

Christine Martinek Brent, MD  
Department of Emergency Medicine  
University of Michigan Health System

# Critical Care Transport

1

## Disclosures

- None financially
- I love aviation



2

## History of EMS



1700s: Hot air balloons



1926: Fixed wing use by US Army Air Core



1940s: WW2 routine Interfacility and military scene evacuation by ground



1950s: Helicopter use started in Korean War



1960s: On scene care in Vietnam: Field Medics->transport->forward surgical hospital



3

## History continued



**1966**

"White Paper" Accidental Death and Disability

- Started civilian EMS transport by comparing to Vietnam

**1973**

National EMS Systems Act funded 300 EMS programs/systems across the country

**1996**

EMS Agenda for the Future

- integration into the health system beyond just trauma and cardiac arrest patients

4

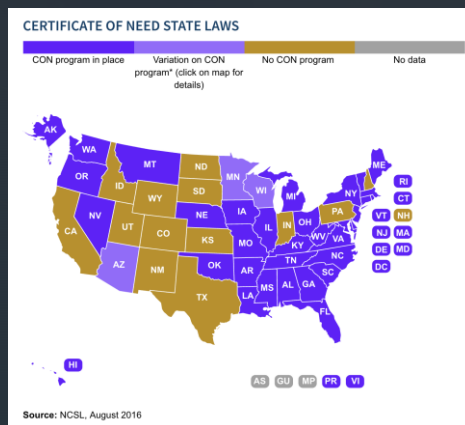
# Growth in CC transport driven by:

-  Closure of critical access hospitals and emergency departments
-  Hub-and-spoke regionalization of care
-  Reduction of level 1 and 2 trauma centers across the country (not in MI though)
-  Profits

6

# Michigan Certificate of Need

[https://www.michigan.gov/documents/mdch/2013\\_Brochure\\_409310\\_7.pdf](https://www.michigan.gov/documents/mdch/2013_Brochure_409310_7.pdf)



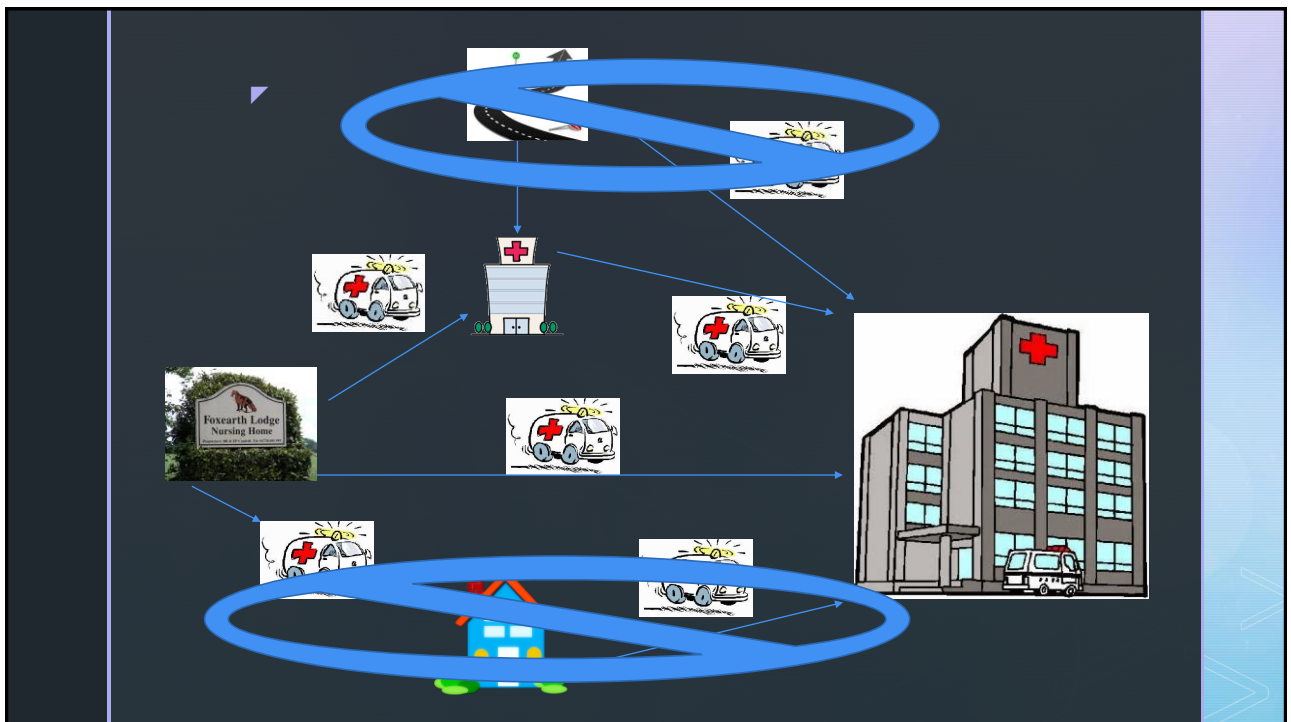
[http://www.ncsl.org/documents/health/CON\\_State\\_List.pdf#page=35](http://www.ncsl.org/documents/health/CON_State_List.pdf#page=35)

