

2019 PROVINCIAL GUIDELINE

Pre-hospital Triage and Transport Guidelines for Adult and Pediatric Major Trauma in British Columbia



BCEHS | BC Emergency Health Services
Provincial Health Services Authority

Trauma Services BC
A service of the Provincial Health Services Authority

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Foreword

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To:

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Regional Health Authority Trauma Program Operations
Regional Medical Directors, BC Emergency Health Services
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Developed as a collaboration between BC Emergency Health Service (BCEHS) and Trauma Services BC (TSBC), this guideline describes the decision making framework for pre-hospital triage and transport of acute major trauma from the scene of injury to initial hospital assessment and stabilization in British Columbia.

This guideline was produced by the Joint BCEHS-TSBC Trauma Working Group and references best evidence including the consensus derived *Guidelines for Pre-hospital Triage of Injured Patients* produced by the U.S. Department of Health and Human Services and Centers for Disease Control and Prevention in 2011, as current best practice. The guideline is endorsed by both BCEHS and TSBC on behalf of BC's five Regional Trauma Programs representing their respective health authorities.

Special accolades to the exceptional work done by Dr. Wilson Wan, Dr. Sandra Jenneson and Beide Bekele in completing this guideline.

Introduction

British Columbia has an inclusive trauma system within which all acute care hospitals play a designated role in the care of the injured patient. Because of B.C.'s expansive and challenging geography, all acute care facilities must be prepared to receive, assess and stabilize major trauma from the field. Level 5 trauma hospitals are generally located in rural and remote regions and provide basic stabilization with the expectation that major trauma will be transferred forward expeditiously from these centres to a higher level of care at an appropriate Lead Trauma Hospital (LTH). Lead Trauma Hospitals are designated trauma centres that serve defined regional catchment areas. By definition, LTH's are capable of and expected to provide definitive care for the vast majority of appropriately referred major trauma patients.

This document defines a provincial pre-hospital trauma triage and transport guideline to be utilized by BCEHS paramedics and dispatchers. It is intended that the Regional Trauma Programs will adapt this guideline to particular geographic and access challenges, resource availability, and other regionally specific needs. Each Regional Trauma Program will specify appropriate referral hospitals, bypass criteria, and no-refusal policies for reception of the major trauma patient from the field.

Given the evolving nature of clinical trauma care and inherent changes within individual health authorities, this document will be reviewed and updated regularly as outlined in the *Management of EMS Guidelines and Procedures for Major Trauma*.

Adult and Pediatric Pre-hospital Trauma Triage Guidelines – Principles

Pre-hospital triage guidelines offer a framework to ensure that acutely injured patients sustaining major trauma are directed to a medical facility capable of providing appropriate care within an acceptable timeframe. Lead Trauma Hospitals are designated trauma centres that serve defined regional catchment areas (Appendix A).

The criteria cited below reasonably identify the major trauma patients and should be applied by paramedics responding at the scene of injury. Adult and pediatric patients meeting these criteria should be directed to the most appropriate trauma receiving hospital as indicated by regionally adapted pre-hospital triage guidelines. The pre-hospital trauma triage standard includes a four (4) step decision process:

- **Step One: Physiological**
- **Step Two: Anatomical**
- **Step Three: Mechanism of Injury**
- **Step Four: Special Considerations**

Steps 1 and 2 are designed to identify the most seriously injured patients. These patients should be transported to LTHs.

The criteria used for bypass to a LTH in Steps 3 and 4 are not absolute; but rather indicators of the potential for significant injury or need for the specific support services at the LTHs. Not all patients in these two categories require transport to a LTH and paramedics should use clinical judgement to determine the need for direct transport to a LTH.

Patients in traumatic arrest should be treated according to the BCEHS traumatic arrest protocol (Appendix B).

Step One – Physiological

Step 1 is to allow for measurement of a critically injured trauma patient's level of consciousness and vital signs. These indicators directly demonstrate with high predictive value the severity of injury and the need to be preferentially transported to a LTH for a higher level of care.

If a paramedic is unable to successfully manage the airway in the trauma patient, the patient should be transported to the nearest Emergency Department.

Adult and pediatric patients who meet any of the following physiological criteria should be transported directly to the nearest LTH.

Adult Trauma Patient:

- GCS \leq 13
- Systolic blood pressure < 90 mmHg
- Respiratory rate < 10 or > 30 breaths per minute or need for ventilatory support

Pediatric Trauma Patient (Appendix C):

- GCS \leq 13
- Abnormal vital signs (HR, RR, SBP) for age or need for ventilatory support

If these criteria have not been met, proceed to Step 2.

In certain cases, the distance or transport time from scene to LTH may be too great given the geographical challenges within the province. As such, regional destination guidelines (Appendix F) may dictate that patients who meet physiological criteria be initially transported to the nearest emergency department. CliniCall or EPOS physician consultation can be obtained for further advice in these situations as necessary.

Step Two – Anatomical

In Step 2, patients do not have abnormal physiologic criteria present but may have obvious major injuries that indicate a moderate risk for clinical deterioration or probable need for definitive surgical management at a LTH.

Adult and pediatric patients who meet any of the following anatomical criteria should be transported directly to the nearest LTH.

- Open or depressed skull fracture
- New paralysis or neurological deficits
- Major penetrating injury (defined as all penetrating injuries to head, neck, torso and extremities proximal to elbow or knee) **
- Facial injury with potential airway compromise
- Two or more proximal long-bone fractures
- Crushed, de-gloved, mangled or pulseless extremity
- Amputation proximal to wrist or ankle
- Chest wall instability or deformity (e.g. flail chest)
- Major burns (defined as partial thickness burns > 20%, full thickness burns > 10% (> 2% for pediatrics), facial or airway burns with or without inhalation injury, 3rd degree burns involving the eyes, neck, hands, feet or groin, high voltage electrical burns)
- Mechanically unstable pelvic fractures

** Patients with a major penetrating injury in traumatic arrest with vital signs absent (VSA) are to be managed by the BCEHS traumatic arrest protocol, and should immediately be transported directly to LTH (preferentially) or closest emergency department, if the time from loss of pulse and respiration to hospital is LESS THAN 15 minutes. Otherwise, EPOS consultation should be obtained for decision to transport or discontinuation of resuscitation.

Similar to Step 1, regional destination guidelines (Appendix F) may dictate that patients who meet anatomical criteria be initially transported to the nearest emergency department due to great distances or transport time to LTH. CliniCall or EPOS physician consultation can be obtained for further advice in these situations as necessary.

If these criteria have not been met, proceed to Step 3.

Step Three – Mechanism

The mechanism of injury (MOI) should be evaluated as some injuries may be occult or in pathophysiological evolution and are more severe. The evaluation of the MOI will assist in determining if the patient should be transported to a LTH. This factor helps to reduce the possibility of under triage.

Adult and pediatric patients with any of the following criteria should be preferentially transported to a LTH if any of the following are present:

- 1) Falls
 - a) Adults \geq 6 metres (one story is equal to 3 metres)
 - b) Children \geq 3 metres or two to three times the height of the child

- 2) High Risk Automobile Crash
 - a) Intrusion \geq 0.3 metres occupant site; \geq 0.5 metres any site, including the roof
 - b) Ejection (partial or complete) from automobile
 - c) Death in the same passenger compartment
 - d) Vehicle telemetry data consistent with high risk for injury (if available)
- 3) Auto vs. pedestrian/bicyclist thrown, run over or with significant (\geq 30 km/h) impact
- 4) Motorcycle crash \geq 30 km/h

CliniCall or EPOS physician consultation can be obtained for advice if required in the decision making process.

If these criteria have not been met, proceed to Step 4.

