

Complex Interplay of EMS Education and Workforce

Ashish R. Panchal, MD, Ph.D., FAEMS
Professor of Emergency Medicine
The Ohio State University



THE COLLABORATIVE FOR ADVANCING EXCELLENCE THROUGH ACCREDITATION

Disclosures

Research and Fellowship Director, National Registry of EMTs



Medical Director, Delaware County EMS and Delaware Emergency Communications, Ohio



Past Chair, Science Subcommittee, American Heart Association/Emergency Cardiovascular Care Committee, 2020 AHA Guideline Chair



Primary Investigator, NCI U54, 1U54CA260582-01

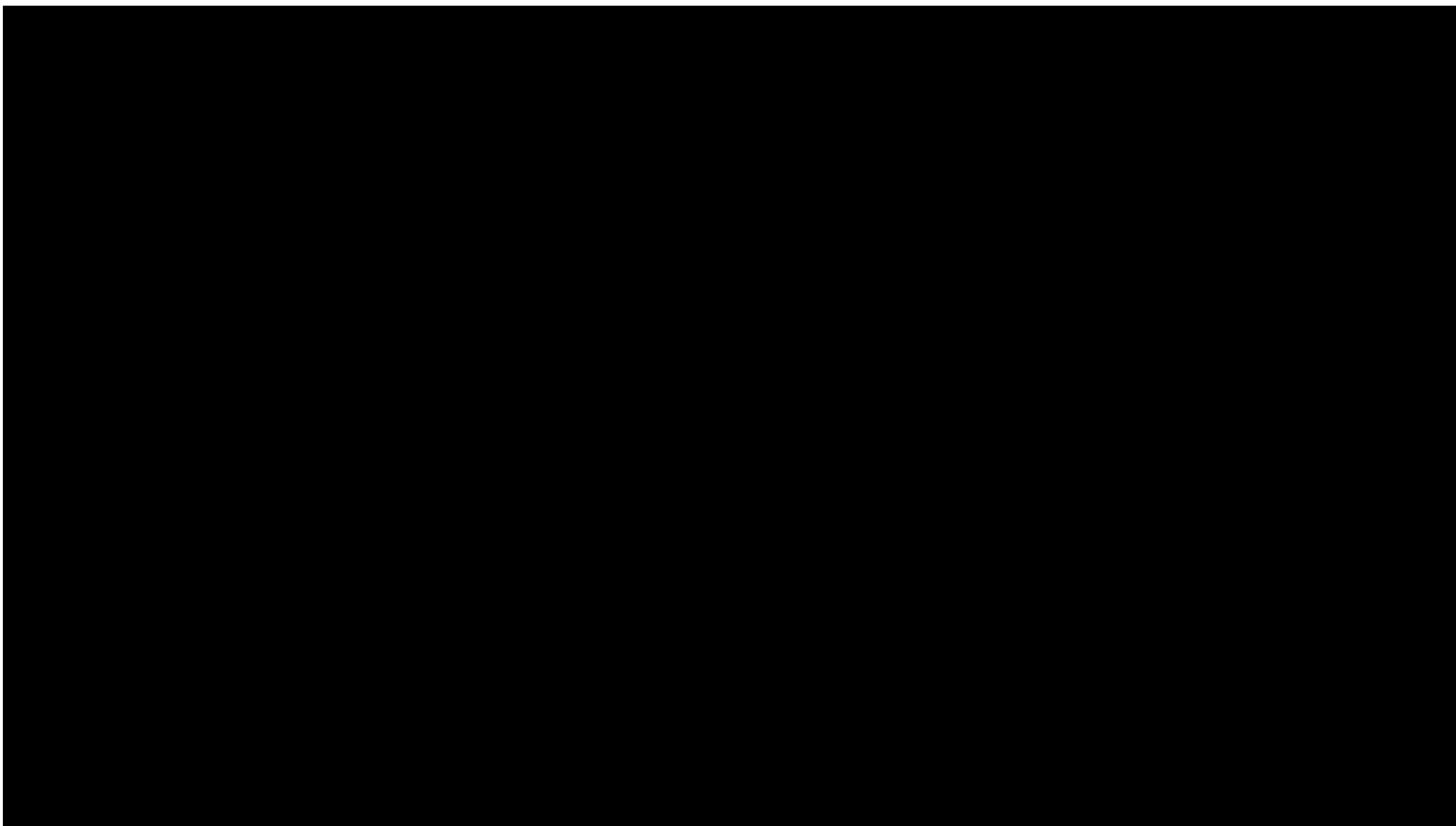


THE COLLABORATIVE FOR ADVANCING EXCELLENCE THROUGH ACCREDITATION









Having no ambulances available due to rise in calls has become daily occurrence, Wake EMS says



By [Elaina Athans](#) 

Wednesday, September 15, 2021



RALEIGH (WTVD) -- For a period of time Tuesday night, there were no Wake County ambulances available to answer calls in the Raleigh city limits.

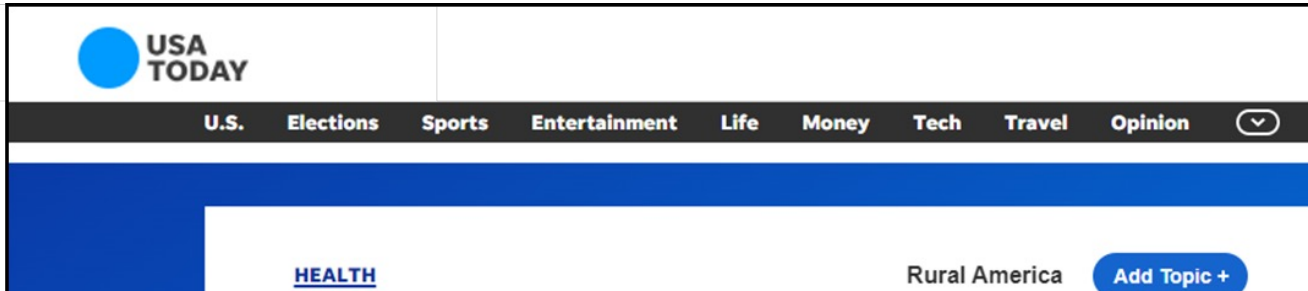
A Wake County spokesperson told ABC11: "We have been extremely busy for the past four months and reaching zero units has unfortunately become a daily occurrence."

He added that response times to calls are up and waits can stretch to 20 minutes sometimes.

Wake EMS said it has procedures in place to manage low system resources.

The county can call on other municipalities or towns through mutual aid agreements.

