time is validated by a clinical supervisor prior to the CCT team orientation process.

1.3.1.3. Pre-hire, the paramedic CCT provider will have a minimum of three years of full-time experience of caring for acutely ill or injured patients in the prehospital and/or inter-hospital transport environment in a progressive ALS system. The candidate's clinical time is validated by a clinical supervisor prior to the orientation process.

1.3.1.4. Prior to employment by a CCTA, the CCT provider will have a minimum of Basic Cardiac Life Support (BCLS), Advanced Cardiac Life Support (ACLS) and/or Pediatric Advanced Life Support (PALS), or equivalent certifications. They must also obtain Neonatal Resuscitation Program (NRP) certification prior to orientation completion if high-risk obstetric transport is included in the scope of practice.

1.3.1.5. In order to be **credentialed** as a CCT provider, the orientation process shall follow guidelines for transport orientation that have been set forth by organization-approved educational standards such the Commission on Accreditation of Medical Transport Systems (CAMTS), Air Surface Transport Nurse Association (ASTNA), International Association of Flight &Critical Care Paramedics (IAFCCP), United Stated Department of Transportation- National Highway Traffic Safety Administration (USDOT-NHTSA).

1.3.1.6. Within one year after completion of orientation, the CCT provider must obtain certification in respective discipline, (i.e. Certified Flight Registered Nurse (CFRN), Certified Transport Registered Nurse (CTRN), Certified Neonatal and Pediatric Transport (CNPT), Flight Paramedic Certified (FP-C) &/or Critical Care Paramedic Certified (CCP-C)). During this first year, they must also obtain an advanced trauma certification such as Advanced Trauma Life Support (ATLS), Pre-hospital Trauma Life Support (PHTLS), or Transport Provider Advanced Trauma Certification (TPATC), if trauma is included in the scope of practice.

1.4. Critical Care Transport Specialist Qualifications

1.4.1. Meets all the requirements of a CCT provider.

1.4.2. Maintain certification in respective discipline (e.g. Certified Flight Registered Nurse (CFRN), Certified Transport Registered Nurse (CTRN), Certified Neonatal and Pediatric Transport (CNPT), Flight Paramedic Certified (FP-C) & Critical Care Paramedic Certified (CCP-C).

1.4.3. Completes 150 critical care transports, of which 20 may be dynamic HPS transport simulations and a minimum of 2 years of experience as a CCT provider.

1.5. Training

1.5.1. All training will be determined by the CCTA's scope of practice and the patient population served

1.5.2. **Didactics:** Critical care patient management in the transport environment, advanced airway and ventilator management, advanced cardiac care, cardiac critical care, medical and surgical trauma, advanced care and treatment of the critically ill patient

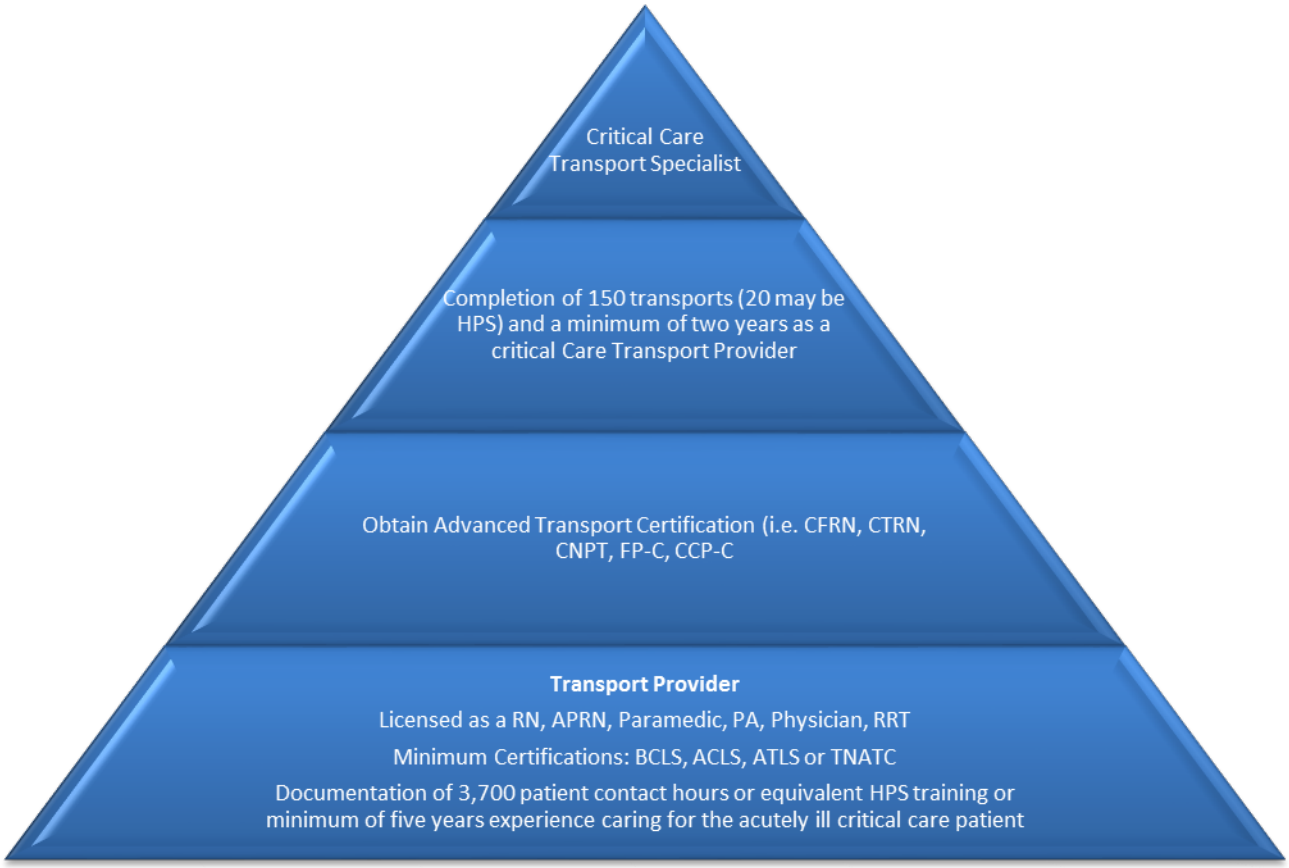
1.5.3. **Clinical Lab Training:** Anatomy and physiology, age specific for scope of practice, advanced airway lab, advanced mechanical ventilation, Intra-Aortic Balloon Pump (IABP), extracorporeal membrane oxygenation (ECMO), invasive hemodynamic monitoring, Cardiac Assist Devices (VADs), Intra-Cranial Pressure (ICP) monitoring.

1.5.4. **Clinical Time:** Critical care, emergency department /trauma, PICU, NICU, labor and delivery. Clinical time may be replaced or augmented with actual critical care patient transports and simulated critical care patients and transports in a high fidelity simulation lab. All forms of clinical time or replacements will have clearly defined objectives that meet the areas listed above and are consistent with the CCTA's scope of practice and patient population

1.5.5. **Aviation and Ground Operations:** Air Medical Crew Resource Management, Aircraft and Ground Safety and Awareness Training, survival skills, EMS communications, hazardous materials training, National Incident Management System (NIMS) 100, 200, Altitude Physiology & Stressors of Flight.

1.5.6. **Certifications:** Obtain remaining certifications as per transport agencies scope of practice (e.g. Neonatal Resuscitation Program (NRP), Advanced Trauma Life Support (ATLS), Pre-hospital Trauma Life Support (PHTLS), Transport Professional Advanced Trauma Course (TPATC) or equivalent).

1.5.7. **Transport Certification:** Within one year after completion of orientation, the transport provider must obtain certification in respective discipline (e.g. CFRN, CTRN, CNPT, FP-C and CCP-C).



1.6. Critical Care Transport Provider Skills

CCT providers' and specialists' skills will be based on the CCTA's scope of practice and defined patient population. They are able to practice under their defined discipline's scope of practice in addition to the following procedures. This list is not intended to be all-inclusive nor is it expected that every CCT team has the ability to perform all of the listed procedures. For example, a CCT team that does not transport neonatal patients would not need to perform umbilical vein/artery cannulation. The intent of this list of advanced skills and procedures is to demonstrate the significant difference, including a higher level of knowledge and training, between a CCT team and an advanced life support (ALS) or CMS-defined specialty care transport (SCT).

1.6.1. Airway/Respiratory

- Advanced Airway Management:
  - Video and direct oral laryngoscopy
  - Rapid Sequence Induction (RSI)

- Supraglottic device insertion (e.g. LMA or KING airway)
- Needle and surgical cricothyroidotomy

- Chest / Lung Compromise
  - Needle, simple, and tube thoracostomy
  - Drainage system initiation and management
- Ventilation
- Mechanical ventilation initiation and management of all modes of ventilation; to include but not limited to: high frequency oscillating; volume, pressure, and dual mode ventilation; non-invasive positive pressure ventilation. Capabilities for all age groups in the CCTA's scope of practice.

1.6.2. Cardiovascular

- Management of Ventricular Assist Device (VAD): including but not limited to: percutaneous or central LVAD, RVAD, and BiVAD
- Management of Extracorporeal Membrane Oxygenation (ECMO) with or without heater/cooler capability
- Intra-Aortic Balloon Pump (IABP) counterpulsation
- Perform and interpret 12 Lead ECGs with catheterization lab activation capabilities
- Intraossesous access (e.g. EZ-IO, FAST1, etc.)
- Indwelling port access (e.g. Hickman, Port-a-Cath, etc.)
- Transcutaneous, transvenous, and epicardial wire pacemaker capabilities
- Pericardiocentesis
- Invasive hemodynamic monitoring (e.g. CVP, Pulmonary Artery Pressures, Abdominal Pressures, arterial pressures, intracranial pressures)
- Blood/fluid warming devices
- Blood product administration (e.g. PRBCs, plasma, platelets)
- Operation of single and multi-channel infusion pump(s), including but not limited to Intravascular, intraosseous, intrathecal, and intra-arterial routes
- Cardiovascular Doppler/ultrasound monitoring
- Arterial cannulation, radial and/or femoral
- Central venous cannulation, femoral, subclavian, and internal jugular
- Wound closure including but not limited to: suturing, stapling, skin glue
- Laboratory sampling, Point of Care testing, result interpretation, and treatment
- Non-invasive tissue oxygenation monitoring
- Hemorrhage control including but not limited to: tourniquet use, chemical clotting agents, Esherman chest seal, tranexamic acid (TXA) and plasma administration

1.6.3. Gastro/Urinary

- Gastric tube placement and management
- Urinary catheter initiation and management

1.6.4. PHARMACOLOGY

- Ability to calculate and independently administer medications applicable to the critical care environment and covered in protocols, guidelines, or standing orders.
  - Vasoactive agents
  - Paralytics
  - Anxiolytics
  - Anti-inflammatory
  - Anticonvulsant
  - Narcotics
  - Anesthetic
  - Thrombolytics
  - Inhaled gases: Heliox, Nitrous Oxide, Nitric Oxide, Anesthesia gases
  - Nebulized medications
  - Antiemetic
  - Antibiotics
  - ACLS medications: Epinephrine, Lidocaine, Atropine, Anti-arrhythmic
  - Electrolytes: Potassium, Magnesium, Calcium
  - Prostaglandin, Surfactant
  - Blood and Blood Products
  - Tranexamic acid (TXA)

1.6.5. Other

- Radiographic interpretation
- Perform and interpret ultrasound imaging including utilization for placement of medical devices
- Ability to manage and transport any indwelling medical device
- Invasive and non-invasive temperature monitoring
- Initiation and management of non-invasive and invasive thermoregulation devices
- Thoracic and extremity escharotomy and fasciotomy

1.6.6. Specialty

- Temperature stabilization
- Fetal heart/uterine monitoring
- Umbilical vein/artery cannulation
- Inhaled nitric oxide
- Surfactant administration
- Esophageal compression tubes
- Peri-mortem cesarean section
- Suprapubic cystostomy
- Esophageal cooling tubes

The CCT provider may be required to perform skills not otherwise listed in this document via direct or video remote medical oversight. Based on the CCTA's patient population, the need for these skills should be anticipated and included in training and competency assessment.

