

Syringe Administration of Epinephrine by Emergency Medical Technicians for Anaphylaxis

Andrew Latimer, MD
Sofia Husain, MPH
Jonathan Nolan, MICP
Vinod Doreswamy, MD
Thomas Rea, MD, MPH
Michael Sayre, MD
Mickey Eisenberg, MD, MPH, PhD

University of Washington
Department of Emergency Medicine
King County EMS
Seattle Fire Department, Medic One



DISCLOSURES

- None



BACKGROUND

- Intramuscular epinephrine is the cornerstone of therapy for anaphylaxis and severe allergic reaction in the pre-hospital environment

THE USE OF EPINEPHRINE FOR OUT-OF-HOSPITAL TREATMENT OF ANAPHYLAXIS

National Association of EMS Physicians

PRE-HOSPITAL EMERGENCY CARE 20(1):155-164



BACKGROUND

- In 2014, in response to rising epinephrine autoinjector (EAI) costs, “Check and Inject Program” was implemented in King County, WA



Total EMS Vehicles
565

Number of EAI 2-packs per year
1,130
Annual cost per 2-pack: \$300

EAI Annualized cost
\$339,000

Number of Epi Kits per year
565
Annual cost per kit: \$9

Epi Kit Annualized cost
\$5,085

Check and Inject Annual Cost Savings
\$333,915



STUDY AIM

- Our investigation into the King County experience over the first 2 ½ years of the “Check and Inject Program” sought to determine if EMTs can implement a protocol utilizing syringe administration epinephrine for patients experiencing presumed prehospital anaphylaxis and/or severe allergic reaction

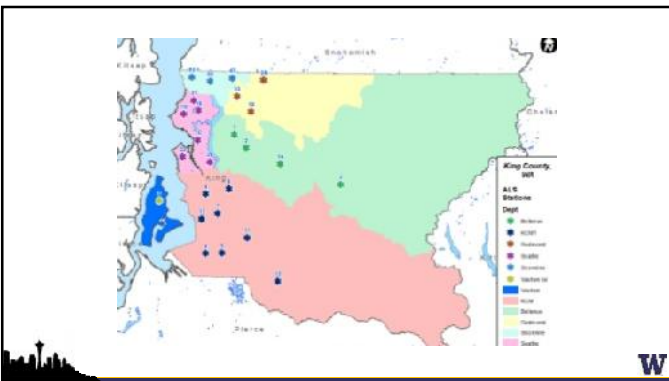


METHODS

- Cases collected prospectively as patients were treated by EMTs with IM epinephrine as part of the “Check and Inject Program”
- Cases from the ~2,700 EMTs in the County were collected from July 2014 through December 2016
- Cases from the ~800 EMTs in the Seattle Fire Department were collected from January 2016 through December 2016




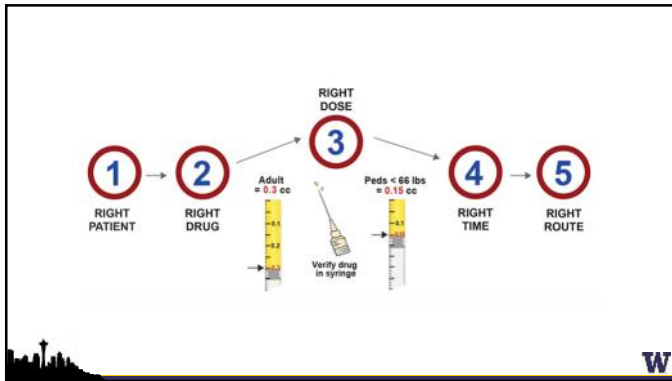








CHECK & INJECT EMT Responder Epinephrine Process				
MEETS CRITERIA	VERIFY DRUG	VERIFY DOSAGE	PREP & INJECT	MONITOR & RECORD
<input type="checkbox"/> VERIFY NEED TRIGGER • food allergy • insect sting • drug allergy <input type="checkbox"/> SYMPTOMS • respiratory distress • hypotension • hives • diffuse wheezing • progressive	<input type="checkbox"/> CONFIRM MEDS • 1:1000 Epinephrine • expiration date • color/clear • name	<input type="checkbox"/> DRAW UP DOSE & CONFIRM DRUG IN SYRINGE Adult = 0.3 cc  Pediatric = 0.15 cc 	<input type="checkbox"/> PREP PATIENT Clean injection site • lock of hair • alcohol wipe • aspirate needle • 90 degrees • lock up to blood return • aspirate syringe • Release safety device • Massage site 10 sec.	<input type="checkbox"/> MONITOR & DOCUMENT • Reassure patient • Monitor for: • response • side effects • Provide oxygen • Be ready to start CPR • Monitor pulse 5 min. • Monitor vitals • Monitor response to injection <input type="checkbox"/> Document • site • time • location • patient response
Date: _____ No P: _____ EMT 1: _____ EMT 2: _____				