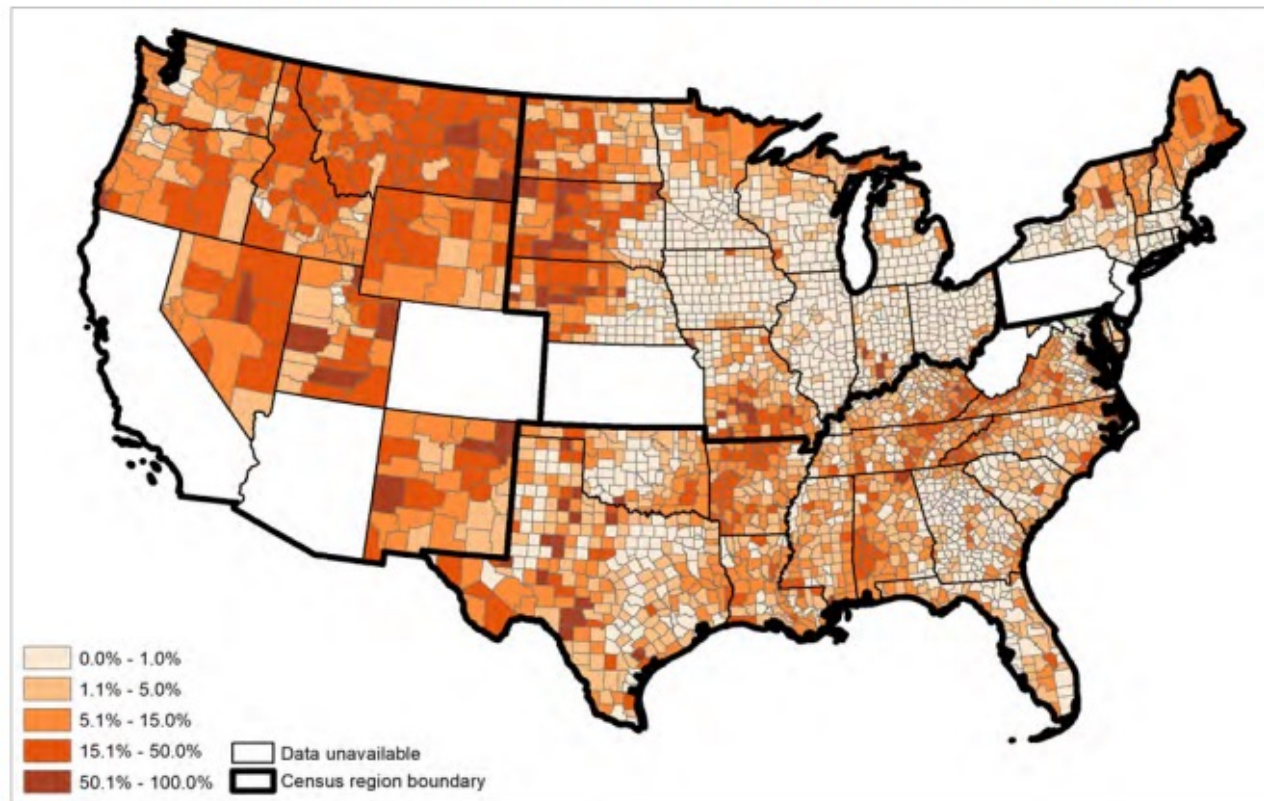
A Wake County spokesperson said:
"We have been extremely busy for the past four months and reaching zero units has unfortunately become a daily occurrence."