Summary

ACCT believes that Critical Care Transport and the CCT provider should be recognized as a higher level of transport than the Centers for Medicare Services (CMS)-defined reimbursement for Specialty Care Transport, which provides reimbursement for care beyond the scope of paramedic practice. It is essential that critically ill and injured patients receive care by highly trained and qualified clinicians. During inter-hospital CCT, the CCT team should, at a minimum, provide critical care commensurate with the referring facility. Optimally, the CCT team should advance the level of critical care towards that of the receiving, tertiary hospital. The goal of standardized qualifications and training would allow for referral providers and patients to be confident that their level of care is not compromised during transport.

Appendix 2: Critical Care Transport Minimum Equipment/Device List

Background

Critical Care Transport (CCT) Medical Equipment: Maintaining the interoperability and continuity of tertiary level care between hospitals and initiating tertiary-level assessment and intervention capabilities in referral hospital settings are core requirements for the critical care transport agency (CCTA).

While all medical transport agencies do not provide CCT, and all patients do not require critical care support during transport, the CCTA must be able to provide all capabilities for any unscheduled transport. Essential medical equipment, devices, and pharmaceutical formularies must be immediately available, stocked on all vehicles assigned, and accessible to clinicians to manage any critically ill or injured adult, pediatric and neonatal populations, based on the CCTA's stated mission and scope of practice.

The CCTA must maintain, and have immediately available, basic and advanced life-support equipment as required by the jurisdictional regulator and licensing authority.

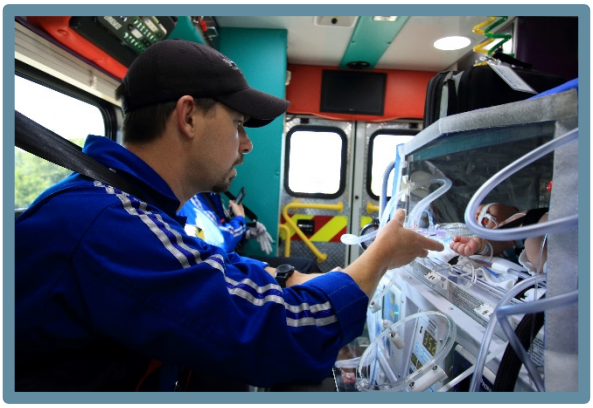
Some CCTAs limit their scope of practice to transporting specific patient populations such as neonatal, pediatric, and high-risk obstetrics (HROB) and the minimum equipment list can be modified to reflect the needs of their specific patient population.

CCTAs that do not exclude patient populations in their scope of practice must be capable of emergent response and transport for all patient populations and must assure the availability of all required types and sizes of medical equipment, devices, and pharmaceutical formulary as noted below.

The CCTA must have medical equipment that is tested and functions in expected temperature, atmospheric pressure, and humidity consistent with the CCTA service area. If this is not feasible for a region (e.g., where temperatures may routinely drop below -18^{o}C during winter months), processes, guidelines, and staff education must address the use of this equipment as it pertains to storage and use in patient care.

Electrically powered medical equipment and devices shall function continuously as intended during loading, transport, and transfer of care with batteries sufficient to provide continuous life support without interruption during all phases of transport.

Fixation, storage, placement and protection of medical equipment and devices must meet applicable regulatory standards and be located as necessary to provide immediate access as needed for resuscitation or management of medical emergencies in transport.



The CCTA must have written policy and documentation that equipment is fully maintained in accordance with manufacturers, biomedical and regulatory requirements at prescribed intervals, consistent with referring and receiving hospital requirements for patients being transported by the CCTA.

This minimum medical equipment and pharmaceutical formulary should be based on the CCTA's scope of practice and patient population. Equipment will include, but not be limited to the following:

2. Equipment

2.1. Patient Monitoring Equipment

2.1.1. Patient monitor (monitoring equipment) with the following capabilities:

- Cardiac monitoring to include 12 Lead capabilities
- Pulse oximetry (neonatal/pediatric team requires dual SpO2 capability for pre and post ductal continuous saturation monitoring)
- In-line continuous waveform capnography monitoring
- Non-invasive and core temperature monitoring (e.g. esophageal/rectal and skin probes/tympanic) appropriate for patient populations managed or treatments administered (i.e. targeted temperature management)
- A minimum of two invasive line monitoring ports (Arterial, Pulmonary Artery (PA), Central Venous Pressure (CVP), Intra-cranial Pressure (ICP), etc.) and transducers
- Non-Invasive Blood Pressure (NIBP) monitoring
- Cardiac defibrillation, cardioversion, and transcutaneous pacing capabilities that meet ILCOR and AHA/ACLS guidelines
- Ability to trend and print patient vital signs and pertinent clinical management events (e.g. defibrillation)

2.1.2. Doppler (certain models have different sensitivity based on patient populations)
- Cardiac Doppler for teams assessing extremity circulation, VS assessment for shock patients, etc.
- Fetal Doppler for teams transporting HROB patients (unless equipped with 2.1.3.)

2.1.3. External fetal monitoring is required for HROB teams

2.1.4. Endotracheal cuff pressure manometer required in air transport modes and strongly encouraged in ground CCT, especially in mountainous regions.

2.1.5. Glucometer unless included in 2.1.6.

2.1.6. Point of care lab values' testing/monitoring (i.e. hemoglobin/hematocrit, electrolytes, arterial blood gas, INR, lactate, etc.) is strongly recommended for CCTAs with extended transport times (greater than 2 hours), who respond to referral hospitals that do not have fully available laboratory capabilities, or who offer critical care intervention or capabilities that may be guided by the lab results (e.g. plasma initiation to reverse Coumadin).

2.1.7. Appropriate size/age specific stethoscope(s) for assessing heart, lung, and abdominal sounds.

2.2. Respiratory Support Equipment:

2.2.1. Multi-mode transport ventilator that is specific to patient age and ideal weight by height specifications and scope of practice:
- Volume and pressure control ventilation with strongly recommended mode of Pressure Regulated Volume Controlled (PRVC)
- Invasive ventilation control modes of controlled, Assist Controlled (AC), Synchronized Intermittent Mechanical Ventilation (SIMV) with Pressure Support (PS) available, Positive End Expiratory Pressure (PEEP), and the ability to adjust inspiratory time
- Continuous Positive Airway Pressure (CPAP) with the ability to adjust pressure and FiO2 from 21% to 100%

- Non-invasive positive pressure ventilation (NPPV) (e.g. Biphasic Positive Airway Pressure) with the ability to adjust iPAP, ePAP, FiO2 from 21% to 100%, Rise Time, iTime, flow and time termination
- Ventilator should provide clinicians the ability to assess key respiratory monitoring outputs (e.g. respiratory rate, PIP, MAP, Plateau Pressures, expired Vt, minute volumes, etc.)
- For neonatal teams, blending gas capability down to room air is required and if inhaled Nitric Oxide (NO) is administered, the proper administration device which integrates into transport ventilator is required for all patient populations
- High frequency ventilator for neonatal transport teams if within scope of practice
- Humidification/artificial nose for neonatal transport teams.
- Ventilator circuits for all patient populations transported by CCTA's scope of practice

2.2.2. The ability to provide elective Endotracheal Tube Intubation (ETI) remains the gold standard for patients at risk for loss of airway during transport. A complete selection of laryngoscope blades and endotracheal tubes specific to the age/scope of practice are required on all transports.

2.2.3. Recent studies indicate that video-assisted laryngoscopy (VL) provides significant risk reduction through improved first pass success and success-to-attempt ratios. While VLs have become standard equipment for rescue of failed ETI, VLs are considered primary required equipment for CCTAs in which vehicle/patient configuration is such that standard laryngoscopy is suboptimal or not possible due to inaccessibility to the head of the stretcher.

2.2.4. A complete selection of airway adjuncts and peri/supraglottic alternate airway devices (e.g., LMAs and King Airways) to manage difficult airway occurrences of all patients within the CCTA's scope of practice are required on all transports.

2.2.5. Adult and/or pediatric surgical and needle cricothyroidotomy kit appropriate to the CCTA's scope of practice.

2.2.6. Tension pneumothorax needle decompression, chest tube thoracostomy, and pericardiocentesis kits that are age appropriate for the patient population of the CCTA's scope of practice

2.2.7. HROB and neonatal teams should have meconium aspirators, suction catheters and bulb syringes included in their delivery kits.

2.2.8. Fixed, oxygen cylinder or liquid oxygen system with at least two flow meters and a source at 50 psi, and compressed air or other required inhaled agent to meet specific patient needs and transport duration for the CCTA's coverage area. The minimum gas volume available **must** be able to meet any ventilator and patient specific flow requirement for the longest possible transport by the CCTA + a 30-minute reserve. For planned long transports when it is impossible to carry the amount of oxygen required to complete the transport there should be a plan in place to replenish the supply. A fixed **minimum** capacity of 3000 gaseous liters for helicopters and fixed wing aircraft is required. CCTAs must maintain a system for calculation of flow rates and capacity of oxygen.

2.2.9. Portable reserve oxygen/compressed air or other required inhaled agent with 30-minute minimum capacity at patient required flow rate for transfer of care and emergency backup if fixed system fails or an unexpected transport delay is incurred. Secure storage for portable tanks is necessary.

2.2.10. Vehicle-powered *and* portable suction system capable of continuous 300mmHg suction within 4 seconds of closure of suction port. Vehicle-fixed suction system must be capable of operation without compromising vehicle engine power, have a visible pressure gauge, rigid and soft suction catheters and endotracheal tube suctioning capability.

2.3. Hemodynamic Support Equipment:

2.3.1. Cardioversion/defibrillator with transcutaneous pacing capability including joule settings and pads for pediatric and adult patients. Neonatal capability consistent with patient population of CCTA.

2.3.2. Temporary transvenous/epicardial pacemaker capabilities (Adult)

2.3.3. Consider an external chest compression device (e.g. Lucas Device) if the CCTA's protocols and policies anticipate the possible provision of CPR during transport

2.3.4. Intra-Aortic Balloon Pump (IABP) for CCTAs that have IABP counterpulsation as part of their scope of practice. IABP must be configured for secure placement in vehicle with a certified manufactured mount and have a battery power capability that allows for continuous counterpulsation from the hospital to the vehicle and from the vehicle back into a tertiary care center.

2.3.5. For CCTAs that support or transport Extracorporeal Membrane Oxygenation (ECMO) and Ventricular Assist Devices (VADs) as part of their scope of practice, adequate adjuncts (i.e., power delivery, invasive line monitoring, medication formulary, infusion pumps and certified manufactured equipment mounts) must be available.

Appropriately trained staff to manage the patient and equipment may be added to CCT crews when appropriately trained to the transport environment and supervised by a safety officer.

2.3.6. The ability to administer multiple concurrent medications via IV pump with medication formulary and dosage calculator to meet specific patient population requirements including back up and patient specific IV pumps such as syringe pumps for newborns. It is recommended that IV pumps contain customizable medication dosing libraries and that they can be safely secured in the transport vehicle.

2.3.7. IV placement equipment via peripheral, intraosseous and/or central IV access or other suitable means for medication and or fluid administration.