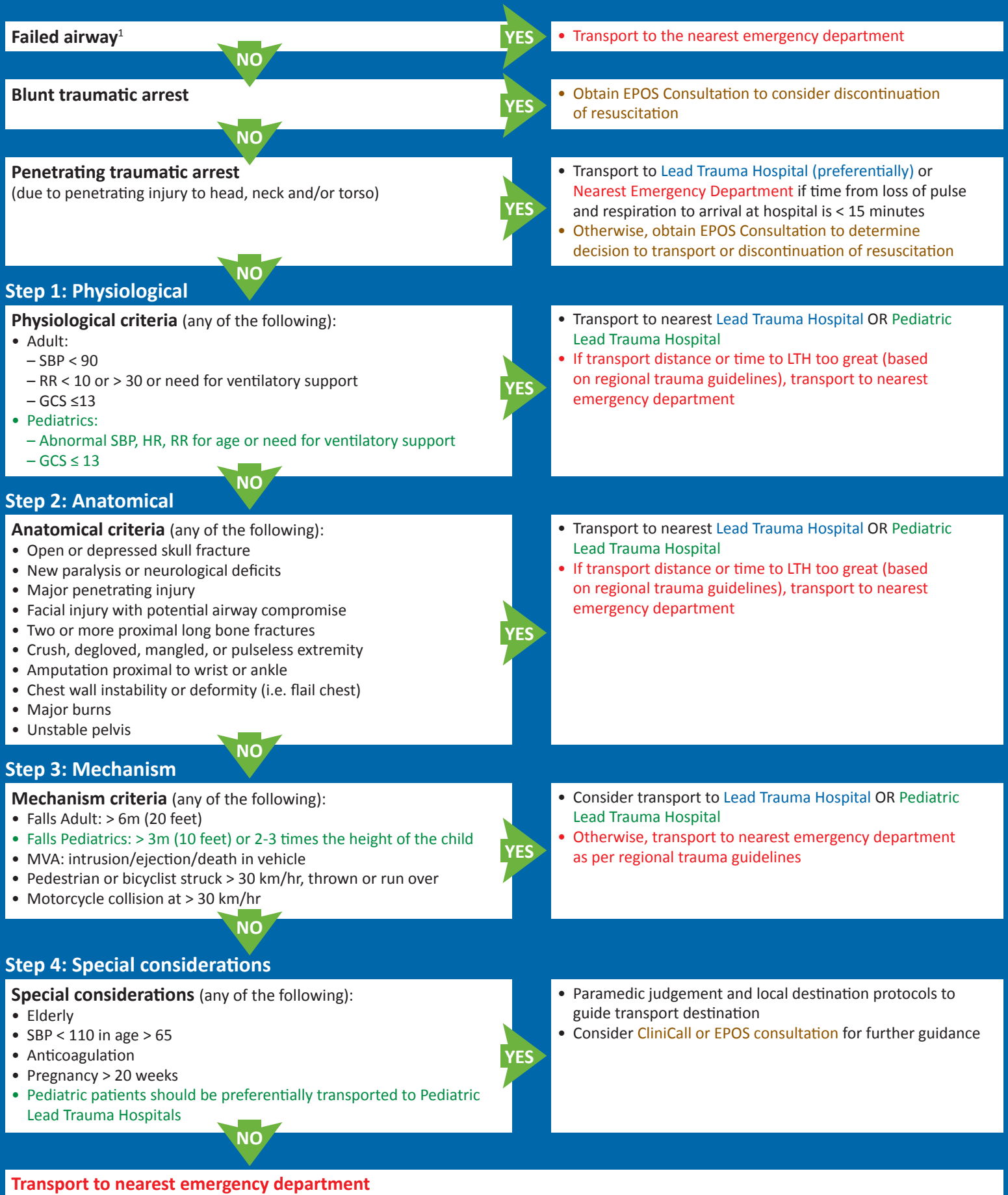
Step Four – Special Considerations

Patients may have underlying conditions that could put them at a greater risk for severe injury. These criteria are indicators of the potential for significant injury or indicate that the patient may require other support services available at the LTH. Patients who meet any of these criteria are recommended to be transported to a LTH or to a hospital that is capable of a complete evaluation and timely treatment.

Paramedic judgement and local destination or bypass protocols can be used to help determine transport destination. CliniCall or EPOS physician consultation can be obtained for advice if required in the decision making process.

- 1) Age
 - Older adults
 - Risk of injury/death increases after age 55
 - SBP <110 may represent shock after age 65
 - Children
 - Should be triaged preferentially to a pediatric-capable trauma centre
- 2) Anticoagulation and bleeding disorders
- 3) Burns with trauma mechanism
- 4) Pregnancy \geq 20 weeks

If these criteria have not been met, transport the patient to the closest, most appropriate emergency department.



Failed airway¹

YES

- Transport to the nearest emergency department

NO

Blunt traumatic arrest

YES

- Obtain EPOS Consultation to consider discontinuation of resuscitation

NO

Penetrating traumatic arrest

(due to penetrating injury to head, neck and/or torso)

YES

- Transport to **Lead Trauma Hospital (preferentially)** or **Nearest Emergency Department** if time from loss of pulse and respiration to arrival at hospital is < 15 minutes
- Otherwise, obtain EPOS Consultation to determine decision to transport or discontinuation of resuscitation

NO

Step 1: Physiological

Physiological criteria (any of the following):

- Adult:
 - SBP < 90
 - RR < 10 or > 30 or need for ventilatory support
 - GCS ≤ 13
- Pediatrics:
 - Abnormal SBP, HR, RR for age or need for ventilatory support
 - GCS ≤ 13

YES

- Transport to nearest **Lead Trauma Hospital OR Pediatric Lead Trauma Hospital**
- If transport distance or time to LTH too great (based on regional trauma guidelines), transport to nearest emergency department

NO

Step 2: Anatomical

Anatomical criteria (any of the following):

- Open or depressed skull fracture
- New paralysis or neurological deficits
- Major penetrating injury
- Facial injury with potential airway compromise
- Two or more proximal long bone fractures
- Crush, degloved, mangled, or pulseless extremity
- Amputation proximal to wrist or ankle
- Chest wall instability or deformity (i.e. flail chest)
- Major burns
- Unstable pelvis

YES

- Transport to nearest **Lead Trauma Hospital OR Pediatric Lead Trauma Hospital**
- If transport distance or time to LTH too great (based on regional trauma guidelines), transport to nearest emergency department

NO

Step 3: Mechanism

Mechanism criteria (any of the following):

- Falls Adult: > 6m (20 feet)
- Falls Pediatrics: > 3m (10 feet) or 2-3 times the height of the child
- MVA: intrusion/ejection/death in vehicle
- Pedestrian or bicyclist struck > 30 km/hr, thrown or run over
- Motorcycle collision at > 30 km/hr

YES

- Consider transport to **Lead Trauma Hospital OR Pediatric Lead Trauma Hospital**
- Otherwise, transport to nearest emergency department as per regional trauma guidelines

NO

Step 4: Special considerations

Special considerations (any of the following):

- Elderly
- SBP < 110 in age > 65
- Anticoagulation
- Pregnancy > 20 weeks
- Pediatric patients should be preferentially transported to Pediatric Lead Trauma Hospitals

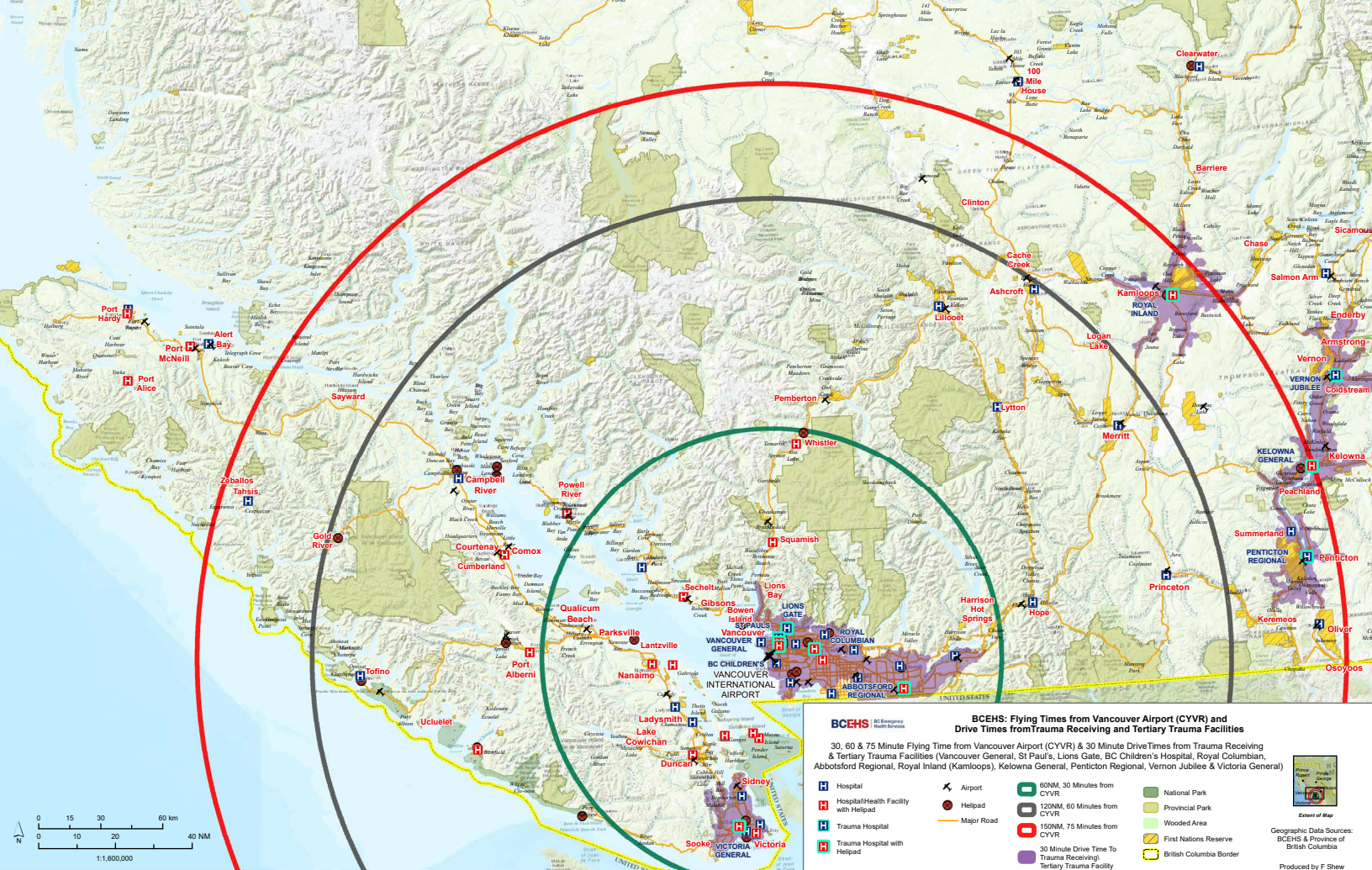
YES

- Paramedic judgement and local destination protocols to guide transport destination
- Consider **CliniCall** or **EPOS consultation** for further guidance

NO

Transport to nearest emergency department

¹. Failed airway = failure to maintain patency by ANY means. If you can oxygenate/ventilate, then it is not a failed airway.