Nearly 4.5 million people across the U.S. live in an "ambulance desert" – 25 minutes or more from an ambulance station – and more than half of those are residents of rural counties.

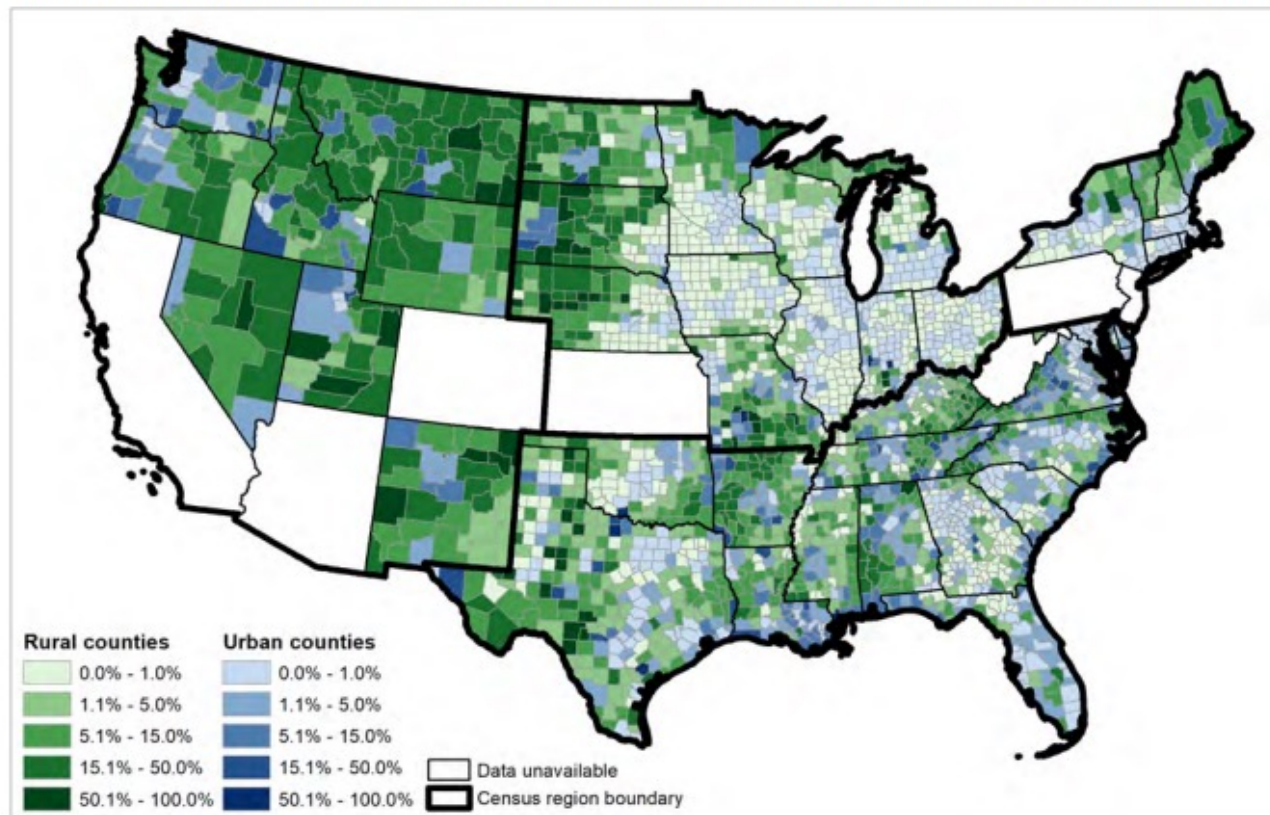
Rural Health Research Centers.