8

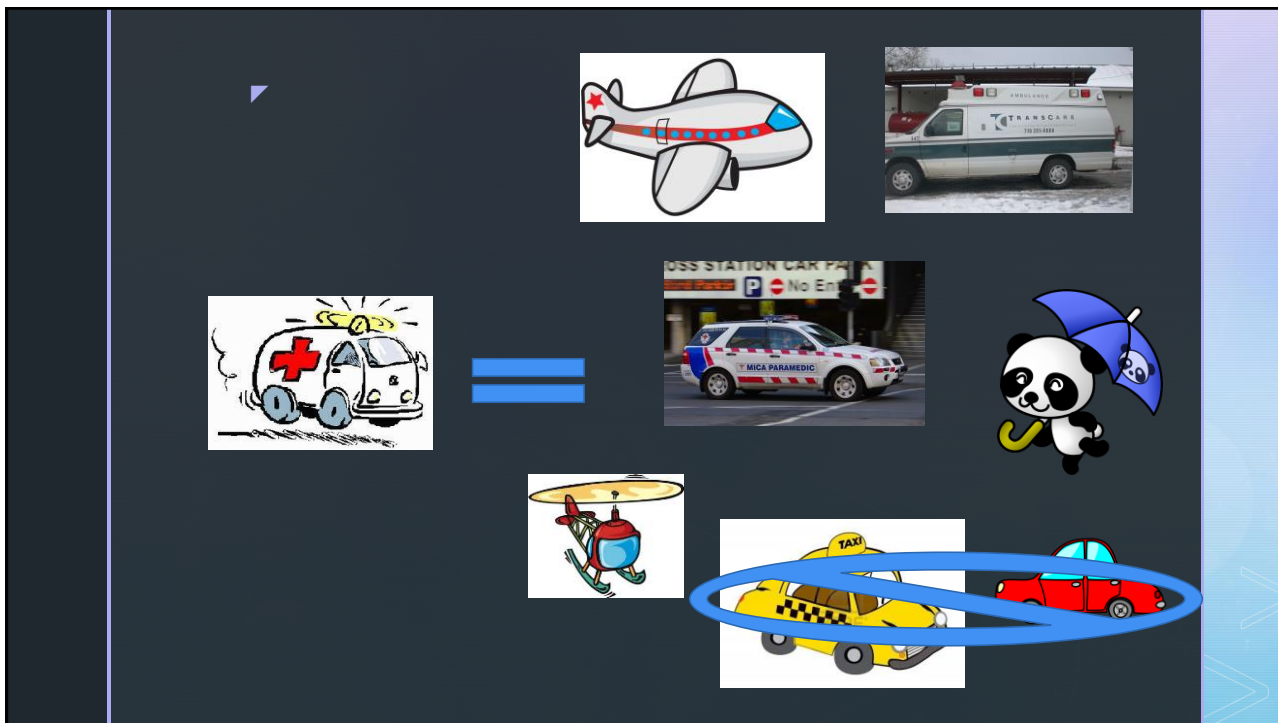
## Objectives of Critical Care Transport