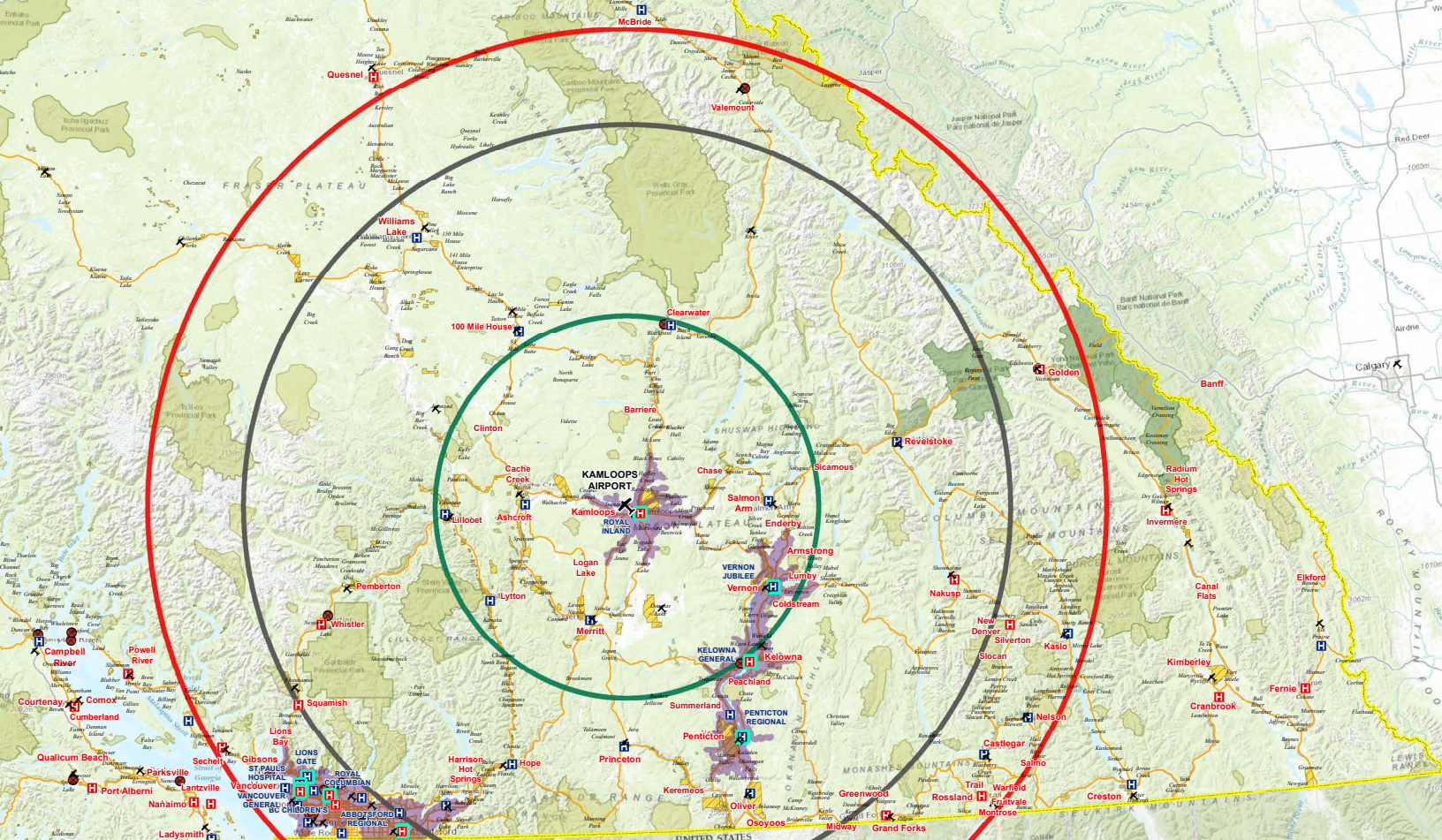
Helicopter Flight Range from Vancouver

Map Credit: Frances Shew, Corporate Data Analyst (GIS), BCEHS

Air Ambulance Utilization Guideline – Introduction

The BCEHS Critical Care Transport Program provides specialized, emergency patient care and transport for the critically injured trauma patient across the province. “Auto-Launch” is an innovative, life-saving protocol that helps ensure that patients with life-threatening injuries are transported to a trauma centre as quickly as possible. The Auto-Launch protocol simultaneously dispatches both a ground ambulance and a helicopter with a critical care transport crew based on information provided from the scene by 911 callers.

The Auto-Launch program is available within the flight ranges of dedicated helicopters located in Vancouver and Kamloops. The helicopter has a flight range of approximately 300 nautical miles without refueling at a speed of 115 nautical miles per hour. As such, the deployment area is considered to be within 60-75 flight minutes for Auto-Launch calls.



BCEHS BC Emergency Health Services

BCEHS: Flying Times from Kamloops Airport (CYKA) and Drive Times from Trauma Receiving and Tertiary Trauma Facilities

30, 60 & 75 Minute Flying Time from Kamloops Airport (CYKA) & 30 Minute Drive Times from Trauma Receiving & Tertiary Trauma Facilities (Vancouver General, St Paul's, Lions Gate, BC Children's Hospital, Royal Columbian, Abbotsford Regional, Royal Inland (Kamloops), Kelowna General, Pentiction Regional, Vernon Jubilee & Victoria General)

- Hospital
- Hospital/Health Facility with Helipad
- Trauma Hospital
- Trauma Hospital with Helipad
- Airport
- Helipad
- Major Road
- 60NM, 30 Minutes from CYKA
- 120NM, 60 Minutes from CYKA
- 150NM, 75 Minutes from CYKA
- 30 Minute Drive Time To Trauma Receiving/Tertiary Trauma Facility
- British Columbia Border
- First Nations Reserve
- National Park
- Provincial Park
- Wooded Area

Scale: 0 15 30 60 km / 0 10 20 40 NM / 1:2,000,000

Geographic Data Sources: BCEHS & Province of British Columbia

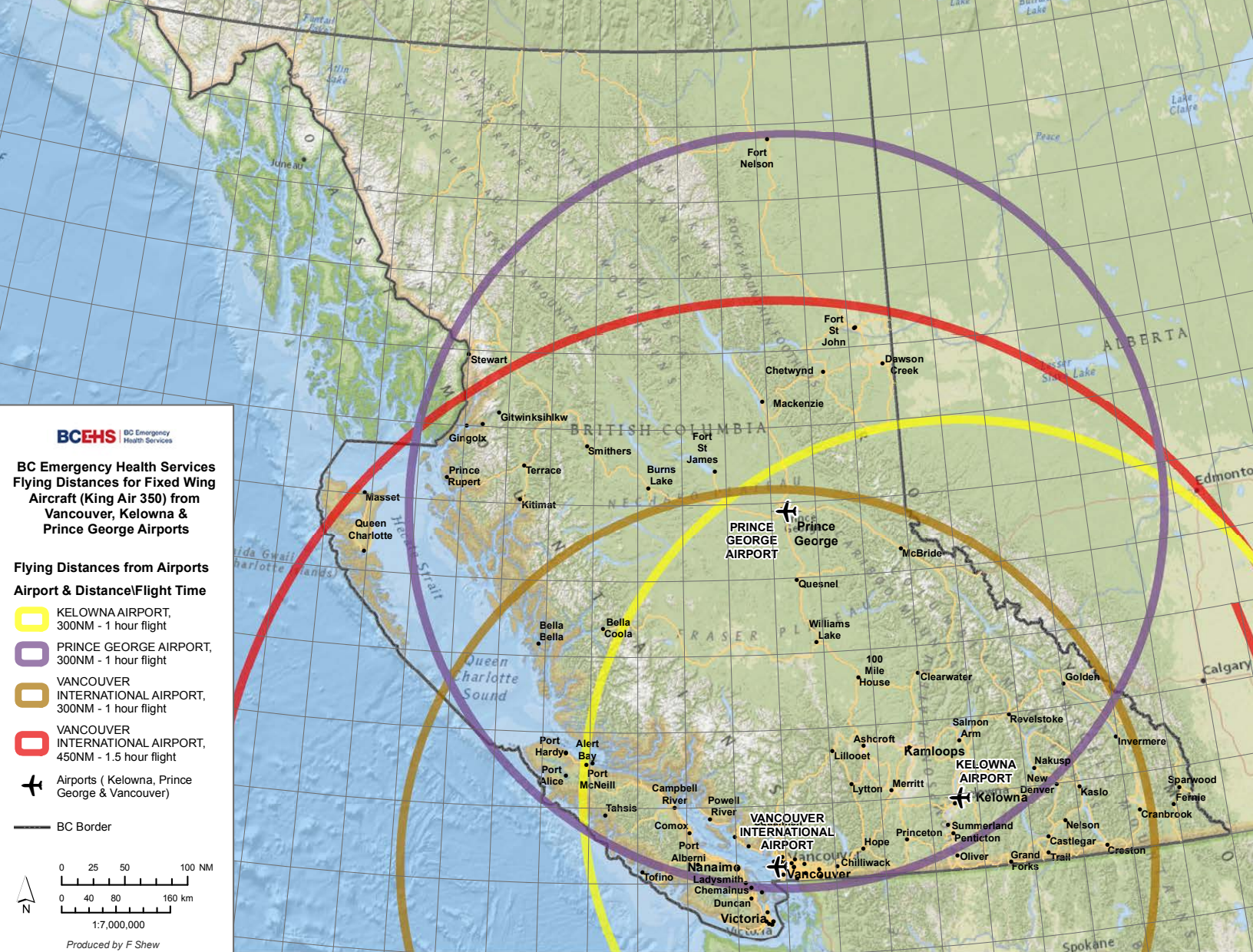
Produced by F Shew

Helicopter Flight Range from Kamloops

Map Credit: Frances Shew, Corporate Data Analyst (GIS), BCEHS

The East Kootenay Auto-Launch is a version of Auto-Launch program modified for the East Kootenay Health service area that utilizes both BCEHS and STARS (Shock Trauma Air Rescue Society via Alberta Air Ambulance) resources and consists of both helicopter and fixed-wing responses. Region specific details on the Auto-Launch protocol can be found in Appendix D.





Fixed Wing Flying Times and Distances

Map Credit: Frances Shew, Corporate Data Analyst (GIS), BCEHS

Requests for air ambulance trauma responses outside the Auto-Launch prescribed operating areas should be considered for an Early Fixed Wing Launch (EFWL). EFWL provides a primary fixed-wing resource for areas of BC that are not accessible by the Auto-Launch program to improve transfer times for trauma patients. The EFWL program relies on aircraft that are based in Vancouver, Kelowna and Prince George.