2.3.8. Pressure infusion device

2.3.9. Umbilical artery and umbilical vein insertion devices and sets for UA/UVC for neonatal and HROB teams

2.4. Other Equipment:

2.4.1. Incubator and/or transport isolette system with active temperature, ventilator, and pharmaceutical control and support for neonatal and HROB teams

2.4.2. Warming mattress (neonatal specific) for neonatal and HROB teams (e.g. Transwarmer®)

2.4.3. Patient protective equipment including pediatric transport equipment/systems to modify adult stretcher as needed

2.4.4. Pediatric restraint/immobilization device

2.4.5. Obstetrical delivery kit

2.4.6. Appropriate size/age gastric decompression devices

2.4.7. Bleeding control devices (e.g. clotting agents, glue, chest seals and tourniquets)

2.4.8. Bleeding control interventions such as the administration of tranexamic acid (TXA) and the continuation or initiation of thawed plasma are strongly encouraged for CCTAs.

2.4.9. Pelvic stabilization devices

2.4.10. Escharotomy/fasciotomy supplies

2.4.11. Thorax drainage/suction equipment

2.4.12. Patient packaging and/or thermoregulation device (i.e. IVF warmer/cooler, Ready-Heat™, etc.) appropriate for geographic service area meteorological conditions and patient-specific requirements such as hemodynamic shock states in pediatric patients.

2.4.13. Provisions for the initiation and continuation of Targeted Temperature Management (TTM)

2.4.14. Provisions for the isolation and management of patients with highly infectious disease states

2.4.15. System to protect and maintain vehicle cabin temperature (heat/cooling) within prescribed limits for pharmaceuticals, blood, and all other temperature sensitive supplies

2.4.16. Communications equipment consistent with the ability to access medical oversight at all times. In some regions this may not be possible and medical guidelines should specifically address processes for such instances.

2.5. Formulary:

Minimum requirements will be based on the CCTA's scope of practice and needs of the agency's patient population. CCTAs must maintain sufficient medication for the maximum duration of transport, plus a 30-minute reserve.

The CCTA must assure temperature stabilization of all pharmaceuticals within limits prescribed by manufacturer and including blood products *if* carried by the CCTA. Formulary may include all of the following:

- Vasoactive agents
- Muscle relaxants/medications necessary for elective intubation
- Anxiolytics/Sedatives
- Anti-inflammatory/steroids
- Anticonvulsants
- Opioids/analgesia agents
- Inhaled gases: Oxygen and medical air
- Other inhaled gases, if applicable to the CCTA scope of mission/practice: Heliox, nitric oxide
- Nebulized medications (Alpha and Beta 2- adrenergic agonist)
- Antiemetics
- Antibiotics
- ACLS medications: Epinephrine, Lidocaine, Atropine, anti-arrhythmic, etc.
- Electrolytes: Potassium, Magnesium, Calcium
- Tocolytic medication to manage preterm labor
- Vitamin K
- Prostaglandins, surfactant therapy (if transport of neonates is within CCTA's stated scope of practice)
- Hypertonic Normal Saline
- Osmotic diuretics
- Blood glucose control agents
- Blood products if applicable to the CCTA scope of mission/ practice, geographic service area and limitations of referring hospitals

Appendix 3: Critical Care Transport Vehicle Attributes to Support Critical Care

Background

Critical Care Transport (CCT) Medical Equipment: Maintaining the interoperability and continuity of tertiary level care between hospitals and initiating tertiary-level assessment and intervention capabilities in critical access hospital settings are core requirements for the critical care transport agency (CCTA).

Emergent, time-sensitive CCT requests often may not allow for ad hoc reconfiguration of vehicles and equipment needed for safe and effective critical care transport. Not all medical transport agencies need to provide CCT, and not every patient requires critical care support during transport. However, the CCTA must assure the immediate availability of configured Critical Care Transport Vehicles (CCTVs), including ground ambulances, helicopter ambulances, and/or fixed wing ambulances, that provide all of the capabilities within the CCTA's scope of mission/practice for any unscheduled transport.

The following standards reflect the configuration and support systems for essential medical equipment that must be immediately available, stocked and accessible to manage the critically ill and injured adult, pediatric, and neonatal populations based on the CCTA's stated mission and scope of practice. It is recognized that environmental conditions for transport are more variable than those of a hospital; however, temperature, humidity, atmospheric pressure, vibration and shock caused by CCTV movement should be minimized to maintain patient hemodynamic, respiratory, neurological and metabolic status during transport.

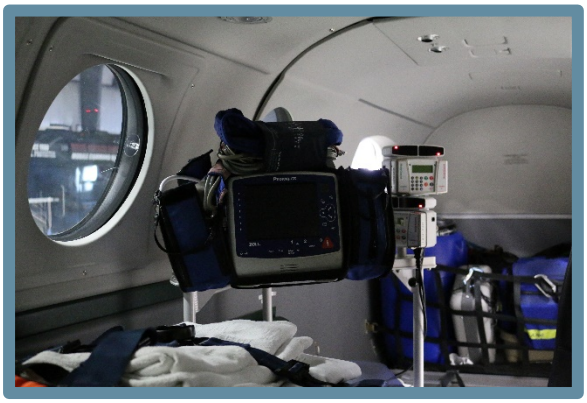
Note: These standards do not reflect all of the required safety and operational attributes of a CCTV, such as design, materials, engine performance, exterior lighting, communications, or onboard safety

equipment. Ground ambulance and air ambulance operational vehicle standards are regulated by applicable governmental agencies.

It is recognized that some CCTAs limit transports to specific patient populations such as neonatal, pediatric, and high-risk obstetrics (HROB) and the CCTV configuration may be modified to reflect the needs of the specific population and scope of practice.

These minimum CCTV configurations and attributes should include the following based on the CCTA's scope of practice and mission. Climate and terrain of the service area should also be considered.

3. Vehicle Attributes to Support Critical Care



3.1. General:

3.1.1. The CCTV must meet all standard and regulatory requirements for the relevant jurisdictional regulator.

3.1.2. The CCTV shall be designed and of sufficient size to accommodate all personnel needed to provide transport with a safe working and operational environment including applicable crew/passenger seating and patient stretcher; each with applicable regulator (FAA, OSHA, DOT) approved rated restraint systems.

3.1.3. The CCTV will be designed with the power, fuel endurance, and range to meet the 95th percentile transport of the CCTA's service area and environment.

3.1.4. The CCTV is designed and equipped to provide continuous patient care with interoperability and interchangeability of necessary patient support systems.

3.1.5. The vehicle interior, equipment and all surfaces should be latex-free construction. When latex-free equipment is not available or in preexisting vehicles, latex should be identified to minimize patient exposure.

3.1.6. The CCTV doors must be fully operational from the interior and capable of being held fully open by a mechanical device.

3.1.7. The CCTV must have sufficient and secured storage to maintain all critical care equipment, devices, and supplies, as well as all basic and advanced life

support equipment as required by the jurisdictional regulator and licensing authority.

3.1.8. In the aviation environment, the CCTA will have a system for regularly documenting the weight of all carry onboard medical equipment, devices and supplies.

3.1.9. The CCTV must be designed and of sufficient size to allow loading and unloading of a patient without excessive maneuvering (no more than 45 degrees about the lateral axis or 30 degrees about the longitudinal access) that could compromise any patient monitoring systems or therapeutic equipment or devices such as ventilation or infusion systems.

3.2. Patient Treatment Compartment:

3.2.1. The CCTV shall be of sufficient dimensions to incorporate a minimum of two seats for medical personnel and one stretcher approved by the applicable regulatory crash standards for capacity and fixation to the vehicle.

3.2.2. The patient stretcher shall have at minimum a five-point restraint system and ability to raise the patient's head 30 degrees during transport.

3.2.3. CCT providers must be able to maintain free access to the patient's head, chest, abdomen, and pelvis at all times and unimpeded access as necessary for expected care and emergency interventions. If HROB is included in the CCTA's scope of practice and there is a significant potential for delivery of an infant during transport, adequate space and patient access must be available for the delivery, care of the mother, and care of the infant(s).

3.2.4. CCT providers must be able to access and maintain a patient's airway while seated to minimize the need to become unrestrained. CCTAs should evaluate the capability of video laryngoscopes to improve airway placement in the confines of a moving CCTV.

3.2.5. Providing Cardio Pulmonary Resuscitation (CPR) in a moving vehicle is suboptimal clinically. It carries high risk for patient safety as the ability to compress the chest with adequate depth and rate per current ILCOR/AHA guidelines for an extended period requires multiple providers who are not seated or restrained. The successful application of either manual or mechanical compressions in a moving vehicle is not supported by evidence. Resuscitation should be avoided if at all possible during the transport phase and CCTAs should have clear policy on loading a patient into a transport vehicle with either CPR in progress or if the patient is expected to arrest. If the CCTA contemplates the need for CPR in their clinical guidelines (e.g. patients experiencing cardiac arrest due to profound hypothermia <30^{o}C), the CCTA should consider the use of a mechanical device rather than manual compressions to maintain safety.

3.2.6. The patient compartment shall be designed such that CCT providers are able to access, view, and manage all medical equipment, devices, and supplies necessary to resuscitate and/or maintain a critically ill patient, ideally without the need to remove CCT provider restraints.

3.2.7. Medical equipment and device alarms and capacity gauges for gases shall be visible to the CCT providers from inside the patient transport compartment without obstruction.

3.2.8. Medical gas/air supply points or gauges will be color coded and protected/padded to prevent injury. Oxygen and other gas supply tanks must allow complete shut off of flow from the interior of the vehicle

3.2.9. The patient compartment shall be designed to protect head strikes including protection from all equipment and device connections (oxygen regulators, IV hooks, and suction regulators)

3.2.10. Fixation (rail), storage, and placement and protection of medical equipment and devices must meet applicable regulatory standards and be located as necessary to provide immediate access as needed for resuscitation or management of medical emergencies in transport.

3.2.11. The positioning of medical equipment and devices shall allow for operation without obstructing emergency egress.

3.2.12. The CCTV will be designed and constructed for ease of cleaning, decontamination, and disinfection of all surfaces (e.g. ceiling, walls, floor).

3.2.13. The construction of the medical interior will be flame resistant/retardant consistent with applicable regulatory standards.

3.2.14. Helicopter fuel systems are required to meet the crashworthiness requirements of 14 Code of Federal Regulations 27.952 or 29.952.

3.3 Environmental Conditions

3.3.1 To maintain patient thermal stability, the CCTV must have an environmental control system capable of raising and/or lowering and then maintaining the temperature in the patient compartment between 60 and 80 degrees F. During times of extreme temperatures, there will be additional means (i.e. equipment, processes, etc.) of maintaining the patient's body temperature.

3.3.2 Active auxiliary heating and cooling systems should be available when the vehicle is stationary.

3.3.3 The CCTV should provide normal ambient humidity conditions for patient treatment if possible.

3.3.4 The CCTV should have provisions to maintain approved thermal stability for medications and blood products as stocked by the CCTA.

3.3.5 Fixed wing CCTVs that operate regularly at flight altitude of 15,000' shall have a pressurized cabin capable of maintaining atmospheric pressure equivalent to 3500'.

3.3.6 Interior lighting shall be provided with a minimum of 50 lumens in patient compartment area with 300 lumens over stretcher area and a 400-lumen directional spotlight. All interior lighting will be dimmable.

3.3.7 A battery powered light source will be available for emergency operations and filtered as necessary for night vision goggles (NVG) operations in the rotor wing (RW) environment. If a portable flashlight is used the pilot should be shielded from the light.

3.3.8 The pilot and/or driver of a CCTV will be shielded, with a curtain or door, from patient compartment lighting for night operations or a lighting system must be in place to protect pilot or driver night vision.

3.3.9 All lighting in the RW environment will be approved and capable of filtering for NVG operations as applicable.

3.3.10 The CCTV will have a positive or free flow ventilation system designed to provide wash out airflow and to protect patient and clinical personnel from excessive airflow.

3.3.11 If noise exposure in the CCTV exceeds 85 dB(A) sound protection for both all personnel and the patient(s) will be provided.

3.3.12 An internal communication system will be available if the noise exposure in the CCTV exceeds 85 dB(A).

3.4 Electrical Supply

3.4.1 Electrically powered medical equipment and devices shall function continuously as intended during loading, transport, and transfer of care with batteries sufficient to provide continuous life support without interruption during all phases of transport.