METHODS

- Cases identified through a phone log, the replacement kit process, and an electronic database search
- Data was abstracted from the EMS medical record and “Check and Inject” QI forms collected from the EMT units
- Each EMS medical record was independently reviewed by two Emergency Physicians

Table 1. Criteria for inclusion of emergency administration of epinephrine in EMTs (only those who are one of the following 5 criteria are included):

1. Patient is 18 years of age or older (pediatric cases will be excluded from the study) - cases where the patient is under 18 years of age will be excluded from the study
2. Patient is not pregnant
3. Patient is not a child of a pregnant woman
4. Patient is not a child of a pregnant woman
5. Patient is not a child of a pregnant woman

RESULTS

- 422 cases of EMT administered epinephrine during the study period
- 11 cases excluded for irrecoverable incident report forms
- 411 cases included in the analysis

(~ 8 / 100,000 person years)

Characteristic	N (%)
Gender	
Male	182 (44.3)
Female	229 (55.7)
Age	
<5 yo	33 (8.0)
5-14 yo	40 (9.7)
15-64 yo	299 (72.7)
> 65 yo	39 (9.5)
Epi was administered prior to EMS arrival	
Patient/Family	25 (6.1)
Healthcare Provider	6 (1.5)
Other	2 (0.5)

Putative Allergic Triggers	
Food – Nuts	92 (22.4)
Food – Shellfish	28 (6.8)
Food – Other	83 (20.2)
Drug – NSAIDs	8 (1.9)
Drug – Antibiotics	26 (6.3)
Drug – Other	35 (8.5)
Insect Sting – Bee	59 (14.4)
Insect Sting – Other	13 (3.2)
Other/Environmental	24 (5.8)
Not documented/Unknown	43 (10.5)

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Vital Signs (Prior to administration of IM epi)	
Respiratory Rate, mean per minute (SD)*	22 (7.5) *
Respiratory Rate, ≥ 20 respirations/min*	223 (67.2)*
Pulse Rate, mean per minute (SD)†	104 (23.1)†
Pulse Rate, ≥ 100 bpm†	226 (63.5)†
Pulse Rate, ≤ 60 bpm†	14 (4.0)†
Any abnormal vital sign prior to epinephrine administration*	380 (92.5)*

* Based on 332 cases where a respiratory rate was documented prior to epi administration.
 † Based on 356 cases where a pulse rate was documented prior to epi administration.
 ‡ BP ≤ 90, or pulse ≥ 100 bpm, or respiratory rate ≥ 20 resp/min, or SpO₂ ≤ 90%. Out of 411 cases.

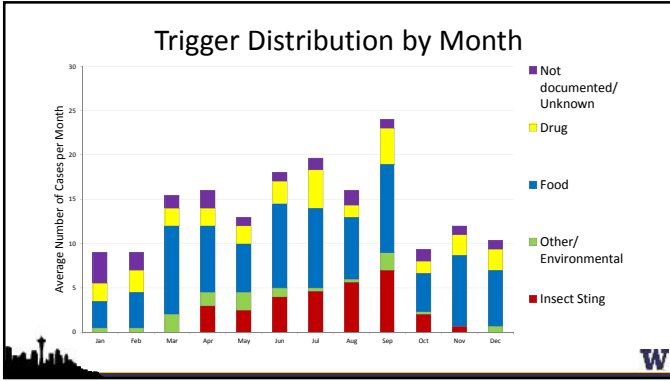


Symptoms/Signs	
Hypotension (BP ≤90)	106 (25.8)
Hives	241 (58.6)
Respiratory Distress	188 (45.7)
Swelling of the face, lips, or oropharynx	189 (46.0)
Number of symptoms	
Patients with only 1 symptom	63 (15.3)
Patients with 2 or more symptoms	315 (76.6)



- 9.5% of patients received a second dose of epinephrine
- There were 2 cases of cardiac arrest from clear anaphylaxis that received IM epinephrine during the study period
 - Both patients were successfully resuscitated to hospital admission
 - One patient died in the hospital
 - One patient survived neurologically intact





Physician Review

		Clinically Indicated Based on Physician Review	
		Yes	No
Followed "Check and Inject" Protocol	Yes	355 (86%)	12 (3%)
	No	36 (9%)	8 (2%)

DISCUSSION

- In our cohort, EMTs identified appropriate patients meeting the criteria of the "Check and Inject" standing order
- No documented adverse outcomes related to epinephrine administration based on review of prehospital care
- No provider injuries

LIMITATIONS

- Unable to obtain follow-up information and patient outcomes from hospital records
- Complications to EMT Epi that were not observed in the prehospital setting may have been missed
- The physician assessment relied on the EMS report forms and did not independently verify the history or exam



CONCLUSIONS

- We found that EMTs in King County successfully implemented the “Check and Inject” protocol for IM epinephrine administration in a manner that typically agreed with physician review and without any overt identified safety issues.
- Our findings support the potential for effective manual aspiration and IM administration of epinephrine by EMTs in a mature system that undertakes ongoing training and continuous quality review.



Questions?

alatim@uw.edu

@alatimer13