- Safely transport the critically ill but stable patient to the resources they need.
- Bring high level tertiary care to the patient and maintain that level of care during transport

9



10



11

**Table 4. Critical Transport Vehicles**

Transport Vehicles	CCT Amb	RW	FW
Full time (dedicated)	234	517	109
Part time (nondedicated)	54	23	23
<b>TOTAL</b>	<b>288</b>	<b>540</b>	<b>132</b>

## 2014 National Survey

**Table 5. Medical Crew Composition**

Caregiver by Type of Transport	Critical Care Ground (n = 71)	Rotor Wing (n = 112)	Fixed Wing (n = 52)	Specialty Care (n = 74)
Emergency Medical Technician (EMT)	34%	1%	2%	7%
EMT-Paramedic (EMT-P)	89%	85%	77%	26%
Respiratory Therapist (RT/RRT)	13%	7%	23%	66%
Registered Nurse (RN)	97%	100%	100%	93%
Advanced Practice Provider (NP/PA)	6%	4%	6%	32%
Physician (MD/DO)	0%	4%	0%	16%

**Table 11. Who Defines Scope of Practice**

	National Certifying Body	State EMS Office	State Medical/ Nursing Board	Program Medical Director
CCT/Flight EMT-P	3%	89%	0%	8%
CCT/Flight RT-RRT	11%	5%	71%	14%
CCT/Flight RN	3%	4%	40%	53%
CCT/Flight MD	57%	8%	12%	23%

[https://www.airmedicaljournal.com/article/S1067-991X\(14\)00291-0/pdf](https://www.airmedicaljournal.com/article/S1067-991X(14)00291-0/pdf)

12

## Critical Care Paramedic/Nurse?

- Can get “certified” as CCP or CCRN etc
- ..BUT no required recognition between states or national consistency
  - IAFCPP
  - BCCTP



13

Wait there is no National Standard for CC transport training/scope?



This Photo by Unknown Author is licensed under [CC BY-NC-ND](https://creativecommons.org/licenses/by-nc-nd/4.0/)



**NATIONAL  
EMS SCOPE  
OF  
PRACTICE  
MODEL**

14

## So how is critical care defined?

- Medical directors are writing their own for their agencies
- Many states have made their critical care transport standards/scope of practice/education (MI doing now)

15

Association for  
Critical Care  
Transport  
(ACCT)  
2016



17

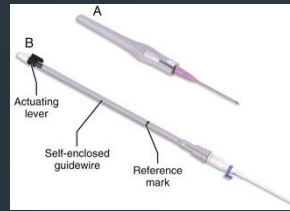




# So what can we do?



This Photo by Unknown Author is licensed under [CC BY-NC-ND](#)



This Photo by Unknown Author is licensed under [CC BY-SA-NC](#)



This Photo by Unknown Author is licensed under [CC BY-SA](#)



This Photo by Unknown Author is licensed under [CC BY-SA](#)



This Photo by Unknown Author is licensed under [CC BY-SA](#)

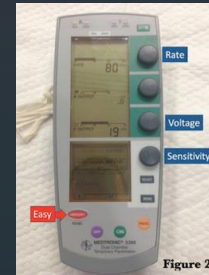


Figure 2

20



21

## Things to remember as the transferring/accepting MD

Rules  
controlling  
transfers

Flight vs  
Ground

Safety Issues

22



**RULES**

23

# EMTALA



Sending physician is responsible for choosing mode or transport, personnel level (EMTB, paramedic, critical care, specialty unit, family car, etc), and equipment.



Sending physician is responsible for patient care and outcomes for the duration of transport until arrival at receiving facility.



Technically, medical ?s and orders go back to them.



Patient must be stabilized prior to transport to the best of their ability, unless they do informed consent and patient desires transport despite not being stable



Risk of transfer CAN outweigh benefits

24




But...

What if transport team is more qualified than sending provider? Capable of things the provider isn't?



The transporting team medical oversight physician often takes over oversight roles.