3.4.2 The CCTV will have a minimum of four (4) 12Vdc and 120/240Vac outlets separately protected with a nominal voltage of 13.8V.

3.4.3 All outlets will be marked for voltage and amperage capacity with a visual indicator for power to the outlet.

3.4.4 Electrical power through an inverter or appropriate power source will provide sufficient amperage to continuously support all required medical equipment and devices without compromising the operation of the vehicle electrical equipment.

3.4.5 The CCTV will have “shoreline” power capability to support outlets in the patient compartment to provide for continuous current when the vehicle is not operating.

3.4.6 The CCTV will have sufficient electrical or engine vacuum power to provide continuous suction of 300 mmHg without compromising the operational performance ofthe CCTV.

3.4.7 The design of the RW and FW CCTV electrical systems shall isolate medical equipment and devices and communications systems to prevent interference between the vehicle electrical or avionic systems and patient support systems.

3.5 Other

3.5.1 The CCTV must have fixed oxygen cylinders or liquid oxygen systems with capacity for the longest transport possible for the CCTA with at least 15 LPM flow capacity and to include a 30-minute reserve capacity.

3.5.2 At least one oxygen outlet will be a 50-psi source.

3.5.3 There will be a minimum of two oxygen outlets and two suction/vacuum pumps.

3.5.4 The CCTV must have fixed or portable medical air, compressed gas, or other inhaled gases with capacity for expected transports and reserves. Portable systems must be adequately secured consistent with regulatory requirements.

3.5.5 Fixed and secured sharps containers should be available in the patient compartment.

3.5.6 A fire extinguisher will be available in patient compartment and accessible to clinical personnel without the need to become unrestrained.

3.5.7 Carry on specialized medical equipment such as transport isolettes, IABP, cardiac assist devices, and ECMO must have individual secure fastening systems and are not to be strapped into seats or patient stretcher with seatbelts.

3.5.8 Pediatric restraint systems are available with ability to secure to stretcher or airframe consistent with regulatory requirements if pediatrics is within the CCTA's scope of practice.

3.5.9 Communications systems to allow medical communications throughout the entire transport without compromising vehicle required communications.

3.5.10 To minimize the need for refueling with a patient on board, the CCTV fuel capacity shall meet the 95th percentile transport profile of the CCTA's service area. Selection of a helicopter or fixed wing CCTV should include the following considerations:

- Appropriate power for all environmental conditions to avoid the need to decrease fuel capacity or clinical personnel in high temperature, humidity, or altitude conditions consistent with the CCTA service area
- Minimized time for transport
- Limited number of ground stops
- Sufficient work room and environmental conditions necessary to positively affect patient care
- Sufficient work room and capacity for additional medical personnel as needed by specific patients and for training purposes
- Fixed wing CCTVs should have minimum three-hour flight time endurance in conditions expected for service area.

Appendix 4: Critical Care Transport Documentation Standards

Background

Critical Care Transport (CCT) Documentation: It is through documentation that patient assessments, treatments and responses during stabilization and transport are recorded and made available to subsequent care providers to assure continuity of care and the longitudinal ability to measure outcomes and system effectiveness. Accurate documentation is essential to improving process and performance measures. Conversely, missing and/or inaccurate information exchange during a transition of care between providers continues to present significant risk to patients. Accurate documentation and prompt transmittal of the patient care record to subsequent clinicians articulates the critical care level of service/intervention and most importantly protects the patient from the risk of iatrogenic adverse events in the transition of care.

The CCTA must have a systemized and thorough documentation process with written policy for clinical documentation standards and appropriate handling of protected health information (PHI).

Document standards should include, but are not limited to the following:

4. Documentation Standards

4.1 General Requirements

4.1.1 The patient care record (PCR) is specific to a single patient and is presented in an organized record consistent with the chronology of care (preferably an electronic PCR). The final report will contain a single treatment summary that has vital signs and medical crew interventions in chronological order.

4.1.2 All PCRs are handled in a manner consistent with state and national privacy statues. All transport agency staff who create or have access to PCRs receive training regarding confidentiality.

4.1.3 Patient name and a unique identifier are documented on each page of the PCR.

4.1.4 Content is standardized, legible, and if abbreviations are allowed, an approved abbreviation list is available. No medications should be abbreviated.

4.1.5 Upon transfer of care from the CCT team to the receiving facility's care provider(s), the CCT provider will provide a written document that includes:

- Patient name, age and weight (if known)
- Onset of injury or symptoms that prompted transport
- Full name of referring individual, agency or provider and physical location of transport initiation
- Significant physical assessment findings
- Summary of procedures, treatments, medications and fluids administered during the transport as well as patient response and periodic vital signs

4.2 Full documentation of care should occur within 24 hours of the transport.

4.2.1 All entries and updates to the PCR must be dated and signed.

4.2.2 All care providers on transport must be noted in the PCR by full name and professional discipline.

4.3 Documentation must include timeline of transport related activities:

- Time request received by the CCTA
- Time weather/road conditions (is) are checked as applicable
- Time request is accepted by CCT team
- Time en route
- Time of arrival at referring location or scene
- Time assessment and care initiated
- Time departing referring location or scene
- Time arriving at receiving facility or destination
- Time of hand off of care at the receiving facility
- If family members accompany patient as a ride along, their full name and presence must be documented in the PCR or dispatch record.
- Full name of the requesting individual, agency, or provider and the physical location of the referring facility/scene must be documented in the PCR.
- Full name of the receiving facility, provider, and the department/physical location of patient care hand off is to be documented in the PCR.
- Unexpected delays in time intervals or the provision of care must be documented in the PCR.

4.4 Clinical Requirements

4.4.1 History of Present Illness (HPI) must describe the chronological process of the patient's illness or injury, including enough detail to present a clinical picture of the patient prior to the transition of care to the CCT crews for transport.

4.4.2 The HPI must also include the reason for critical care transport and the providers involved in the decision-making process regarding both destination and mode of transport.

4.4.3 A clinical impression (working/field diagnosis) is documented.

4.4.4 The patient's past medical, surgical, and family history significant to the current clinical impression are to be documented in the PCR. An obstetrical history should be included on all women who are or were recently pregnant.

4.4.5 Current patient medications and any known allergies are to be documented in the PCR when known.

4.4.6 Chief Complaint – Patient complaint and pertinent positive and negative signs and symptoms supporting the complaint are to be documented.

4.4.7 Documentation of treatment and diagnostics prior to arrival (PTA) to include:

- Summary of clinically pertinent procedures, treatments, medications (dose and time if known) and fluid/blood product input and output (amount, type and time if known) PTA of the transport team.
- Description of any indwelling devices (type, size, depth, location, placement verification, placement date, security and function as appropriate to the device)
- Laboratory, radiologic and other diagnostic findings significant to patient's clinical condition

4.4.8 Initial assessments and vital signs to potentially be documented include (a prioritized, targeted assessment and physical exam is anticipated for most CCT patients):

- Age appropriate assessments of heart rate, respiratory rate and work of breathing, blood pressure, temperature, pulse

oximetry reading, end tidal CO2 (if indicated), capillary refill time, pain level, glucose (if indicated), and Glasgow Coma Scale

- For high-risk obstetrical patients (HROB), additional assessments include contraction frequency, duration and intensity, uterine resting tone, fundal height, fetal heart rate and fetal movement. If the CCTA's guidelines allow for cervical dilatation and effacement, these would also be documented.
- Physical Exam to include both pertinent positive and negative findings are to be documented using a standard format is to be included in the PCR. If a specific exam is deferred, a reason for deferral is to be documented.
- General Assessment - an initial impression of patient's physical presentation and the most significant physical or diagnostic findings.
- HEENT – visual and tactile assessment of the cranium, eyes, ears, nose and throat
- Chest – visual, tactile and auscultory assessment of chest to include heart and breath sounds
- Abdomen – visual and tactile assessment of abdomen, divided into four quadrants if indicated
- Back - visual and tactile assessment of back including cervical, thoracic and lumbar portions of the spine
- Pelvis/GI/GU - visual and tactile assessment of the pelvic and genital area, as necessary and pertinent to clinical condition or injuries
- Skin – general assessment of skin. If condition involves burns, documentation of percentage of body surface area and degree is to be included.
- Extremities – visual and tactile assessment of the extremities, upper and lower, left and right, including circulation, motor function, sensation and range of motion when indicated by clinical condition

4.4.9 Continuing assessments and vital signs are to be documented at least every 15 minutes or more frequently if indicated by patient condition.

4.4.10 Chronological PCR entries that describe the process and timing of assessments, treatments, stabilization, and transport activities are to be included in the PCR.

4.4.11 Patient condition at hand off of care to include general assessment and vital signs.

4.5 Documentation Specific to Diagnostic and Therapeutic Procedures

4.5.1 For all procedures performed by members of the CCT team, documentation in the PCR must include clinical indications, time, specific provider, outcome (successful or unsuccessful), specific location, patient tolerance and response to procedure, and any complications.

4.5.2 Additional specific documentation includes but is not limited to:

- Oxygen administration – method and device, rate of flow, FiO2 as appropriate
- Peripheral venous/interosseous access - size, type, site, skin preparation, security and function
- Central venous and arterial access – size, type, location, skin preparation, security, function and if monitored
- Fluids administered including input and output amounts
- Blood product administration – patient blood type and Rh factor(if known), product (e.g., PRBCs, plasma, platelets, etc.), product unit ABO type and Rh factor, expiration date, and product unit number, infusion rate, amount administered (can be documented in transport I&O), infusion site, heart and respiratory rate and patient temperature prior to administration and at 5, 10 and 20 minutes after product initiation, time infusion complete, documentation of any transfusion reaction and crew response
- Medications – full name, dose, route, time, rate of administration, administration site, and effect of medication including any adverse reaction
- Medication drips – full name, concentration, base solution, dose, rate of administration, administration site, and effect of medication including any adverse reaction and crew response to reaction
- Airway management – vital signs at onset of procedure, intended method, documentation of preparation, oral or nasal placement, blade (size/type and direct or video laryngoscope), use of stylet, use of endotracheal tube introducers (gum elastic bougie), tube size, depth of insertion, confirmation methods, method of securing, lowest oxygen saturation during procedure, vital signs at 5,10 and 15 minutes following procedure, endotracheal tube cuff pressure, verification of placement including first EtCO2 and reverification after each patient movement (i.e., to stretcher, into transport vehicle, out of vehicle, off stretcher)
- Invasive mechanical ventilation – mode, sensitivity, tidal volume, inspiratory pressure, rate, FiO2, inspiratory time, pressure support, PEEP, peak inspiratory pressure, exhaled tidal volume, plateau pressure, mean airway pressure, alarm settings as appropriate to mode delivered
- Non-invasive positive pressure ventilation – inspiratory pressure, expiratory pressure, FiO2, rate (if applicable), ramp, flow termination, spontaneous expiratory tidal volumes