FIGURE 2. Percent of County Populations Living in Ambulance Deserts, 2021-2022



Jonk et. al, 2023, Maine Rural Health Research Center.

FIGURE 3. Percent of Rural and Urban County Populations Living in Ambulance Deserts, 2021-2022



Jonk et. al, 2023, Maine Rural Health Research Center.

*Not enough EMS clinicians are trained
and ready to enter the Workforce*

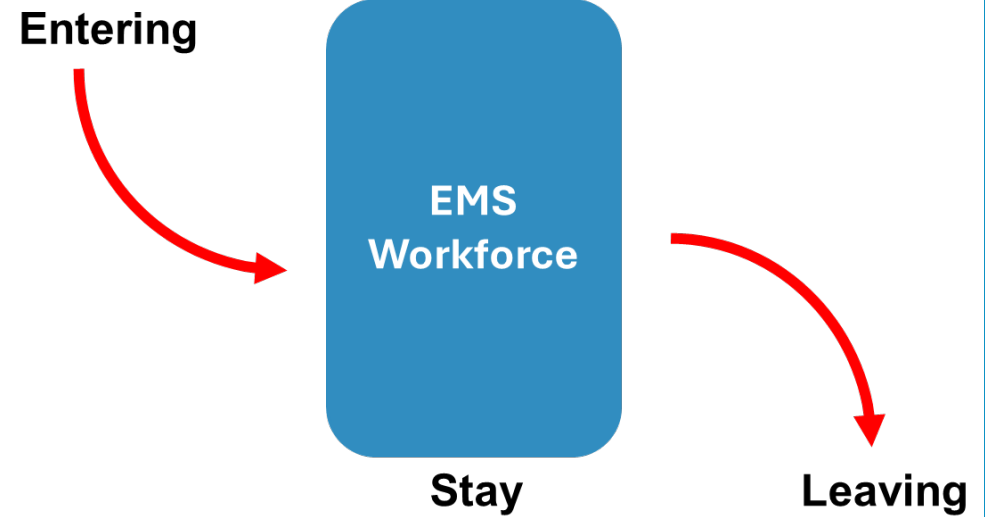
Outline

Complex Interplay of EMS Education and Workforce

- Define the dynamics of the EMS workforce
- Key challenges in education
- Education and Relationship to Workforce