The EFWL program includes geographic areas serviced by the Northern Health Authority, Island Health Authority (northern Vancouver Island), Interior Health Authority (communities outside Station 370 and STARS ranges), and Vancouver Coastal Health Authority (communities of Bella Bella and Bella Coola). Additionally, EFWL provides a secondary air resource, when appropriate, for areas covered by Auto-Launch but where the dedicated helicopter is unavailable for patient transfer.

Helicopter On-Scene Response for Trauma Patients (Auto-Launch Protocol)

Auto-Launch is a dispatch protocol and is the automatic dispatching of dedicated helicopters with a critical care transport (CCT) crew to a specific set of MPDS criteria.

The following two criteria must be met by a patient to qualify for an air ambulance on scene response:

Criteria #1: MPDS Auto-Launch criteria AND

Criteria #2: Meeting the continuation criteria AND / OR The patient is not accessible within a reasonable treatment window.

When Criteria #1 is met, based on the 911 call information and MPDS coding, the helicopter will be launched directly to the scene. Once the ground ambulance crew arrives at scene, they will assess for continuation criteria (Criteria #2). If the patient meets the continuation criteria, the helicopter will continue to the scene. If the patient is not accessible by ground ambulance within a reasonable treatment window, the helicopter will continue to scene without confirmation of continuation criteria.

If the call's circumstances and patient fail to meet the continuation criteria and an air ambulance is known to be responding based on the merits of the initial request (i.e. 911 call), the ground paramedic will obtain CliniCall consultation to confirm that an on-scene response is not required.

In addition to the MPDS and continuation criteria, the transport time from accident scene to the LTH by ground ambulance must be greater than 30 minutes.

Once the CCT crew arrive at the scene and assess the patient, they may decide to:

- Transport the patient by air to the LTH
- Accompany the patient by ground with the BCEHS ground crew to the LTH
- Direct the BCEHS ground paramedics to the appropriate local hospital without the support of the CCT crew

BCEHS ground paramedics on scene may decide to cancel the Auto-Launch if:

- The patient does not meet the Auto-Launch continuation criteria
- The response time of the aircraft and CCT crew is longer than the drive time to the LTH

Criteria #1: MPDS Auto-Launch Criteria

Patients with the following dispatch MPDS coding and criteria are eligible for Auto-Launch:

Event Type Code	Description	Additional Criteria
07C03	Burns – Burns=>18% body area with or without Explosion or Fire Present	
07C04	Burns – SIGNIFICANT FACIAL burns	
07D02	Burns – Unconscious? Arrest with or without Explosion or Fire Present	
07D03	Burns – Not alert	
08D01	HAZMAT / CBRN – Unconscious or Arrest – CBRN, Smell of gas, CO, Suicide attempt or unknown	
08D02	HAZMAT / CBRN – not alert – CBRN, Smell of gas, CO, Suicide attempt or unknown	
14D01	Drowning – Unconscious or Arrest	
14D03	Drowning – Diving or suspected neck injury	
14D04	Drowning – SCUBA accident	
15D01	Electrocution – Unconscious	
15D04	Electrocution – EXTREME FALL	
15D05	Electrocution – LONG FALL	Not Alert
15E01	Electrocution – NOT BREATHING / INEFFECTIVE BREATHING	
17D01	Falls – EXTREME FALL	
17D05	LONG FALL	Not Alert
22D01	Inaccessible Incident / Other Entrapments – Mechanical /Machinery ENTRAPMENT	
22D02	Inaccessible Incident / Other Entrapments – Trench collapse	
22D03	Inaccessible Incident / Other Entrapments – Structure collapse	
22D04	Inaccessible Incident / Other Entrapments – Confined space ENTRAPMENT	
22D06	Inaccessible Incident / Other Entrapments – Mudslide / Avalanche	
27D01	Stab / GSW – unconscious or Arrest – Gunshot, Penetrating, Stab or Self inflicted	
27D03	Stab / GSW – CENTRAL wounds – gunshot, Penetrating, Stab or Self-inflicted (all sub-determinants)	
29D01	MVA - MAJOR INCIDENT	
29D02	MVA – HIGH MECHANISM	
29D04	MVA – Pinned (trapped victim)	
30D01	Traumatic Injuries – Unconscious or Arrest	
30D03	Traumatic Injuries – Chest or Neck injury	

Criteria #2: Auto-Launch Continuation Criteria

In order for the helicopter to continue to scene after ground ambulance crew arrival and assessment, one of the following criteria must be confirmed:

1) Physiological and Anatomical:

- a. GCS now less than or equal to 13
- b. Patient was unconscious but not yet returned to GCS 15
- c. Respiratory rates less than 10 or greater than 30
- d. SBP less than 90 and/or clinical signs of shock
- e. SBP less than 110 in age > 65
- f. Open or depressed skull fracture
- g. New paralysis or neurological deficits
- h. Major penetrating injury (defined as all penetrating injuries to head, neck, torso and extremities proximal to elbow or knee)
- i. Facial injury with potential airway compromise
- j. Two or more proximal long-bone fractures
- k. Crushed, de-gloved, mangled or pulseless extremity
- l. Amputation proximal to wrist or ankle
- m. Chest wall instability or deformity (e.g. flail chest)
- n. Major burns:
 - i. Partial thickness burns > 20% or full thickness burns > 10% ($\geq 2\%$ for pediatrics)
 - ii. Facial or airway burns with or without inhalation injury
 - iii. Full thickness burns involve the eyes, neck, hands, feet or groin
 - iv. High voltage electrical burns
- o. Mechanically unstable pelvic fractures

2) Mechanism Considerations (in absence of above criteria):

- a. Fall: Adult > 6 m (20 feet), Pediatrics > 3m (10 feet) or 2-3 times height of the child
- b. Intrusion, entrapment, prolonged extrication > 20 minutes
- c. Severe deceleration event, ejection from vehicle, death in same vehicle
- d. Pedestrian or bicyclist struck > 30 km/hr, thrown or run over
- e. Motorcycle collision > 30 km/hr

3) Access

- a. Obvious severe injury but unable to fully assess, or treat the patient
- b. Patient is not accessible in a reasonable treatment time window (i.e. located in isolated community or area)

Criteria for Early Fixed Wing Launch (EFWL)

Launching an early fixed-wing response is dependent on the patient meeting physiological, anatomical, or mechanism of injury indicators (see below). Activation of the EFWL is not dependent upon the proximity to the nearest non-trauma hospital.

An EFWL can only be initiated by paramedics at the trauma scene and CliniCall / EPOS physician consultation to confirm the activation. Once this occurs, dispatch will send the aircraft and will advise the sending and receiving hospitals, and PTN about the EFWL.

The Lead Trauma Hospital destination selection for the EFWL program follows the trauma referral patterns established by the respective health authorities.

Early Fixed Wing Launch Criteria

Physiologic Indicators	Anatomic Indicators	Mechanism Indicators
<ul style="list-style-type: none"> GCS \leq 13 	<ul style="list-style-type: none"> Open or depressed skull fractures 	<ul style="list-style-type: none"> Falls: Adult > 20 feet (6 metres) OR Pediatrics > 10 feet (3 metres) or more 2-3 times height of the child
<ul style="list-style-type: none"> SBP < 90 SBP < 110 in Age > 65 	<ul style="list-style-type: none"> New paralysis or neurological deficits 	<ul style="list-style-type: none"> Motor vehicle accident (ejection, intrusion, rollover, death of occupant)
<ul style="list-style-type: none"> RR < 10 or > 30 	<ul style="list-style-type: none"> Major penetrating injury 	<ul style="list-style-type: none"> Pedestrian or bicyclist struck at > 30 km/h, thrown, run over
<ul style="list-style-type: none"> Respiratory compromise or need for ventilatory support 	<ul style="list-style-type: none"> Facial injury with potential airway compromise 	<ul style="list-style-type: none"> Motorcycle collision > 30 km/hr
<ul style="list-style-type: none"> Abnormal SBP, HR, RR for age in pediatrics 	<ul style="list-style-type: none"> Two or more proximal long bone fractures 	
	<ul style="list-style-type: none"> Crushed, de-gloved, mangled, or pulseless extremity 	
	<ul style="list-style-type: none"> Amputation proximal to wrist or ankle 	
	<ul style="list-style-type: none"> Chest wall instability or deformity (e.g. Flail Chest) 	
	<ul style="list-style-type: none"> Major burns 	
	<ul style="list-style-type: none"> Unstable pelvic fracture 	

Conclusion

The introduction of the Pre-hospital Trauma Triage Guidelines and Air Ambulance Utilization Standard for Trauma in British Columbia is based on expert medical opinion guided by established existing evidence. The goal is to improve the outcomes of severely injured trauma patients by providing paramedics with the necessary criteria to apply when assessing trauma patients in the pre-hospital environment and determining the most appropriate receiving facility.

For any questions, comments or change requests, please email Trauma Services BC at tsbc@phsa.ca



Appendix A. Adult and Pediatric Lead Trauma Hospitals in British Columbia

Health Authority	Location	Name of Facility	Level
FHA	New Westminster	Royal Columbian Hospital	Level 1
	Abbotsford	Abbotsford Regional Hospital and Cancer Centre	Level 3
IHA	Kamloops	Royal Inland Hospital	Level 2
	Kelowna	Kelowna General Hospital	Level 2
	Cranbrook	East Kootenay Regional Hospital	Level 3
	Penticton	Penticton Regional Hospital	Level 3
	Trail	Kootenay Boundary Regional Hospital	Level 3
	Vernon	Vernon Jubilee Hospital	Level 3
	Williams Lake	Cariboo Memorial Hospital	Level 3
NHA	Prince George	University Hospital of Northern British Columbia	Level 3
	Fort St. John	Fort St. John Hospital	Level 4
	Quesnel	GR Baker Hospital	Level 4
	Terrace	Mills Memorial Hospital	Level 4
PHC	Vancouver	St. Paul's Hospital	Level 3
PHSA	Vancouver	British Columbia Children's Hospital (Pediatric LTH only)	Level 1
VCH	Vancouver	Vancouver General Hospital (Adult LTH only)	Level 1
	North Vancouver	Lions Gate Hospital	Level 3
VIHA	Victoria	Royal Jubilee Hospital	Level 2
	Victoria	Victoria General Hospital	Level 2
	Nanaimo	Nanaimo Regional General Hospital	Level 3

Appendix B. BCEHS Traumatic Arrest Guidelines

The BCEHS Traumatic Arrest Guidelines are found on the BCEHS handbook and online at <https://handbook.bcehs.ca/treatment-guidelines/adult-guidelines/major-trauma/traumatic-arrest/traumatic-arrest-medical-principles/>.