- Labs – POC versus lab testing, type of sample, site, specific laboratory marker(s) (e.g. glucose, sodium, pH, pCO2, lactate, etc.), result, laboratory unit (e.g., mg/dl, mmol, etc.), and the normal range for specific marker(s) tested per College of American Pathologists (CAP) standards
- Needle and surgical thoracostomy – site, size, type of device, skin preparation, initial air/fluid output, placement to Heimlich valve or suction, response to intervention, and complications
- Pericardiocentesis – puncture site, needle/catheter size and type, skin preparation, initial output, response to intervention, and complications
- Escharotomy/Fasciotomy – site, description of incisions, skin preparation, patient response (e.g., respiration status, distal pulse status)
- Cricothyroidotomy – airway size and type, skin preparation, procedure method type, patient response to intervention, and complications OG/NG tube – tube size and type, depth of insertion, method of verifying placement, securement, initial and ongoing output (may be documented in I&O), suction (e.g., capped, open or to low intermittent/continuous suction), patient response to intervention, and complications
- Urinary catheter – tube size, site preparation, initial and ongoing output (may be documented in I&O), patient response to intervention, and complications
- Cardioversion – presenting rate and rhythm, if synchronized, energy setting, pad location, resulting rhythm, and complications
- Defibrillation - presenting rate and rhythm, energy setting, pad location, resulting rhythm, and complications
- Cardiac Pacing – presenting rate and rhythm, pacer mode, rate, set energy, pad/catheter/wire location, patient response to intervention (e.g., electrical and mechanical capture) and complications. For transvenous pacing or epicardial wires: pacing mode, mA for pacing, mV for sensing, thresholds, site status, and securement
- Administration of special gases (nitric oxide, Heliox or nitrous oxide) – initiation time, method of administration, patient response to intervention, and complications
- Use of trauma devices (tourniquets, occlusive dressings, pelvic splints, immobilization devices, traction splints) – indication, type and location, time of application (also documented directly onto any tourniquet placed), patient response to intervention, and complications
- Use of other cardiac and respiratory assist devices (intra-aortic balloon pump, left ventricular assist device, bi-ventricular assist device or extracorporeal membrane oxygenation) - cannulation site, condition of dressings, clinically pertinent settings specific to device and distal perfusion

Appendix 5: Critical Care Transport – "Always Events" and "Never Events"

Background

ACCT is committed to assuring an accountable and safe air and ground Critical Care Transport (CCT) system that recognizes the interests of patients as the first priority. Reducing and eliminating preventable injury and fatalities is a necessary and ever-continuing objective within medicine. The Institute of Medicine's 1999 report *To Err is Human*[i] report highlighted the enormous challenge of error in medicine and the need to relentlessly search for strategies to improve patient safety. As medicine becomes ever more complex—with ever-greater benefit, the chance for error increases. The risk of error is introduced at each layer of assessment, decision, and intervention and increases the possibility that the expected outcome, an improvement in health status, is not achieved.

The *To Err is Human* report estimated 44,000 to 98,000 premature deaths occurred each year in U.S. hospitals due to iatrogenic causes.[ii] Fifteen years later, there remains a long road to a safer system. Recent studies, with better reporting, estimate 210,000 to 440,000 premature deaths occur annually in U.S. hospitals due to medical error.[iii] This staggering figure ranks iatrogenic medical error as the third leading cause of death in the country. CMS' findings point to wide variation in two main areas: quality of medical care and hospital safety practices. Recent estimates by Medicare Provider Analysis and Review (MedPAR), examining the average risk of adjusted in-hospital mortality, indicate that if all hospitals performed at the highest level, as ranked by this CMS performance review program, an estimated 235,378 deaths and 183,534 adverse events resulting in patient harm would have been avoided between 2009 and 2011.[iv]

Emergency medical care is characterized by difficult attributes: events are unscheduled, unpredictable, and often-unplanned with care delivered in uncontrolled settings. Critical care medicine is complex, urgent, and resource intensive, with routine application of high consequence interventions by highly

[i] Kohn L, Corrigan J, Donaldson M, eds. To Error is Human: Building a Safer Health System. Committee on Quality of Healthcare in America, Institute of Medicine, National Academy Press, Washington D.C. 2000
[ii] Kohn L, Corrigan J, Donaldson M, eds. To Error is Human: Building a Safer Health System. Committee on Quality of Healthcare in America, Institute of Medicine, National Academy Press, Washington D.C. 2000
[iii] James, JT, A New Evidence-based Estimate of Patient Harms Associated with Hospital Care, Journal of Patient Safety: Sept 2013; Vol. 9, Issue 3
[iv] American Hospital Quality Outcomes 2013*: Healthgrades Report to the Nation*, November 2013

trained professionals routinely practicing under demanding conditions. The benefits of modern critical care medicine are unparalleled, and yet these benefits come with potential risks and costs. Because time-emergent and critical care interventions occur at the highest levels of consequence in medical practice, extraordinary attention to detail in maintaining the highest standards of quality and patient safety is crucial.

Critical care response and transport medicine creates a unique synergy between transportation and medicine. The rapid deployment of expert clinicians with skills, knowledge, experience, and equipment can literally bring tertiary care to a patient's side, allowing immediate stabilization of critical injury or illness – whether on the side of a road or in a community critical access hospital followed by direct transport to a specialty care center. While evidence demonstrates the benefit of this unique tethering of two distinct technologies, as with all benefits in medicine, the interface between the two systems is complex. The complexity itself increases opportunity for error.

Similarly, the medical transport environment, whether on the ground or in the air, is among the unique and complex of medical arenas. This is especially true of helicopter EMS operations where limited planning time, critical clinical need, 24-hour operations and marginal weather conditions combined with limited weather reporting, and an overall hazardous, unstructured environment converge in one setting. This scenario requires extraordinary attention to detail in maintaining high quality and safe operations. The National Transportation Safety Board (NTSB), the Federal Aviation Administration (FAA), and state regulatory oversight agencies all have highlighted the need to improve safety within the medical transport environment.

Assuring patient safety is the first and foremost task of medical providers. Leading medical provider organizations and physicians have established a framework for events that should ***always occur*** and simultaneously, a framework of events that should ***never occur*** during patient care. Together these improve the overall safety of patients during medical transportation.

The following suggestions should be considered an initial step in the development of "*always events" and "never events*" frameworks for critical care transport agencies. It may be helpful to conceptualize them as two sides of a coin in developing systems and measurement tools to improve patient safety. The work group has used the National Quality Forum (NQF) format to describe these events.

The Picker Institute for Patient and Family Centered Care, and more recently the Institute for Healthcare Improvement (IHI), developed the concept of "*Always Events*" which "refer to aspects of the patient experience that are so important to patients and families that health care providers must perform them consistently for every patient, every time."[v] *Always events* within the context of critical care transport can be thought of as positive behaviors and safety practices in the management of critically ill and injured patients.

[v] Picker Institute. Always Events: Creating an Optimal Patient Experience. Oct. 2011 Available through the Institute for Healthcare Improvement

"*Never Events*" were first introduced by Dr. Ken Kizer, the former CEO of the NQF, to better understand and highlight the need to address particularly egregious medical errors, such as a wrong site surgery.

The NQF has expanded the list over time to identify unambiguous adverse medical events that are clearly identifiable, measureable, and preventable. *Never events* are also often defined as *Serious Reportable Events* (SRE) by state regulators, the Joint Commission, and the Agency for Health Care Research and Quality. The NQF and the Centers for Medicare and Medicaid (CMS) published a list of *"never events"* measures. The two lists overlap on some measures, but while the NQF is focused on the prevention of unambiguous preventable harm, CMS is focused on preventable occurrences deemed non-reimbursable by Medicare such as serious hospital acquired infections. This paper does not speak to Medicare reimbursement.

Never events within the context of critical care transport include not only actual documented harm, death, or disability to patients incurred while under the care a transport agency but also include preventable adverse occurrences where the risk of harm or actual harm to a patient was greater than any possible clinically beneficial outcome for the patient. CCT *Never Events* should be evaluated by state regulators and the Commission for the Accreditation of Medical Transport Systems (CAMTS) for inclusion in sentinel or SRE registries.

ACCT encourages critical care transport agencies (CCTAs) to adopt these measures and continue the dialogue for additional evidenced based measures. CCTAs need to develop internal registry reporting systems for both near miss and adverse events and are encouraged to develop or work with patient safety organizations, which can aggregate and share de-identified data for wider health care community learning.

ALWAYS EVENTS PATIENT PROTECTION		
Event	**Additional Specifications**	**Implementation Guidance**
1. Care Coordination and Transition	Includes: a) CCT team assurance of obtaining written records vs. verbal report prior to interfacility transport b) Developing written SBAR type communications for receiving clinicians	This event is intended to capture: ▪ Processes assure that all necessary documentation related to the care of a patient is obtained prior to transport and transmitted to receiving clinicians Care transition has been demonstrated to be one of the leading risks for patients due to loss or missed crucial health information, record of interventions, diagnostics, and results in a timely manner. CCTAs must develop reliable processes to assure that care coordination and transition is seamless and thorough.
2. Physical comfort, pain relief, emotional support, and alleviation of fear and anxiety	Includes: a) Administration of adequate analgesia including basic pain relief techniques such as positioning and gentle handling b) Processes to improve the experience of care c) Assurance of environment (visual, temperature, light, humidity, sound protections, etc.) that protects patient from secondary exposures to physiologic or emotional stressors	This event is intended to capture: ▪ Procedures for alleviating patient pain and fear because the onset of a sudden critical illness or injury is often bewildering and frightening. Uncontrolled pain and stress reactions increase morbidity. In the fast pace of high tech health care it is possible to inadvertently lose “high touch.” CCTAs must develop prompt processes to manage pain and discomfort adequately, including holding a patient’s hands, speaking softly, moving a bit more slowly, and introducing calm to chaos. Developing a culture and measurable goals of supporting patients is as important as throughput. Sometimes “fast is slow and slow is fast.”

ALWAYS EVENTS		
PATIENT PROTECTION		
Event	**Additional Specifications**	**Implementation Guidance**
3. Prevent invasive line or wound infections.	Includes: a) Placement of any invasive intravenous line or invasive device such as endotracheal tubes or urinary catheters b) Management of indwelling catheters or devices during transport Excludes: a) Documented previous community hospital acquired infection	This event is intended to capture: ▪ Processes and procedures to assure within the realities of the CCT environment the most sterile conditions for the placement of any indwelling catheter and device. Although true sterile technique is nearly impossible in the transport environment, CCTAs must develop tightly managed processes and care norms to minimize the risk of iatrogenic infection Management during CCT must protect indwelling catheters and devices. While it is nearly impossible to document the relationship between poor technique in resuscitative and transport care of subsequent documented hospital acquired infection, the time criticality and lack of ability to assure a sterile field for invasive care presents enormous risk to patients. CCTAs must develop processes and demonstrate commitment to cultural norms to make sure of hand cleaning, adequate skin preparation, and prevention of infection is at the leading edge of care. Prevention of downstream infection is as or more important than success in placement of an indwelling device.
4. Prevent Ventilator Acquired Pneumonia (VAP)	Includes: a) Management of ventilated patients during transport to maintain cleanliness of airway and positioning of patient to prevent VAP through standard hospital practice Excludes: a) Transport of previously documented VAP	This event is intended to capture: ▪ Processes to assure infection control strategies for the care of intubated ventilated patients. Whenever possible, ventilated patients should be transported in a 30-degree head raised position to minimize risk of ventilator-associated pneumonia.

ALWAYS EVENTS CARE MANAGEMENT		
Event	**Additional Specifications**	**Implementation Guidance**
1. Respect for patients' values, preferences, and expressed needs.	Includes: a) Respect for patient and families religious and culture values b) Involvement of family and friends Excludes: a) Patient and family decisions that impact safety (e.g. parent accompanying child during transport). The parent may not be able to ride in the patient care compartment or may not be able to accompany the transport if presence increases safety risk.	This event is intended to capture: ▪ Processes to involve patients and families in the care of a critically ill and injured patient. By and large patients and families in the midst of an emergency do not get many choices in how care is going to be delivered Clinicians are faced with making time sensitive decisions with the focus on immediate patient care needs rather than the full experience of care. Caregivers need to develop processes to improve communications and trust; to make sure they have clear understanding of patients' religious beliefs and culture values. This is especially important in the care of patients who speak a different primary language than the caregivers, or who, through immigration or refugee status, come from very different cultural norms or who have a communication barrier such as limited visual acuity, hearing, previous loss of function in a limb. As an example, many transport agencies have policies that prohibit a parent, child, or family member to accompany a patient during transport. CCTAs must develop policies and processes to allow risk managed exceptions or a plan to make sure the family member is supported to travel to a distant receiving hospital.
2. Prevent pressure ulcers	Includes: a) Patient acquired pressure ulcers from transport on backboards or prolonged transport on hard stretchers in non-moving, generally supine positions Excludes: a) Patients with known unstable orthopedic / neurologic injury b) Previously acquired pressure ulcers	This event is intended to capture: ▪ Processes to assure that patients are protected from prolonged supine or single position immobilization on hard surfaces CCTAs should develop policies and protocols to minimize transport of patients on backboards. Current evidence demonstrates increased risk of harm for patients that are immobilized for even relatively short periods of time (30 minutes) versus any benefit from the immobilization for pending clearance of a suspected spine injury.