25

 <p><b>Airplane:</b>                  Longer distance                  Bad weather                  Less emergent                  Airport destination (need EMS ground coordination)                  Faster</p>	 <p><b>Helicopter:</b>                  Shorter distance (&lt;200miles)                  Good weather                  Hospital destination                  More emergent                  Slower</p>	 <p><b>Ambulance:</b>                  Worst weather                  Distances can vary                  Slower                  Can stop at hospital en route                  PRN</p>
--	---	---

26

## When to choose Flight vs Ground?



This Photo by Unknown Author is licensed under [CC BY-SA](#)



This Photo by Unknown Author is licensed under [CC BY-SA](#)



This Photo by Unknown Author is licensed under [CC BY-SA](#)

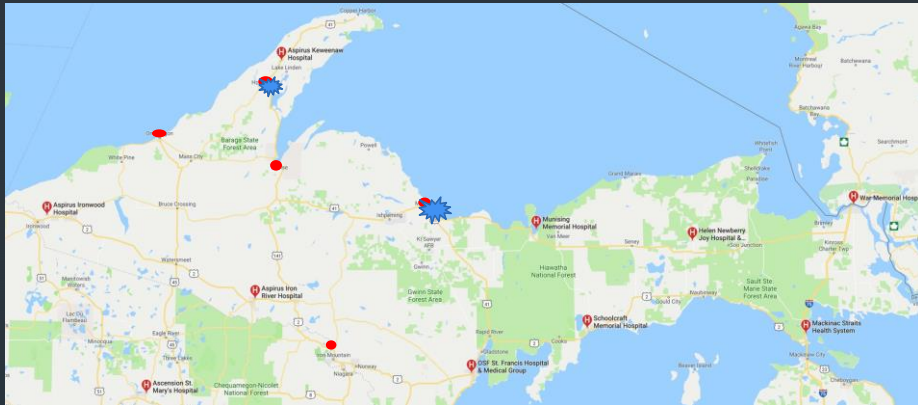


This Photo by Unknown Author is licensed under [CC BY-NC](#)

27

# Rural ground EMS salvage

[https://www.michigan.gov/documents/mdch/List\\_of\\_Designated\\_Trauma\\_Facilities.11.19.14\\_474565\\_7.pdf](https://www.michigan.gov/documents/mdch/List_of_Designated_Trauma_Facilities.11.19.14_474565_7.pdf)



16,377 square miles, <20 hospitals  
NO LEVEL 1 TRAUMA CENTERS

28



Stroke



Cardiac/STEMI



Trauma



Pediatric/OB/Neonatal

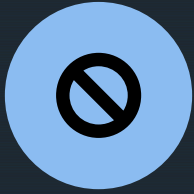


Burns/CO poisoning

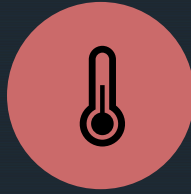
## Possible Medical Indications for Flight

29





NO TRANSPORTING  
HAZMAT OR EBOLA ETC



HOT WEATHER MAY  
PRECLUDE FLIGHT



COST-BENEFIT

## HEMS things to remember

32

## Michigan House Bills 5217-5219

- Require hospitals to prioritize ground transport, unless air transport is deemed medically necessary.
- Require hospitals to prioritize nonemergency patient air transportation using in-network providers before using out-of-network services.
- Require air ambulance companies and hospitals to disclose network status and estimated cost of air ambulance transport prior to ordering the service for nonemergency patients.
- Require air ambulance providers to accept the amount covered by an emergency patient's insurance as payment in-full.
- Require hospitals to allow a patient's in-network air ambulance to land at their facility.
- Hold hospitals responsible for a patient's excess charges should they fail to comply with the above requirements.