Traumatic Arrest Principles

Discontinue in Obvious Death:

- Transsection
- Decapitation
- Incineration
- Open skull fracture with exposed brain matter

Identify Treatable Causes:

- Tension pneumothorax
- Hypovolemia due to blood loss
- Suspected cardiac tamponade

Blunt Traumatic Arrest:

Review the history of the event carefully. It is sometimes difficult to determine if a medical event preceded the trauma or if the severe trauma resulted in the arrest.

With signs of major trauma and loss of pulse and respiration (either after the initial assessment and rapid trauma survey or during transport), you are likely dealing with a non-survivable situation.

EPOS consultation should be obtained for likely discontinuation orders.

With lower force trauma, consider medical diagnosis for the event.

Penetrating Traumatic Arrest:

This is a special situation where there may be a surgically correctable bleeding site if direct control is quickly possible.

If you are within 15 minutes anticipated time from loss of pulse and respiration to a Level 1 or 2 trauma centre, then rapid transport and pre-notification is indicated. Otherwise, EPOS consultation should be obtained to determine decision to transport or discontinuation of resuscitation.

Traumatic Arrest Intervention Guidelines

Paramedic
Practice
Level

Interventions

EMR

Discontinue in obvious death

Assess degree of injury and mechanism

Ensure open airway and provide ventilations

Low energy blunt trauma:

- CPR according to medical guidelines

High energy blunt trauma:

- CPR
- Obtain EPOS consultation for decision to discontinue resuscitation

Penetrating trauma:

- CPR
- If time from loss of pulse to arrival at Level 1 or 2 trauma centre is less than 15 minutes → immediately prepare for rapid transport
 - Otherwise, obtain EPOS consultation for decision to transport or discontinue resuscitation
- Control life threatening bleeding while facilitating transport
- Direct pressure to sites of obvious ongoing blood loss
- Application of tight tourniquet for catastrophic extremity injury with ongoing large volume blood loss

PCP

All the above, plus:

IV therapy (NS fluid challenge up to 2L)

ACP / CCP

All the above, plus:

Assess for pneumothorax

- Decompress chest with needle thoracentesis

Consider advanced airway management en-route to hospital

Appendix C. Pediatric Assessment Triangle, Pediatric Vital Signs and GCS

Normal Pediatric Vital Signs (from BCEHS Handbook)

Age	Heart Rate	Resp Rate	Systolic BP
0-1 month	100-160	40-60	50-90
3 months	100-180	30-45	65-100
6 months	100-180	25-35	70-110
12 months	100-180	25-35	70-110
2 years	80-160	20-30	70-110
3 years	80-130	20-30	75-110
4 years	70-110	18-24	80-110
6 years	70-110	18-24	80-110
8 years	70-110	18-22	80-110
10 years	70-110	18-22	80-110
12 years and older	70-110	16-20	90-120

Pediatric Glasgow Coma Scale (GCS)

Eye Opening	Verbal	Motor
4 Spontaneous	5 Coos and babbles / Oriented	6 Spontaneous / Obeys
3 To Speech	4 Irritable Cry / Confused	5 Withdraws to touch / Localizes to Pain
2 To Pain	3 Cries to Pain / Inappropriate Words	4 Withdraws to Pain
1 No Response	2 Non-specific sounds / Moans to Pain	3 Flexion / Decorticate
	1 No Response	2 Extension / Decerebrate
		1 No Response

Appendix D. Regional Specifics for Auto Launch

Region	Lead Trauma Hospital	Response Area
Kamloops Dispatch	Royal Inland Hospital Kelowna General Hospital	<ul style="list-style-type: none"> • Interior Health Authority area excluding East Kootenay • First call for responses west of Golden • “No Fly Zone” in Okanagan corridor between Vernon and Penticton (area served by trauma centres in Penticton and Vernon)
Easy Kootenay Auto-Launch	Foothills Medical Centre Alberta Children’s Hospital	<ul style="list-style-type: none"> • East Kootenay Health Service Area
Vancouver Dispatch	Vancouver General Hospital Royal Columbian Hospital BC Children’s Hospital	<ul style="list-style-type: none"> • Sea-to-Sky corridor to Pemberton • East up to Coquihalla toll booth • South down to USA Border • Sunshine coast
Vancouver Island Dispatch	Victoria General Hospital	<ul style="list-style-type: none"> • All areas of Vancouver Island from south of Sayward

The East Kootenay Auto-Launch is a version of Auto-Launch modified for the East Kootenay Health Service Area. It involves BCEHS and Alberta Air Ambulance resources, and includes both rotor-wing and fixed wing transport.

STARS (Shock Trauma Air Rescue Society via Alberta Air Ambulance) helicopter response is the primary choice for East Kootenay Auto-Launch activations (availability and weather permitting). STARS is launched at the same time as the BCEHS ground unit.

When BCEHS ground paramedics determine the patient can be transported to the nearest hospital prior to helicopter arriving on scene, the helicopter can be diverted to that hospital in anticipation of a subsequent transport to the trauma centre.

If STARS is not available or unable to fly due to weather, dispatch will decide on assigning a BCEHS or STARS fixed-wing transport for the call.

The Lead Trauma Hospital assigned to the East Kootenay Auto-Launch are Foothills Medical Centre for adult trauma and Alberta Children’s Hospital for pediatric trauma.

Appendix E. BCEHS & Trauma Program Key Contacts

Provincial Contacts

	Name	Title
Trauma Services	Dr. David Evans	Medical Director, Trauma Services BC
	Micheline Wiebe	Provincial Clinical Director, Trauma Services BC
	Beide Bekele	Program and Project Lead, Trauma Services BC
	Jaimini Thakore	Provincial Lead, Data Evaluation & Analytics, Trauma Services BC