NEVER EVENTS: SERIOUS REPORTABLE EVENTS (SRE)		
CARE MANAGEMENT		
Event	**Additional Specifications**	**Implementation Guidance**
1. Patient death or disability caused by loss of supply of oxygen or any incident in which a line designated for oxygen or other gas to be delivered to the patient contains the wrong gas or is contaminated by toxic substances.	Includes: a) Depletion of vehicle oxygen supplies b) Mechanical malfunction of oxygen supply system c) Inability of transport crews to operate the oxygen system d) Inability to deliver oxygen due to oxygen delivery system incompatibility with vehicle ports Excludes: a) Unanticipated addition of a patient due to unforeseen circumstances (e.g., family member accompanying patient on transport becomes ill) b) Oxygen supply and delivery within a referring or receiving facility c) Unavoidable oxygen depletion via portable tanks at an out-of-hospital scene where extended scene time is necessary due to environment/safety /logistical needs	This event is intended to capture: ▪ Occurrences of unintended depletion or non-delivery of oxygen concentrations necessary to maintain adequate patient oxygenation during the patient transport phase of a medical transport mission Proper transport planning should be completed prior to any patient transport. This planning should include potential oxygen needs for any patient transport or patient condition change during transport. If multiple patient transports are within the mission profile, adequate systems and supplies must be taken into consideration. Replenishment of oxygen at designated facilities may be planned and required as part of the mission. Daily shift checks and preventative maintenance on oxygen delivery systems should assure that oxygen depletion or non-delivery does not occur due to device malfunction. Educational requirements should assure that all crewmembers are competent to complete shift checks, operate, and appropriately troubleshoot equipment. A CCTA must have assurance that vendor sources of gas supply have effective safety compliance programs.

NEVER EVENTS: SERIOUS REPORTABLE EVENTS (SRE)		
CARE MANAGEMENT		
Event	**Additional Specifications**	**Implementation Guidance**
2. Delivery of a baby during the transport leg of a patient encounter.	Includes: a) Accurate patient assessment and management of HROB and pre-term labor to assure delivery in most controlled circumstance Excludes: a) Accepted residual risk of delivery during transport after consultation with attending or consulting OB/ Perinatologists	This event is intended to capture: ▪ Occurrences of unplanned delivery of an infant in a moving vehicle CCTAs must have risk matrix and consulting capability to assess and manage HROB to prevent inadvertent delivery during transport unless known absolute post-delivery risk to infant outweighs risk of delivery in moving vehicle, especially aircraft. In general, it is preferable to deliver a child in the most stable environment or referring community hospital with transport team present for support and secondary NICU retrieval team/equipment as needed for subsequent newborn transport.

NEVER EVENTS: SERIOUS REPORTABLE EVENTS (SRE)		
PATIENT PROTECTION		
Event	**Additional Specifications**	**Implementation Guidance**
1. Patient or passenger death or serious disability caused by the CCTA vehicle failure or crash	Includes: a) Vehicle crashes or failures due to mechanical reasons or human error Excludes: a) Acts of terrorism by entities outside of the CCTA, patient, or passengers screened by the CCTA b) Acts of God (e.g. bird strikes)	This event is intended to capture: ▪ Occurrences where a vehicle failure or crash caused patient or passenger death or disability through direct injury or through the delay in delivery to definitive care The primary goal of a CCTA is to provide the appropriate level of medical care while delivering the patient safely to the intended destination. If the vehicle fails or crashes due to mechanical reasons or human error, the CCTA was unable to provide the intended service or it provided a disservice to the patient. The CCTA must assure quality maintenance and complete documentation of maintenance of all vehicles utilized by patients, passengers, and crewmembers. The CCTA must assure quality maintenance and complete documentation of maintenance of all vehicles utilized by patients, passengers, and crewmembers. The CCTA must assure quality initial and recurrent vehicle operation and safety education and complete documentation of this education for crewmembers transporting patients or passengers. The CCTA must create, educate, and utilize post incident/accident processes to respond to vehicle failures or crashes. The policies primarily should address patient and crew safety needs and provide options for transporting the patient and any other injured passengers to appropriate medical care with minimal delay.

NEVER EVENTS: SERIOUS REPORTABLE EVENTS (SRE)		
PATIENT PROTECTION		
Event	**Additional Specifications**	**Implementation Guidance**
2. Patient death or serious disability caused by transport to an unintended destination	Includes: a) Unintended patient transport to destinations through human error Excludes: a) Specific destinations within a receiving facility (e.g. emergency department, catheterization lab, and critical care unit) b) Diversions due to hospital /physician orders, patient condition, weather, or any other safety issue necessitating a diversion from the planned destination	This event is intended to capture: ▪ Occurrences where the transporting program unintentionally transports a patient to an unintended destination through human error in communication, navigation, or other means The primary goal the CCTA is to provide the appropriate level of medical care while delivering the patient safely to the intended destination. Appropriate and expedient medical care at the destination facility can have a significant effect on patient outcomes. Unintended transport to other facilities may cause delays to definitive care and lesser or deficient medical capabilities may create a negative patient outcome.
3. Patient death or serious disability caused by dropping a patient or allowing a patient to fall during the transport process	Includes: a) Patient falls while under the care of transport crews, dropping of patients being carried or transport by a device (stair chair, wheelchair, Stokes basket, stretcher, backboard, loading ramps, harnesses, or any other approved/unapproved device)	This event is intended to capture: ▪ Occurrences where a patient receives unintended trauma directly resulting from the transport process The primary goal of the CCTA is to provide the appropriate level of medical care while delivering the patient safely to the intended destination. Though CCTA providers offer patient care and transport in a variety of challenging environments, it is expected CCTA's will have the resources, equipment, and knowledge to operate in those environments and be able to transport patients without falls, drops, or other unintended injury.

NEVER EVENTS: SERIOUS REPORTABLE EVENTS (SRE)		
PATIENT PROTECTION		
Event	**Additional Specifications**	**Implementation Guidance**
4. Death or serious disability to EMS personnel or patient caused by failure of the CCTA to communicate an initial estimated time of arrival to the scene or subsequent delays of the transport response	Includes: a) Communication of the initial estimated time of arrival (ETA) b) Communication of all expected or unexpected delays in response Excludes: a) Documented communication delays or errors by the requesting EMS agency or health care facility	This event is intended to capture: ▪ Occurrences where delays in patient transport or scene hazards occur due to the lack of communicating response delays by the CCTA CCTA resources are requested to provide patient transport to definitive care for injuries or illness. Response delays may impact operational/safety issues on scene as well as patient treatment plans. It is imperative that CCTA providers communicate and document the initial estimated time of arrival of the medical resource on the scene of the request. If delays are expected or occur unexpectedly, CCTA must communicate these delays as soon as possible to the requesting agencies. CCTA delays such as "stacking calls" should not occur. Definition: Delay is subject to a variety of factors such as response mode, distance, and patient condition. For this purpose delay is defined as a time frame that will have a negative impact on scene safety operations or patient care. It is essential that the CCTA consider these factors and communicate any delay that may impact safety or care.
5. Transport of a patient with an undetected esophageal intubation, patient death or disability caused by loss of oxygen/ hypoxia	Includes: a) Unrecognized missed placement of an endotracheal tube b) Unrecognized dislodgement of an endotracheal tube	This event is intended to capture: ▪ Initial and recurrent processes and documentation systems for CCTAs; provider direct observation; physical exam, and continuous wave form end-tidal CO2 monitoring to prevent undetected missed intubation CCTAs must have processes and documentation systems to verify continued proper tube position during transport at every physical movement of patient along with timed observations.

NEVER EVENTS: SERIOUS REPORTABLE EVENTS (SRE)		
PATIENT PROTECTION		
Event	**Additional Specifications**	**Implementation Guidance**
6. Arrival at the wrong sending location for either a scene response or interfacility transport	Includes: a) Missed or faulty dispatch information gathering resulting in delays in care and transport Excludes: a) Documented location errors by requesting agencies (e.g., referring provider provided wrong coordinates or address)	This event is intended to capture: ▪ Accuracy in dispatch including redundant systems to check coordinates; develop known landing zones (LZ)/rendezvous points, and hospital names CCTAs must have processes and cross checks to assure clear identifiers and coordinates are provided to pilots/drivers to assure that transport units arrive at the correct LZ/rendezvous point or hospital especially in communities with multiple hospitals or LZs.
7. Patient death or serious disability caused or associated with hypoglycemia, the onset of which occurs during transport	Includes: a) Failure to test or document hypoglycemia immediately prior or during transport b) Failure to correct hypoglycemia during transport Excludes: a) Continued hypoglycemia despite intervention	This event is intended to capture: Inadvertent and missed recognition, testing, and documentation of hypoglycemia during transport Neonates and pediatric patients due to high metabolic demand are particularly at risk for poor outcomes secondary to missed hypoglycemia.
8. Knowingly causing patient death or disability associated with a medication error	Includes errors: a) Wrong medication b) Wrong dose c) Wrong patient d) Wrong timing e) Wrong rate f) Wrong preparation g) Wrong route of administration h) Delivery of pressor by means other than infusion pump. i) Administration of known or potentially known adulterated or contaminated medication Excludes: a) Administration of medication in which adulteration, mislabeled concentration, or contamination was unknowable by caregiver.	This event is intended to capture: ▪ Occurrences of preventable medication errors CCTAs must have systems and cultural norms in place to prevent known recurrent common medication errors. CCTAs must have systems to accurately calculate dosing and deliver infusion medications. CCTAs should have systems and cultural norms to document crosschecking by second caregiver or other system prior to administration.

NEVER EVENTS: SERIOUS REPORTABLE EVENTS (SRE)		
PATIENT PROTECTION		
Event	**Additional Specifications**	**Implementation Guidance**
9. Knowingly causing a patient death or disability associated with hemolytic reaction due to the administration of ABO/HLA-incompatible blood or blood products	Includes: a) Failure to accurately identify patient and blood product compatibility prior to administration b) Failure to quickly recognize and intervene in patient with suspected or identified hemolytic reaction c) Administration of blood that has exceeded safe storage temperatures	This event is intended to capture: ▪ Occurrences in which providers do not follow and or document standard procedures in administration of blood products CCTAs must have processes and documentation systems to monitor safety of blood product storage, compatibility, and known patient incompatibility with blood products. Increasing numbers of CCTAs are stocking blood products for transport. Careful monitoring of on-site and transport storage systems is essential for patient safety.
10. Knowingly cause death or serious disability associated with the use of contaminated or inoperable devices, use of device for purpose other than approved, contaminated drugs, or biologics	Includes: a) Use of a device, instrument, or medication for non FDA approved purpose b) Known or poor process control leading to use of contaminated device or medication Excludes: a) Adverse patient occurrence or outcome due to inadvertent use of unknowable contaminated or inoperable device. b) Adverse patient occurrence or outcome due to inadvertent use of unknowable contaminated medication or biologic	This event is intended to capture: ▪ Occurrences of patient harm due to misapplication or failure to have system in place to assure safety of devices, medications, and biologics CCTAs must have processes and systems in place to assure sterilization of equipment if non-single patient use, and systems to prevent inadvertent or known use of a device or medication for non-prescribed or approved use without careful and documented medical oversight. CCTAs must provide assurance of purchase and storage systems to maintain medications and devices in accordance with manufacturers' specifications including temperature, humidity, light, controls and packaging sterility, as applicable.