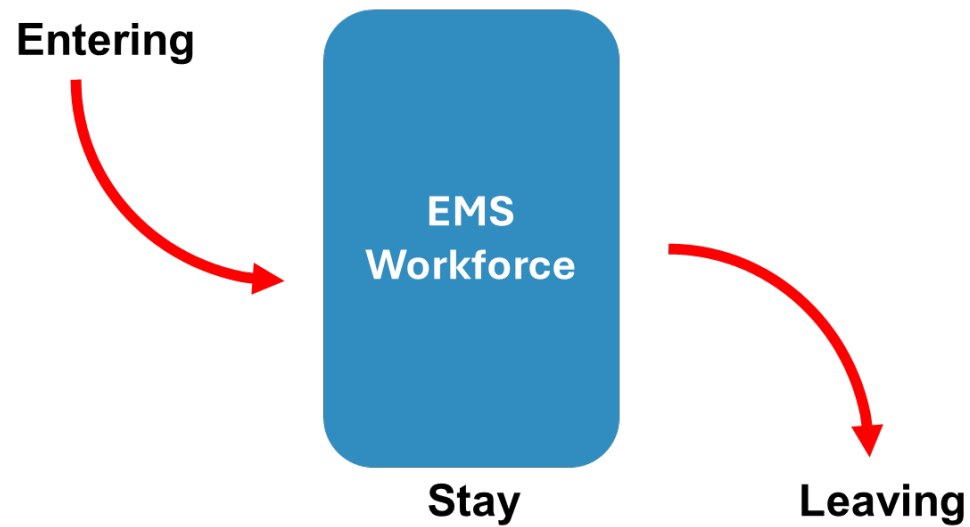


Dynamics of the EMS workforce





Dynamics of the EMS workforce



Gaps of Knowledge at all Levels

- Staying:

- What roles are served by EMS clinicians
- Have the proportion of secondary roles increased
- What keeps you in the field?

- Leaving

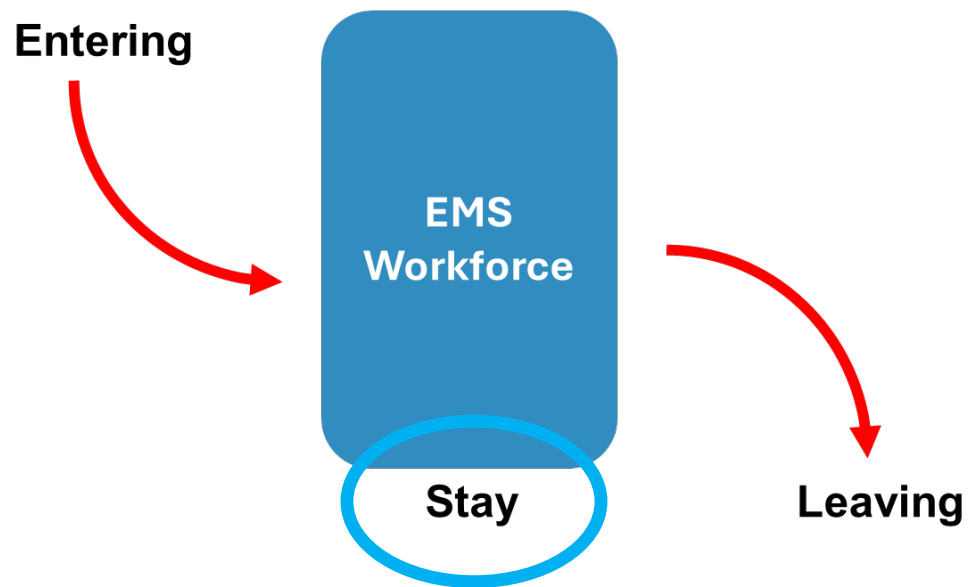
- Reasons for leaving
- Characteristics associated with leaving
- Population based estimates

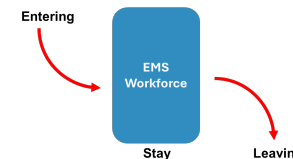
- Entry:

- Impact of attrition, certification
- Do all EMS clinicians attain EMS agency affiliation at graduation