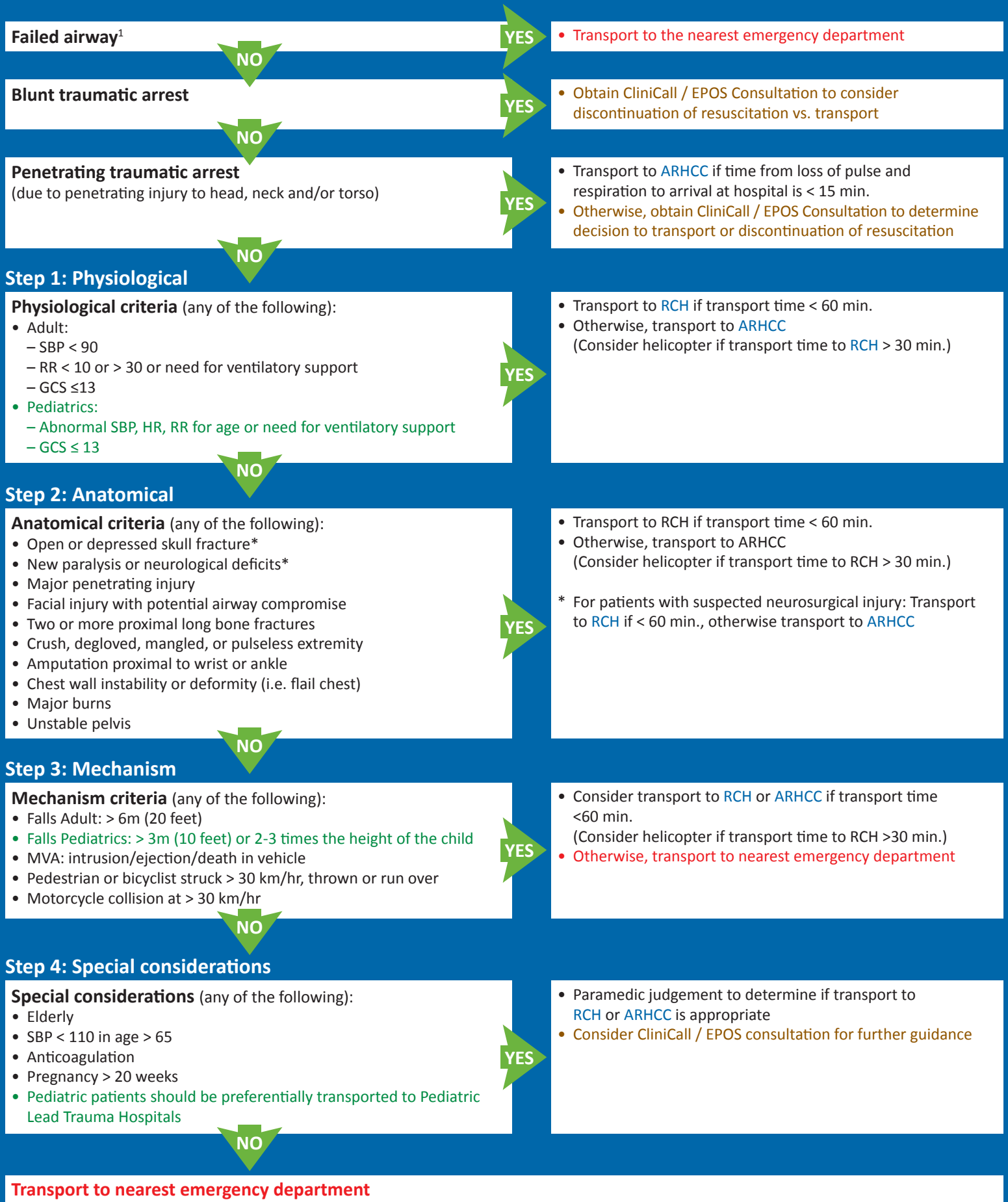
Regional Contacts

Fraser Health	Dr. Ian MacPhail	Regional Medical Director, FH / RCH Trauma
	Dr. Wilson Wan	BCEHS Regional Medical Director
	Chris Windle	Director Clinical Operations, RCH Emergency, Medicine and FH Trauma
Interior Health	Dr. Heather Wilson	Medical Director, Trauma Program
	Dr. Anders Ganstal	BCEHS Regional Medical Director
	Crystal White	IHA Operations Director
Island Health	Dr. Hans Cunningham	Medical Director, Trauma Program
	Dr. Jim Goulding	BCEHS Regional Medical Director
	John Marc Priest	Regional Manager, Trauma Services
	Anna Hill	Director for Trauma Services
Northern Health	Dr. Patrick Rowe	Medical Director, Trauma Program
	Dr. Devin Spooner	BCEHS Regional Medical Director
	Jordan Oliver	Executive Lead, Emergency and Trauma Program
Vancouver	Dr. Hazel Park	Medical Director, Trauma Program
Coastal Health	Dr. Jan Trojanowski	BCEHS Regional Medical Director
	Michelle de Moor	Regional Director, Emergency and Trauma Programs
	Ruby Syropiatko	Regional Program Lead – Emergency and Trauma
PHSA, Pediatric Trauma	Dr. Gen Ernst	Co-Medical Director, Trauma Program
	Dr. Robert Baird	Co-Medical Director, Trauma Program
	Michelle Dodds	Trauma Manager, BC Children's

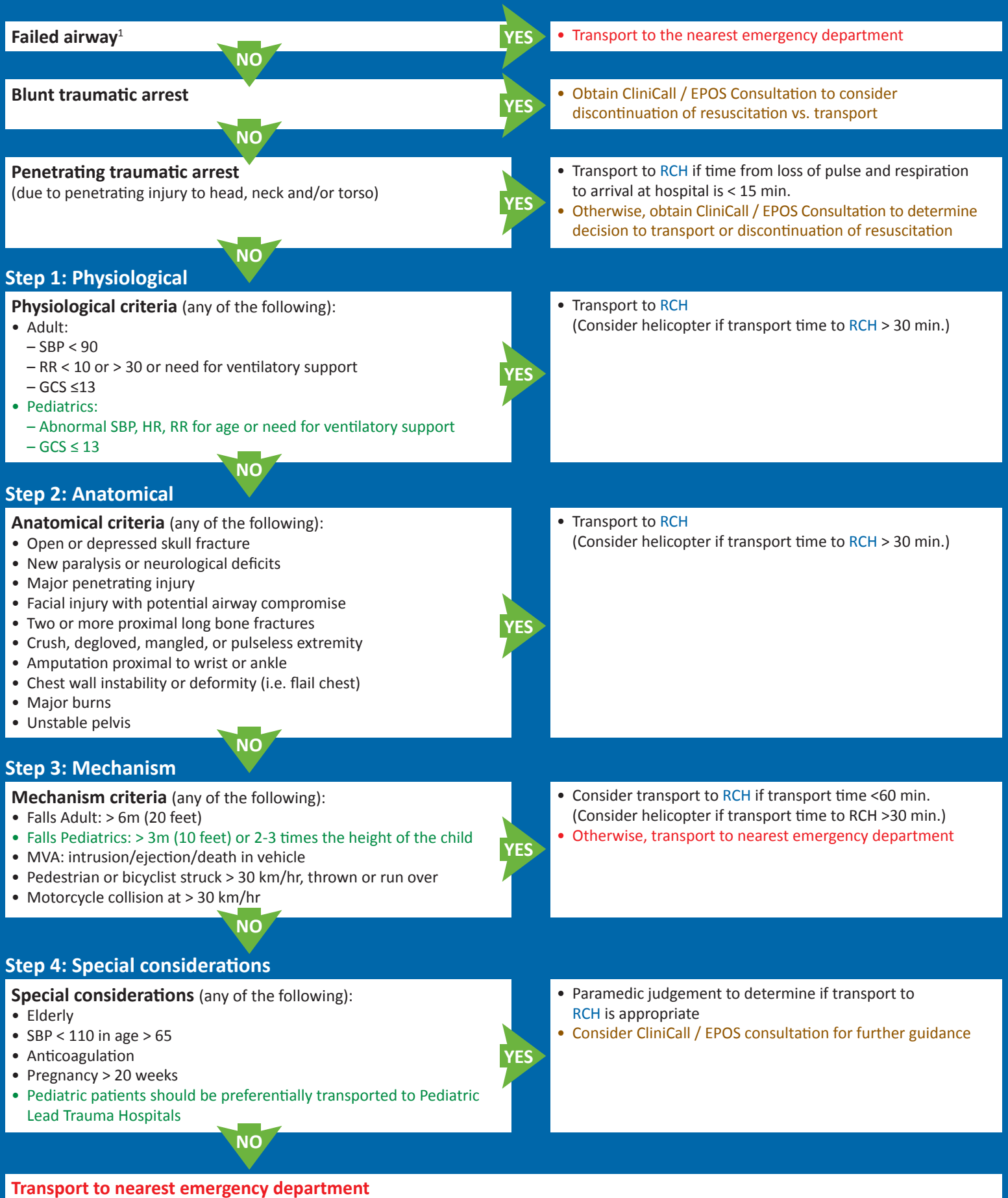
Appendix F. Pre-hospital Triage and Inter Facility Transfer Guideline by Health Authority

- Fraser Health
 - East
 - West
- Interior Health
- Island Health
- Northern Health
- Vancouver Coastal Health
 - Urban Adult
 - Pediatric
 - Rural / Remote





¹ Failed airway = failure to maintain patency by ANY means. If you can oxygenate/ventilate, then it is not a failed airway.



¹ Failed airway = failure to maintain patency by ANY means. If you can oxygenate/ventilate, then it is not a failed airway.

KEY TRIAGE POINTS

Tertiary Trauma Centres (Level 2) for transport times < 90min

- Kelowna
- Kamloops

Regional Trauma Receiving Centres (Level 3) if transport times > 90 min

- Penticton
- Vernon
- Cranbrook
- Trail
- Williams Lake

Consider Transport Resources

- BC Helicopter / STARS / Fixed wing / HART

EPOS/CliniCall if:

- Unsure, Physiologic, Anatomical, Mechanism criterion

AUTOLAUNCH Cancelling?

- MUST Consult CliniCall or EPOS

Failed airway or suspected Tension Pneumothorax
(Failed airway = failure to maintain patency by ANY means. If you can oxygenate/ventilate, then it is not a failed airway.)

YES

• Transport to the **nearest** emergency department

NO

Blunt traumatic arrest

YES

• Obtain **CliniCall / EPOS Consultation** to determine decision to likely discontinue resuscitation vs. transport

NO

Penetrating traumatic arrest
(due to penetrating injury to head, neck and/or torso)

YES

Transport time < 15 min from loss of pulse/respirations to hospital:

- Transport to nearest LEVEL 2 **Trauma Receiving Centre**

Transport time > 15 min from loss of pulse/respirations to hospital:

- Obtain EPOS Consultation to determine decision discontinue resuscitation vs. transport

NO

Step 1: Physiological

Physiological criteria (any of the following):

- Adult:
 - SBP < 90
 - RR < 10 or > 30 or need for ventilatory support
 - GCS ≤ 13
- Pediatrics:
 - Abnormal SBP, HR, RR for age or need for ventilatory support
 - GCS ≤ 13

YES

1. **Transport time < 90 min**
 - Transport to **Tertiary (Level 2) Trauma Centre**
- Transport time > 90 min**
 - Transport to **Regional (Level 3) Trauma Centre**
 - Consider BC Helicopter / STARS / Fixed wing intercept

NO

Step 2: Anatomical

Anatomical criteria (any of the following):

- Open or depressed skull fracture
- New paralysis or neurological deficits
- Major penetrating injury
- Facial injury with potential airway compromise
- Two or more proximal long bone fractures
- Crush, degloved, mangled, or pulseless extremity
- Amputation proximal to wrist or ankle
- Chest wall instability or deformity (i.e. flail chest)
- Major burns
- Unstable pelvis

YES

2. **Call EPOS/Clinical:**
 - Destination/Treatment Uncertainty
 - Patient has Physiologic, Anatomic or Mechanism Criterion
 - Change in Patient Condition
 - Multi Casualty
 - Pregnant > 20 weeks
 - Elderly
 - Pediatrics – Consider:
 1. Possible transport to: KGH, RIH, BC Children’s Hospital, Alberta Children’s Hospital
 2. Transport Intercept

NO

Step 3: Mechanism

Mechanism criteria (any of the following):

- Falls Adult: > 6m (20 feet)
- Falls Pediatrics: > 3m (10 feet) or 2-3 times the height of the child
- MVA: intrusion/ejection/death in vehicle
- Pedestrian or bicyclist struck > 30 km/hr, thrown or run over
- Motorcycle collision at > 30 km/hr

YES

If Communication Unavailable:

- **Initiate Auto-Launch**
- **Pre-notify Destination**
- **Consider ALS intercept if available**
- *****NOTE - Ensure ED / D&T / Health Centre is NOT on diversion or closed**

NO

Step 4: Special considerations

Special considerations (any of the following):

- Elderly
- SBP < 110 in age > 65
- Anticoagulation
- Pregnancy > 20 weeks
- Pediatric patients should be preferentially transported to Pediatric Lead Trauma Hospitals

YES

• Consider CliniciCall or EPOS consultation for further guidance.