NEVER EVENTS: SERIOUS REPORTABLE EVENTS (SRE)		
PATIENT PROTECTION		
Event	**Additional Specifications**	**Implementation Guidance**
11. Patient death or serious disability caused by impairment of medical provider	Includes: a) Working under the influence of intoxicating medications, drugs, or alcohol b) Working under the influence of a prescribed medication without supervision by agency medical director and personal primary care physician c) Working under the influence of an over- the-counter (OTC) medication with known side effects that might impair provider, i.e., Benadryl causing drowsiness d) Working in a fatigue state that impairs judgment or coordination	This event is intended to capture: ▪ Occurrences in which an impaired provider is allowed or undertakes patient care CCTAs must have means for crew to check themselves and each other for potential risks to patients caused by known or inadvertent impairment. As providers may have duty conflict to come to work with mild illness, fatigue, with or without an OTC, CCTAs must have a just culture system to assist providers with alternative duties if they self-check and identify that they might be unable to perform tasks in safe manner.
12. Patient death or permanent disability caused by lack of temperature protection with resulting hypo or hyperthermia	Includes: a) Known exposure of patient to prolonged temperature extremes with identifiable risk of patient harm, such as post trauma hypothermia b) Transport in vehicle without adequate environmental control unit during extreme temperature conditions Excludes: a) Rescue conditions in which need for extrication is less risk/ higher benefit and outweighs thermal protection of patient during rescue.	This event is intended to capture: ▪ Failure to provide a thermally controlled environment to a patient at risk of adverse outcome due to combination of injury/ illness and ambient temperature whether extreme of cold or hot Failure of CCTA to have environmentally controlled vehicles with known and expected extreme of temperature condition, i.e., failure to provide air conditioning in vehicle in climate with documented temperatures in excess of 95F for average > 15 days per year or failure to provide adequate or functioning heating in northern climate winter months.

NEVER EVENTS: SERIOUS REPORTABLE EVENTS (SRE) SYSTEM EVENT		
Event	**Additional Specifications**	**Implementation Guidance**
1. Respond without a formal request	Includes: a) Any freelance responses to potential patient transports Excludes: a) The CCTA that participates in auto-response/standby responses as part of a coordinated, integrated and published policy developed in cooperation with local/regional requesting agencies b) Instances when the CCTA crew happens upon the scene of an EMS need and initially acts as a first responder, notifying the public service answer point (PSAP) to activate standard response protocol for that location	This event is intended to capture: ▪ Occurrences where a CCTA self-dispatches resources to scenes or health care facilities without a formal request from or coordination with personnel on scene. The utilization of CCTA resources are coordinated events between the CCTA, PSAPS, dispatch centers, other responding EMS resources, and hospitals. Freelance responses to potential patient transports by CCTA resources can jeopardize coordination efforts as well as impact crew and patient safety. There must be a formal request of service to respond with CCTA resources.
2. Knowingly misrepresenting information in a medical record, whether by falsification, obfuscation, or omission of information	Includes: a) Purposeful inaccurate or missed documentation entered in a patient record b) Post transport edit of patient care record to cover up or change potential error in patient care.	This event is intended to capture: ▪ Occurrences in which providers purposefully hide error or adverse patient event ▪ Occurrences where providers purposefully omit pertinent patient information with resultant adverse risk or harm to patient. CCTAs must have a reliable and thorough patient care documentation system that has the means to identify post record completion edits.

Appendix 6: Recommended Safety Metrics for Critical Care Transport

Background

In 2006, the National Academy of Sciences Institute of Medicine's (IOM) three-part landmark emergency care report highlighted multiple challenges in the emergency care system. The *EMS Medical Services: at the Crossroads* report noting that accountability has "failed to take hold" in the EMS system, calling for the development of system performance indicators that "*include structure and process measures, but evolve toward outcome measures over time. These performance measures should be nationally standardized so that statewide and national comparisons can be made. Measures should evaluate the performance of individual components of the system, as well as the performance of the system as a whole. Measures should also be sensitive to the interdependence of these components."*[vi]

While there is early progress and organization such as the American Academy of Pediatrics (AAP) and the Air Medical Physician Association (AMPA) have developed voluntary measurement standards and shared databases, there is also continuing lack of agreement on definitions, standards, and metrics for care leading to wide variability of practice throughout the EMS system. Unfortunately, as the IOM paper notes this is "an urgent problem of unknown scope" because no nationally agreed upon data set or reporting center for adverse events exists. While the public and healthcare providers perceive that Critical Care Transport (CCT) agencies, providers, and vehicles are essentially all the same, there is a substantial gap between reality and perception. Essential to improvement is the attention that must be paid to underlying continued problems in patient safety. Recognizing the need to improve out-of-hospital care, the Federal Interagency Committee for EMS and the National EMS Advisory Council through the National Highway Traffic Safety Administration (NHTSA) and the EMS for Children's Division of the U.S. Health Resources and Services Administration engaged the American College of Emergency Physicians (ACEP) to develop a national strategy to improve the culture of safety in EMS.[vii] Significantly, the white paper, a National EMS Culture of Safety used recent work from the University of Pittsburgh to define an adverse event in EMS as "a harmful *or potentially harmful* event during the continuum of EMS care that potentially preventable and thus independent of the progression of the patient's condition."[viii]

[vi] National Academy of Sciences / Institute of Medicine: *Emergency Medical Services: at the Crossroads.* ISBN: 0-309-66216-8, (2006)
[vii] www.emscultureofsafety.org/wp-content/uploads/2013/10/Strategy-for-a-National-EMS-Culture-of-Safety-10-03-13.pdf
[viii] Patterson PD, Weaver MD, Abebe K, Martin-Gill C, et al. Identification of adverse events in ground transport emergency medical services. Am J Med Qual. 2012 Mar-Apr;27(2):139-46

Achieving a safer and higher quality system is an enormous challenge that will take concentrated efforts by every healthcare stakeholder, policy maker, regulator, purchaser, as well as the public and individual patients and families. Appropriately used, transport medicine can act as an integrator of care due to its multiple jurisdictional reach. ACCT members recognize they have been entrusted to provide high quality critical care to their patients and that is why ACCT works to lead the effort to create a better system. Building on the work of the National Quality Forum (NQF) and the Institute for Healthcare Improvement (IHI), and concurrent with work by the AAP and AMPA, ACCT has developed and/or concurred with a series of initial core measures to improve the quality of care and safety of patients in the continuum of care. The goals are aligned with IHI "Triple *Aim"* framework to optimize health system performance:

- Improving the patient experience of care (including quality, safety, and satisfaction);
- Improving the health of populations; and
- Reducing the per capita cost of healthcare.

ACCT's initial core measures, enumerated in this section are patient safety focused and are inspired by the Joint Commission on the Accreditation of Hospital Organization (JCAHO) Sentinel Event Policy adopted in 1996. [ix] ACCT believes that it is imperative for every CCTA to track these basic patient safety event measures for the purpose of initiating continuous quality improvement activities. Developing a means of reporting these metrics to a protected, nationwide database for the purpose of measuring the quality and safety of the CCT industry is a foundational goal of ACCT. In addition, this database could allow participants to compare their quality and safety metrics against the industry for the purpose of targeting and prioritizing performance improvement projects.

Moving forward, with the input of members and affiliate associations, ACCT aims to release additional clinical performance measures beyond this initial set applicable to CCT. These should not be considered critical care accreditation standards or mandatory data reporting data points for the industry. ACCT's goal is to aid stakeholders in recognizing the distinction between critical care transport performance measures versus evaluations used for other modes of patient transport, along with the associated high standards and quality of care provided to CCT patients.

[ix] https://www.jointcommission.org/sentinel_event_policy_and_procedures/

1	Domain: Patient Safety	Clinical Area: All
Measure Name: Patient Safety Incidents		
Description: An event, incident, or condition that could have resulted or did result in harm to a patient. A patient safety incident can be, but is not necessarily, the result of a defective system or process design, a system breakdown, equipment failure, or human error. A Sentinel Event is a subset of patient safety incidents.		
Measure: Incidents per 1000 patient contacts		
Numerator: Number of CCT-related Patient Safety Incidents		
Denominator: Number of patient contacts		
Exclusions: Excludes issues related to the natural course of the patient's illness or underlying condition, adverse drug reactions or known complications that may result from a procedure or treatment Excludes incidents that were initiated by referring or receiving facilities outside the control of the CCT crews		
Goal: To be determined		
2	Domain: Patient Safety	Clinical Area: All
Measure Name: Patient Safety Sentinel Events		
Description: A patient safety incident that reaches a patient and results in any of the following: death, permanent harm, severe temporary harm.		
Measure: Incidents per 1000 patient contacts		
Numerator: Number of CCT-related Patient Safety Sentinel Events		
Denominator: Number of patient contacts		
Exclusions: Excludes issues related to the natural course of the patient's illness or underlying condition, adverse drug reactions or known complications that may result from a procedure or treatment Excludes incidents that were initiated by referring or receiving facilities outside the control of the CCT crews		
Goal: To be determined		
3	Domain: Patient Safety	Clinical Area: Respiratory
Measure Name: Transport-Related Hypoxia		
Description: Patients experiencing adequate oxygenation (>90% SpO2) pre and post CCT but experience hypoxia (<90% SpO2) during CCT documented pulse oximetry reading begins at, or is resuscitated to, 90% or greater and subsequently declines to below 90%. Multiple incidents with one patient are considered as one incident.		
Measure: Incidents per 1,000 patient contacts		
Numerator: Number of patient contacts during which the hypoxia occurred		
Denominator: Number of patient contacts where SpO2 was > 90% prior to CCT assuming care		
Exclusions: Excludes issues related to the natural course of the patient's illness or underlying condition Excludes encounters where the SpO2 is never at or above 90%, either by design, by chronic health state, or by current physiology		
Goal: To be determined		
4	Domain: Patient Safety	Clinical Area: Medical/Trauma Bleeding
Measure Name: Blood Product/Transfusion Errors and Adverse Reactions		
Description: The following occurred during CCT team administration of blood products:		
▪ Administered incorrectly ▪ Adverse transfusion reaction ▪ Expired/deteriorated product ▪ Wrong ABO Rh type	▪ Wrong IV fluid administered with product ▪ Wrong number of units ▪ Wrong patient, rate, time, or use of product ▪ Failure to recognize or respond appropriately to transfusion reaction	
Measure: Occurrences per 1000 units of blood products administered		
Numerator: Number of CCT-related blood/transfusion incidents or events		
Denominator: Number of units of blood products initiated by CCT crew		
Exclusions: Excludes issues related to the natural course of the patient's illness or underlying condition Excludes incidents that were initiated by referring or receiving facilities outside the control of the CCT crews		
Goal: To be determined		