33



“LIFE OR DEATH”



ALTRUISTIC NATURE  
OF THE CREW



REIMBURSEMENT TIED  
TO TRANSPORT ONLY

## ▸ Safety

34

## To maximize air critical care safety

- Pilots don't know what the medical case is
- 3 to go, 1 to say no
- NVG
- IFR capabilities (<10% currently do this) but realize that IFR night flight is most dangerous
- Checklists
- In cockpit video monitoring
- Only fly when the patient really needs it!
- Appropriate maintenance
- Train ground crews on service capabilities, when to call, and landing zone needs/scene management

35



## To maximize ground critical care safety

- Protocols delineating the weather minimums
- Checklists
- Detailed QA
- Appropriate maintenance
- Train hospitals on service capabilities, when to call
- Minimize Lights and Sirens

36

## Lights and Sirens

Although they vary in each state, specific state laws and regulations are frequently designed around the Uniform Vehicle Code, which provides four general exceptions to motor vehicle rules for drivers of emergency vehicles. These include:

- 1) Proceeding through a red traffic signal, stop light, or stop sign
- 2) Driving the wrong way in lanes of opposing traffic or on one-way streets, disregarding directions of movement or turning in specified direction
- 3) Exceeding the posted speed limit
- 4) Parking the vehicle in locations that would otherwise not be legal

Important to realize: You DO NOT have the RIGHT OF WAY when utilizing these exceptions!

37

## Lights and Sirens

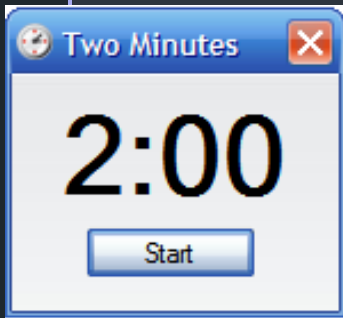


TABLE N  
Mean transport time interval differences related to L&S use  
(from eight studies as shown)

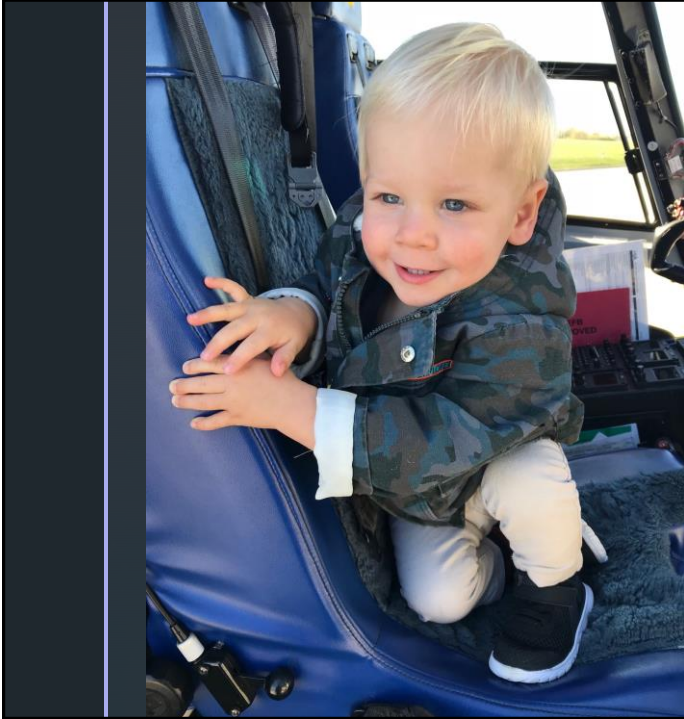
Author	Year of Study	Community/Geographical Location	Time Saved (in minutes)	Notes
Dhindsa	1994	Washington, DC	3.0	Poster Abstract
Hunt	1995	Greenville, NC	0.7	
O'Brien	1999	Jefferson County, KY	3.8	
Brown	2000	Syracuse, NY	1.8	
Williams	2005	Anne Arundel County, MD	2.4	Up to 10.2 minutes for areas farther from hospital
Marques-Baptista	2010	New Brunswick, NJ	2.6	Reviewed critical interventions at hospital
Fleischman	2013	Multnomah County, OR	3.1	GPS/Google maps
Dami	2014	Vaud, Switzerland	1.8	No difference at night, 16.6% L&S transport rate

38

## Washtenaw/Livingston MICU Transport protocols

- <https://www.washtenaw.org/DocumentCenter/View/3355/12-02-MICU-Transport-Capabilities>

39



Questions?

[martinek@med.umich.edu](mailto:martinek@med.umich.edu)