NO

Transport to nearest emergency department

Island Health pre-hospital triage guidelines

The regional pre-hospital triage guidelines are currently under review and will be published shortly.

KEY TRIAGE POINTS

UHNBC Trauma Activation Number: (250) 563-0935

Additional resources and assistance when transporting a patient with major trauma:

- Initiate Early Fixed Wing Launch or Rotary Wing Auto-launch (if available in area)
- Pre-notify destination for Trauma Team Activation at 20 min prior to arrival (or at scene if transport time < 20 min)
- Consider ALS intercept if transporting to UHNBC

Call EPOS/CliniCall if:

- Uncertain about destination
- Patient's condition changes
- Multi-casualty incident (MCI)
- Paramedic disagreement about destination

****Ensure ER/D&T (Diagnostic and Treatment Centre)/Health Centre is not on diversion or closed. Individual D&T/Health Centre resources and staffing may be limited and may not be appropriate destinations to transport trauma patients.**

Failed airway

(Failed airway = failure to maintain patency by ANY means. If you can oxygenate/ventilate, then it is not a failed airway.)

YES

- Transport to the nearest emergency department or D&T/Health Centre

NO

Blunt traumatic arrest

YES

- Obtain CliniCall / EPOS Consultation to consider discontinuation of resuscitation

NO

Penetrating traumatic arrest

(due to penetrating injury to head, neck and/or torso)

YES

- Transport to nearest ER or D&T Centre if time from loss of pulse and respiration to arrival is < 15 min
- Otherwise, obtain EPOS Consultation to determine decision to transport or discontinuation of resuscitation

NO

Step 1: Physiological

Physiological criteria (any of the following):

- Adult:
 - SBP < 90
 - RR < 10 or > 30 or need for ventilatory support
 - GCS ≤ 13
- Pediatrics:
 - Abnormal features on Pediatric Assessment Triangle assessment
 - Abnormal SBP, HR, RR for age or need for ventilatory support
 - GCS ≤ 13 Penetrating

YES

Transport Destination Decision:

Call EPOS/Clinicall if one of the following apply:

- If Transport time to Lead Trauma Hospital (LTH) > 60 min and > 15 min to nearest ER/D&T/Health Centre
- If Transport time to LTH < 60 min **and** < 15 min to nearest ER/D&T/Health Centre
- If uncertain about best hospital destination, including neighbouring province or territory hospital

NO

Step 2: Anatomical

Anatomical criteria (any of the following):

- Open or depressed skull fracture
- New paralysis or neurological deficits
- Major penetrating injury
- Facial injury with potential airway compromise
- Two or more proximal long bone fractures
- Crush, degloved, mangled, or pulseless extremity
- Amputation proximal to wrist or ankle
- Chest wall instability or deformity (i.e. flail chest)
- Major burns
- Unstable pelvis

YES

OR

- **Transport to Lead Trauma Hospital (LTH) within area**
 - if transport time > 15 min to nearest ER/D&T/Health Centre and < 60 min to LTH

OR

- **Transport to Nearest ER/D&T/Health Centre***
 - If Transport time < 15 min to nearest ER/D&T/Health Centre
 - Consider physician check on stretcher to facilitate timely transfer to LTH with same ground crew and/or more than 60 min out of hospital time expected

NO

Step 3: Mechanism

Mechanism criteria (any of the following):

- Falls Adult: > 6m (20 feet)
- Falls Pediatrics: > 3m (10 feet) or 2-3 times the height of the child
- MVA: intrusion/ejection/death in vehicle
- Pedestrian or bicyclist struck > 30 km/hr, thrown or run over
- Motorcycle collision at > 30 km/hr

YES

LTH = Lead Trauma Hospital within regional catchment areas include the following hospitals:

- Northern Interior
 - UHNBC (Prince George) – both adults and pediatrics
 - Quesnel
- North East
 - Fort St John
 - Dawson Creek
- North West
 - Mills Memorial (Terrace)
 - Prince Rupert

NO

Step 4: Special considerations

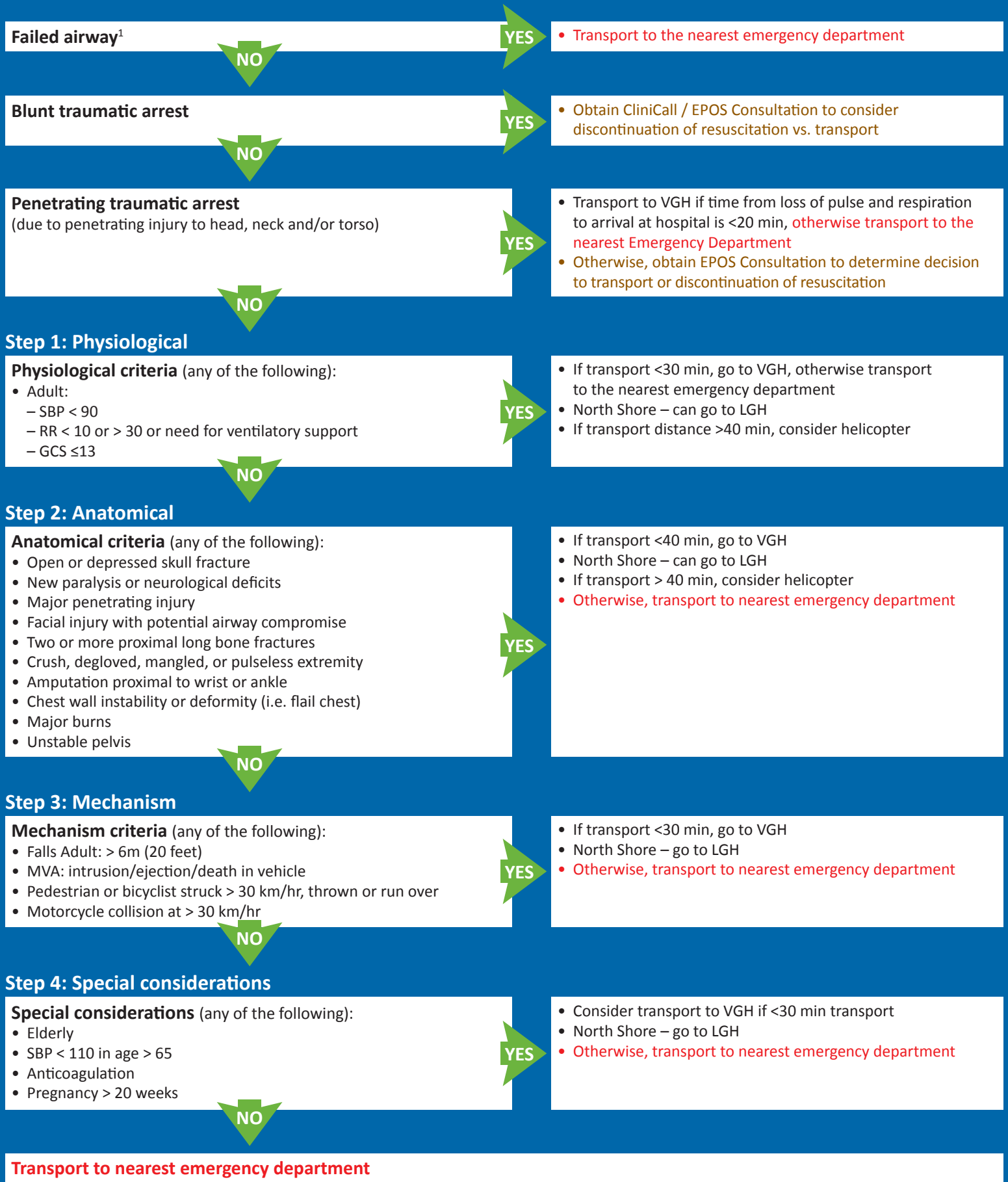
Special considerations (any of the following):

- Elderly
- SBP < 110 in age > 65
- Anticoagulation
- Pregnancy > 20 weeks
- Pediatric patients should be preferentially transported to Pediatric Lead Trauma Hospitals