5	Domain: Patient Safety	Clinical Area: Environment/Equipment
Measure Name: Environmental / Equipment Conditions		
Description: Any patient incident or event caused by the following equipment conditions: ▪ Contaminated ▪ Failure ▪ Functioned or used other than as intended ▪ Unavailable/missing ▪ Operated incorrectly ▪ Unintended hypo/hyperthermia		
Measure: Incidents per 1000 patient contacts		
Numerator: Number of CCT-related Environmental/Equipment incidents or events (may be more than one per patient contact)		
Denominator: Number of patient contacts		
Exclusions: Excludes occasions where equipment is assessed as failed, contaminated, or unavailable unrelated to a patient transport (i.e. during a daily equipment check)		
Goal: To be determined		
6	Domain: Patient Safety	Clinical Area: Environmental - Neonate
Measure Name: Unintended Neonatal Hypothermia		
Description: Infants (< 29 days old) without significant hypothermia prior to CCT with admission temperatures less than 36.5oC axillary at destination.		
Measure: Incidents per 1000 patient contacts		
Numerator: Number of infants found hypothermic		
Denominator: Number of transported neonate patients not meeting exclusion criteria		
Exclusions: Excludes intentional cooling (i.e. therapeutic hypothermia) and patients with profound hypothermia prior to transport		
Goal: To be determined		
7	Domain: Patient Safety	Clinical Area: Patient Movement
Measure Name: Patient Falls/Drops		
Description: While in the care of the CCT team the patient experiences: ▪ All patient falls or dropping of patients ▪ Dropping equipment onto patient causing pain, skin integrity impairment, bruising or fracture		
Measure: Incidents per 1000 patient contacts		
Numerator: Number of CCT-related patient falls/drops (may be more than one per patient contact)		
Denominator: Number of patient contacts		
Exclusions: Excludes incidents that were initiated by referring or receiving facilities outside the control of the CCT crews		
Goal: To be determined		
8	Domain: Patient Safety	Clinical Area: Vascular Access
Measure Name: Infiltration/Vascular Access Related		
Description: Medication infiltrations (as infusions or IV push medications) via peripheral inserted central catheter, central venous catheter, peripheral intravenous line, intrathecal, or intraosseous line		
Measure: Occurrences per 1000 medication administrations via included routes		
Numerator: Number of CCT-related infiltration / vascular access related incidents or events		
Denominator: Number of drug infusions via vascular access initiated by CCT crews during patient contact		
Exclusions: Excludes incidents that were initiated referring or receiving facilities outside the control of the CCT crews		
Goal: To be determined		

9	Domain: Patient Safety	Clinical Area: Therapeutic Devices
Measure Name: Unplanned removal/dislodgement of therapeutic device		
Description: Unplanned dislodgements of therapeutic devices that were in place when CCT assumes primary care of the patient through hand off of care at destination. Therapeutic devices include, but are not limited to the following: peripheral IV, intraosseous line, UAC/UVC, central venous catheters, arterial lines, advanced airway, tracheostomy tubes, chest tubes, urinary catheters, epicardial wires, surgical drains, G-tubes, J-tubes, etc.		
Measure: Occurrences per 1000 patient contacts where applicable devices were in place prior to transfer of care to CCT providers or were inserted by CCT providers		
Numerator: Number of unplanned removals/dislodgements of therapeutic devices (may be more than 1 per patient contact)		
Denominator: Number of patient contacts where therapeutic devices were in place during care of CCT team		
Exclusions: Does not include intended removal of any device due to malfunction or misplacement or due to improving device (e.g., removal of supraglottic airway with significant air leak to place an endotracheal tube)		
Goal: To be determined		
10	Domain: Patient Safety	Clinical Area: Care Management
Measure Name: Care Management		
Description: Through medical director review of CCTs, notification from involved medical facilities, or self-report at least one of the following incidents are discovered: ▪ Delay in treatment ▪ Wrong treatment ▪ Omitted treatment ▪ Incorrect response to resuscitation status ▪ Infection introduction ▪ Intravascular air embolism		
Measure: Incidents per 1000 patient contacts		
Numerator: Number of CCT-related management of care incidents or events		
Denominator: Number of patient contacts		
Exclusions: Excludes issues related to the natural course of the patient's illness or underlying condition, adverse drug reactions or known complications that may result from a procedure or treatment Excludes incidents that were initiated by referring or receiving facilities outside the control of the CCT crews		
Goal: To be determined		
11	Domain: Patient Safety	Clinical Area: Medication Administration
Measure Name: Medication Administration		
Description: Includes medications administered by CCT team where at least one of the follow incidents occurred: ▪ Wrong dose/quantity ▪ Drug-drug interaction ▪ Expired medication administered ▪ Medication incompatibility with IV fluids ▪ Wrong concentration ▪ Wrong medication: known allergy ▪ Wrong med for clinical condition ▪ Wrong patient, rate, route or time		
Measure: Occurrences per 1000 medications administered		
Numerator: Number of CCT-related medication administration incidents or events		
Denominator: Number of medication administrations initiated by CCT crews during patient contact		
Exclusions: Excludes previously unknown or unavailable medication allergy information (e.g., unknown and unresponsive patient with no family present) Excludes incidents that were initiated by referring or receiving facilities outside the control of the CCT crews		
Goal: To be determined		

12	Domain: Patient Safety	Clinical Area: Skin Integrity
Measure Name: Pressure ulcers/skin integrity		
Description: Any of the following skin integrity impairments resulting from CCT: ▪ Pressure ulcers ▪ Tears ▪ Abrasions ▪ Lacerations ▪ Burns		
Measure: Occurrences per 1000 patient contacts		
Numerator: Number of CCT-related skin integrity incidents or events (may be more than one per patient contact)		
Denominator: Number of patient contacts		
Exclusions: Excludes issues related to the natural course of the patient's illness or underlying condition Excludes incidents that were initiated by referring or receiving facilities outside the control of the CCT crews		
Goal: To be determined		
13	**Domain: Patient Safety**	**Clinical Area: Patient Safety/Security**
Measure Name: Safety/Security		
Description: Any of the following occurring during or related to the CCT process: ▪ Vehicle crash ▪ Improper or non-use of patient restraint systems ▪ Disappearance/elopement ▪ Homicide ▪ Improper biohazard disposal ▪ Physical assault of patient or staff ▪ Self-inflicted harm ▪ Sexual misconduct – abuse or assault ▪ Suicide/attempted suicide		
Measure: Occurrences per 1,000 patient contacts		
Numerator: Number of CCT-related safety / security incidents or events		
Denominator: Number of patient contacts		
Exclusions: Excludes issues related to the natural course of the patient's illness or underlying condition Excludes incidents that were initiated by referring or receiving facilities outside the control of the CCT crews		
Goal: To be determined		
14	**Domain: Patient Safety**	**Clinical Area: Procedures**
Measure Name: Surgical / Invasive Procedures		
Description: Any of the following incidents resulting from CCT: ▪ Anesthesia/induction-related ▪ Wrong side/site ▪ Site contamination ▪ Unexpected adverse death during/within 24 hours ▪ Unexpected injury/complication/serious disability ▪ Wrong patient		
Measure: Occurrences per 1000 surgical/invasive procedures		
Numerator: Number of CCT-related surgical/invasive procedure incidents or events (may be more than one per patient contact)		
Denominator: Number of surgical/invasive procedures initiated by CCT crews during patient contact		
Exclusions: Excludes issues related to the natural course of the patient's illness or underlying condition Excludes incidents that were initiated by referring or receiving facilities outside the control of the CCT crews		
Goal: To be determined		

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Appendix 8: Definitions & Acronyms

AAP: American Academy of Pediatrics

ACLS: Advanced Cardiac Life Support

AHA: American Heart Association

AMPA: Air Medical Physicians Association

APRN: Advanced Practice Registered Nurse

BCLS: Basic Cardiac Life Support

CAMTS: Commission on Accreditation of Medical Transport Systems

CCP-C: Critical Care Paramedic- Certified

CCT: Critical Care Transport

CCTA: Critical Care Transport Agency

CCTV: Critical Care Transport Vehicle

CFRN: Certified Flight Registered Nurse

CNPT: Certified Neonatal Pediatric Transport

Critical Care Transport: The provision of medical care by a critical care team to a patient requiring critical care transport by a critical care transport agency such that the failure to initiate on an urgent basis, or maintain during transport, acute medical interventions, pharmacological interventions, or technologies would likely result in sudden, clinically significant or life threatening deterioration in the patient's condition.

Critical Care Transport Agency: An organization licensed established to provide critical care transport between hospitals.

Critical Transport Provider: Caregiver whom by evidence of education, training, licensure, applicable experience, certification, and credentialing is able to provide acute medical interventions, pharmacology, and technical life support systems exceeding those able to be provided by the national scope of practice of a paramedic as currently defined by National Highway Traffic Safety Administration's (NHTSA) National EMS Scope of Practice Model, DOT HS 810 657, February 2007.

CTRN: Certified Transport Registered Nurse

Critical Care Transport Specialist: A critical care transport provider has achieved mastery of the entry-level transport provider requirements and demonstrates strong knowledge, application and critical thinking in the critical care transport environment. Critical Care Transport specialists will have obtained a minimum number or critical care transport hours and have certification in critical care transport.

Critical Care Transport Team: Critical care transport services are delivered by a critical care transport team with the requisite decision making skills of high complexity to assess, manipulate, and support vital organ system failure and/or to prevent further life threatening deterioration of the patient's condition during transport.

ECMO: Extracorporeal Membrane Oxygenation

EURAMI: European Aero-Medical Institute

FP-C: Flight Paramedic Certified

HROB: High Risk Obstetrical

ILCOR: International Liaison Committee on Resuscitation

Intensive Care Unit: An intensive care unit in which concentrated special equipment and skilled personnel are available for the care of seriously ill patients requiring immediate and continuous attention.

Interchangeability: The capability to transfer patients between scenes of emergencies, ambulances and hospitals as well as between hospitals, including transport between countries, providing continuous patient care, treatment and monitoring

Interface: The place of interaction between one or more of the medical devices, the ambient conditions, the user, the patient, and when relevant, the various kinds of ambulance vehicles

Interoperability: The ability to connect various medical devices that are attached to patients, to connections of associated medical devices including the possibility of connecting powered medical devices to various kinds of ambulance vehicles

Medical device: Instruments, apparatus, appliances, material or other article, whether used alone or in combination, including software necessary for its proper application intended by the manufacturer to be used on patients for the purpose of diagnosis, prevention, monitoring, treatment or alleviation of disease and injury.

NRP: Neonatal Resuscitation Program

NICU: Neonatal Intensive Care Unit

Neonatal Intensive Care Unit: An intensive-care unit specializing in the care of ill or premature newborn infants. This unit is typically directed by one or more neonatologists and staffed by nurses, advanced practice nurse practitioners, pharmacists, physician assistants, resident physicians, and respiratory therapists trained in newborn critical care.

PALS: Pediatric Advanced Life Support

Patient Compartment: A defined space which provides the possibility to accommodate and transport one or more patient(s), medical crew, medical devices, systems and installations which are required during transport to properly treat and care for the patient.

Patient treatment area: The space located within the patient compartment, which is required to accommodate a patient on a stretcher as well as the minimum space in the vicinity of the stretcher enabling the medical crew to properly care and treat a patient

Patient Requiring Critical Care Transport: A patient requiring critical care transport has a critical illness or injury that acutely impairs one or more vital organ systems such that there is a high probability of imminent or life threatening deterioration in the patient's condition during transport.

Pediatric Intensive Care Unit: A unit within a hospital specializing in the care of critically ill infants, children, and teenagers. The unit is typically directed by one or more pediatric intensivists and staffed by physicians, nurses, and respiratory therapists who are specially trained and experienced in pediatric critical care. The ratio of professionals to patients is generally higher than in other areas of the hospital, reflecting the high acuity of patients and the risk of life-threatening complications. Complex technology and equipment is often in use, particularly mechanical ventilators and patient monitoring systems.

PICU: Pediatric Intensive Care Unit

PA: Physician Assistant

Quaternary Care: sometimes used as an extension of tertiary care in reference to advanced levels of medicine which are highly specialized and not widely accessed. Experimental medicine and some types of uncommon diagnostic or surgical procedures are considered quaternary care.

RN: Registered Nurse

RT: Registered Respiratory Therapist

Tertiary Intensive Care: The most specialized intensive care administered to critically ill patients with severe or complex disease or injury requiring high-risk pharmacologic regimens, surgical procedures, or high-tech and advanced resources. Often associated with teaching institutions and requires sophisticated technology and multiple specialty resources.

TPATC: (formerly TNATC) Transport Provider Advanced Provider Course.

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The Association of Critical Care Transport (ACCT) is a non-profit grassroots patient advocacy organization committed to ensuring that critically ill and injured patients have access to the safest and highest quality critical care transport system possible. ACCT is comprised of air and ground critical care transport providers, business organizations, associations, and individuals all striving to provide our communities, hospitals and EMS partners in care, regulators, and policy makers with a path toward a safer and fully integrated critical care transport system that revolves around the needs of the patients.

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