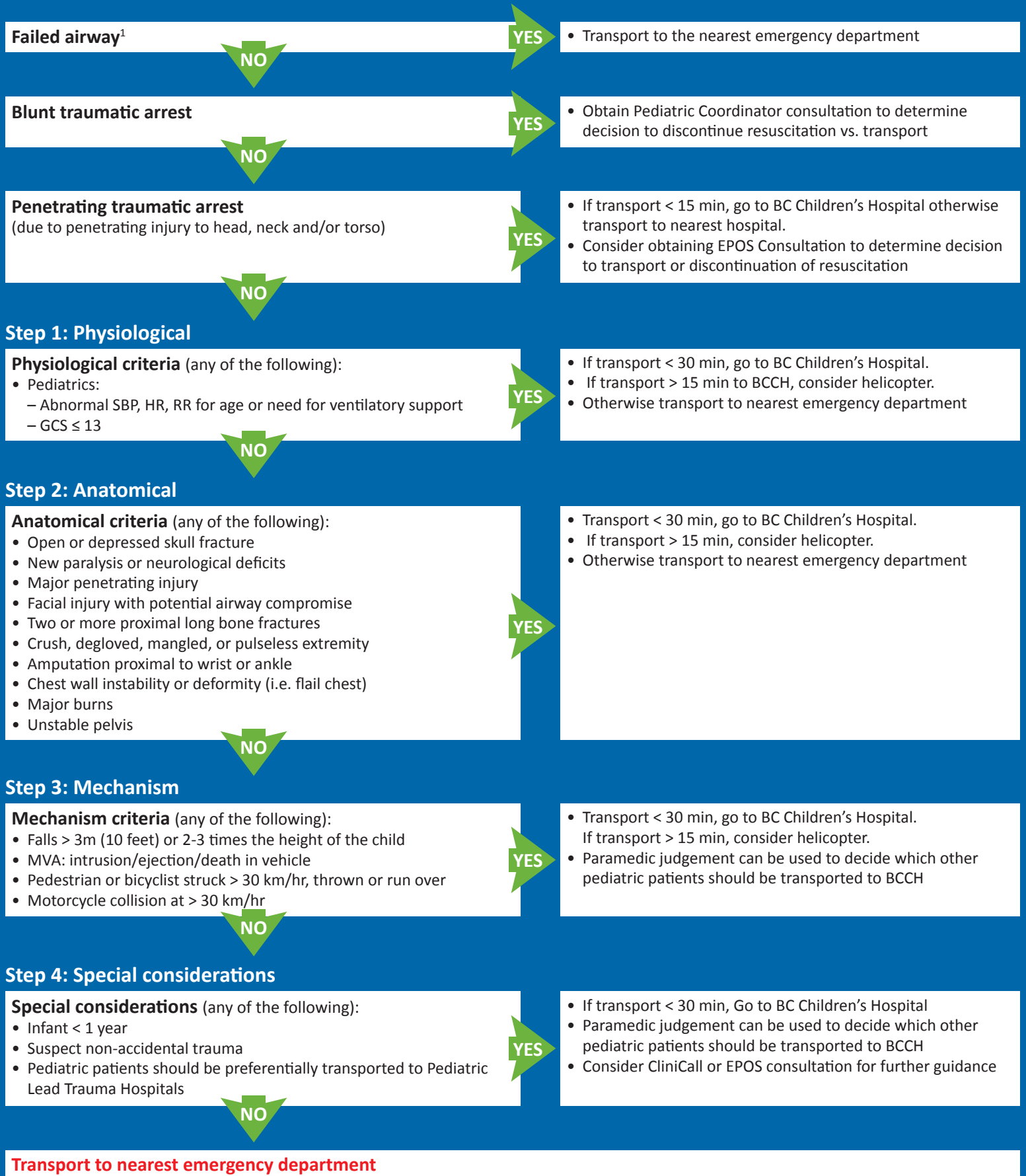
YES

NO

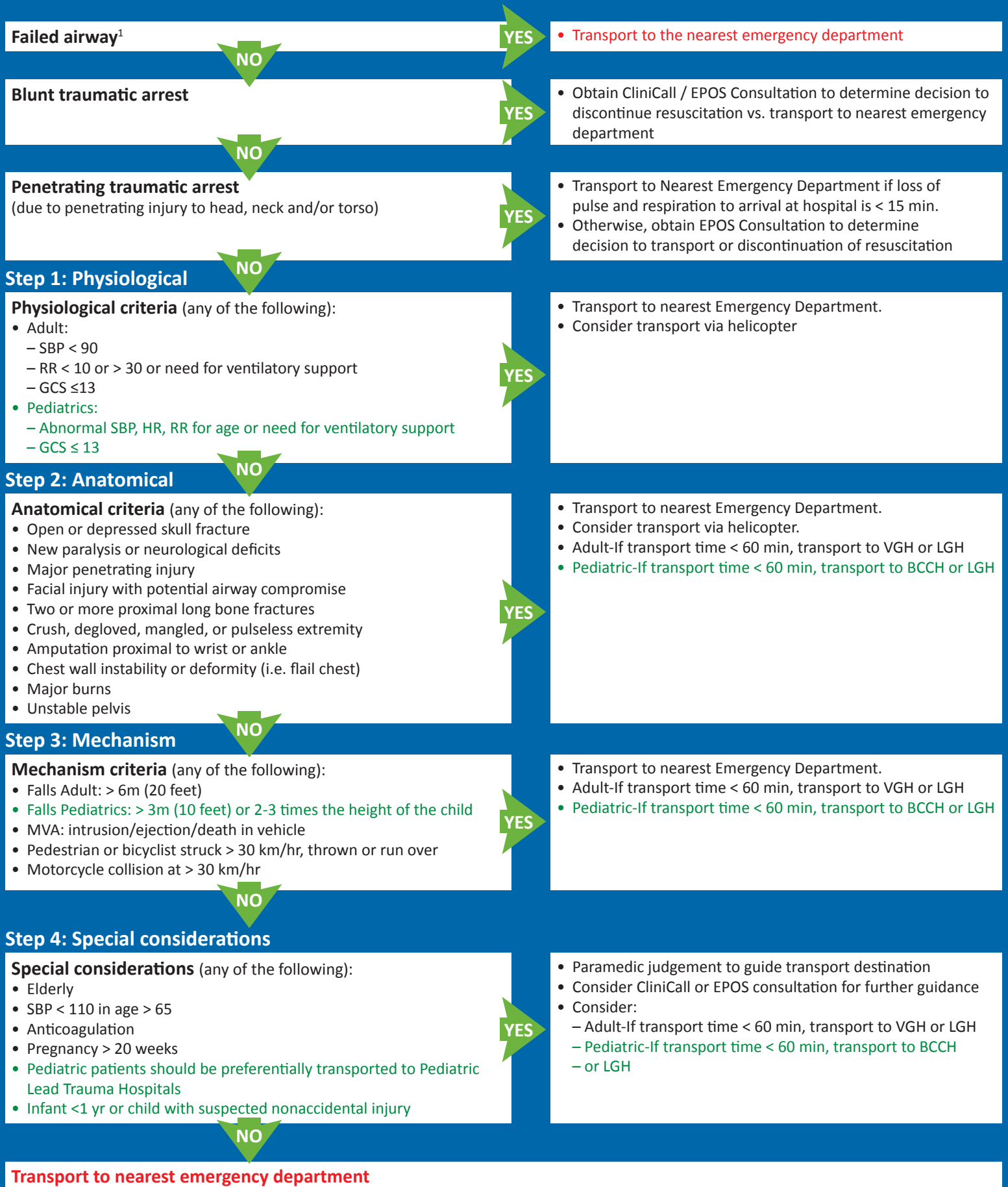
Transport to Nearest Emergency Department or Diagnostic & Treatment/Health Centre**
Call EPOS/Clinicall if uncertain about destination



¹. Failed Airway = failure to maintain patency by ANY means. If you can oxygenate/ventilate, then it is not a failed airway.
². Patients with suspected neurosurgical injuries should be transported to either VGH or LGH.



¹ Failed Airway = failure to maintain patency by ANY means. If you can oxygenate/ventilate, then it is not a failed airway.



¹ Failed airway = failure to maintain patency by ANY means. If you can oxygenate/ventilate, then it is not a failed airway.

Appendix G. Pre-hospital Trauma Triage Standard & Air Ambulance Utilization Review Process

Given the evolving nature of clinical trauma care, and the operational demands within each health authority, it is important that each regional trauma program hosts an annual review of its regional trauma pre-hospital triage and inter-facility guideline. The review should be hosted in collaboration with Trauma Services BC and regional medical directors of BCEHS. A collaborative performance based review will ensure both pre-hospital and in-hospital considerations are taken in to account in determining region-specific primary (field) and secondary (transfer) triage protocols to definitive care for trauma patients.

Regional Review Process

Trauma Pre-hospital Triage and Inter Facility Guidelines

What is reviewed?	Regional Trauma Pre-hospital Triage and Inter-Facility Guidelines
How often is it reviewed?	Annually
Who should participate in the review? (Mandatory Review Members)	BCEHS Regional Medical Director BCEHS Paramedic Practice Leader Regional Trauma Medical Director (Chair) Regional Trauma Operational Director TSBC – Provincial Clinical Director TSBC – Provincial Lead, Data, Evaluation and Analytics
Provincial Repository (Source of truth)	BCEHS APP (BCEHS Handbook) https://handbook.bcehs.ca/clinical/trauma/
Performance Reports	A high level report on trauma transport metrics and compliance to pre-hospital triage and inter-facility guidelines will be pre-circulated by TSBC to facilitate discussion.
Version Control / Change communication	Change in practice or destination guideline: A 'MEMO' should be drafted highlighting ' <i>what</i> ' is changing and the ' <i>Change Rationale & Impact</i> ' to all review members listed above. BCEHS and TSBC will collaborate to ensure: <ol style="list-style-type: none"> 1. All source documents are updated 2. Memo is circulated to key stakeholders

Appendix H. Communication & Education for Provincial Pre-hospital Trauma Triage Guideline

BCEHS

BCEHS Learning, Practice & Clinical Initiatives is responsible for supporting paramedics by providing consistent, relevant, and timely practice support. Practice updates such as the Provincial Pre-hospital Triage Guidelines will be communicated through two main approaches: online communication and face-to-face field learning support.

The Provincial Pre-hospital Triage Guidelines and the regional destination guidelines will be made available to all paramedics through the BCEHS Handbook. The BCEHS handbook is an online resource that can be accessed via web browser or iOS app that houses all the BCEHS treatment guidelines and clinical reference materials. The guidelines will also be featured on the BCEHS service-wide monthly practice update e-mail, SnapComms communications, and the BCEHS Facebook Operations page. They will also be presented at the monthly BCEHS educational clinical rounds with a dedicated discussion and question period, which is broadcasted to 10 locations in province and accessible anywhere via the internet.

BCEHS Paramedic Practice Educators, Paramedic Practice Leaders, and Medical Directors provide field learning support on a regular basis. The guidelines will be reviewed with individual paramedics during station and field visits, with an opportunity to discuss or address any questions that may arise.

TSBC

Each of the regional guidelines have been vetted and endorsed by regional trauma program operations and medical leadership. Trauma Services BC will support regional health authorities as they implement this guidelines. Each regional trauma program will disseminate the Pre-hospital Trauma Triage Guidelines via their regional trauma advisory committees, medical advisory committees, and key trauma stakeholders for information purposes only. As changes need to be made to these guidelines, TSBC will work with BCEHS and regional programs to provide data for reviews and ensure updated versions are published on the BCEHS handbook.

Pre-hospital Trauma Triage Guidelines for all regional health authorities will be easily accessible through the BCEHS handbook which will serve as the source of truth for the most up-to-date version. Clinicians may also download the BCEHS Handbook App (as described above) for instant access to trauma transport information.