Dynamics of the EMS workforce





Staying in the Workforce

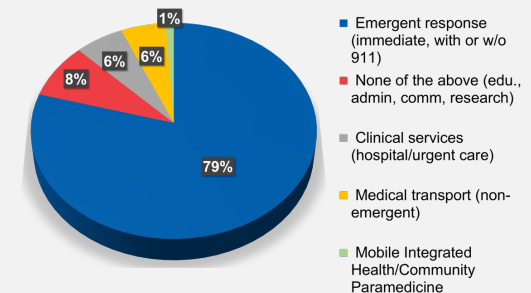
- Part of the reasons for loss of workforce could be the changing roles in EMS
- We recognize more EMS clinicians work in alternative settings, but how many have moved away from emergent 9-1-1 care?

Paramedic and EMT Roles in EMS

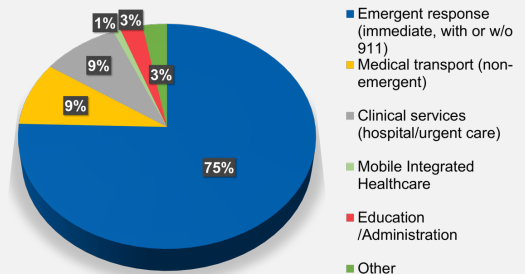
- Survey of nationally certified Paramedics and EMTs
- Response: 35,000!!

7-10% Working in
other Clinical
settings

Paramedic

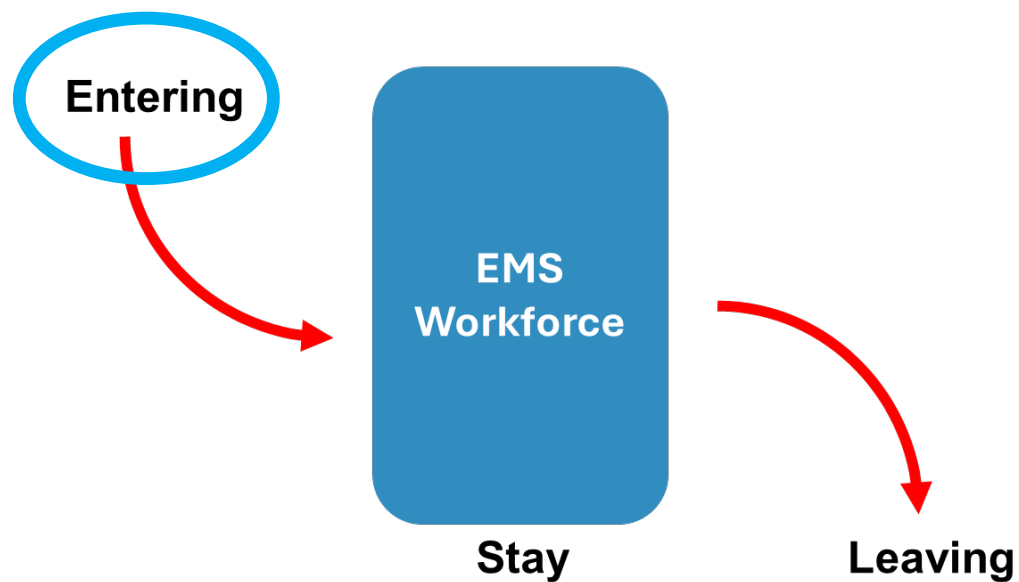


EMT





Dynamics of the EMS workforce



Entering the Workforce



- Starts when someone applies for a program, they are now part of “Possible EMS clinicians”
- They can leave this process in a couple ways:
 - Do not complete training program (attrition from program)
 - Do not attain certification (not minimally competent)



ORIGINAL RESEARCH

Administrative and Educational Characteristics of Paramedic Programs in the United States

Matthew T. Ball, MD;¹  Jonathan R. Powell, MPA, NRP;^{2,3} Lisa Collard;⁴ Doug K. York, PS, NRP;⁴ Ashish R. Panchal, MD, PhD^{2,3,5}

Ball et. al. Prehospital Disaster Medicine 2022

Size and Structure of Programs

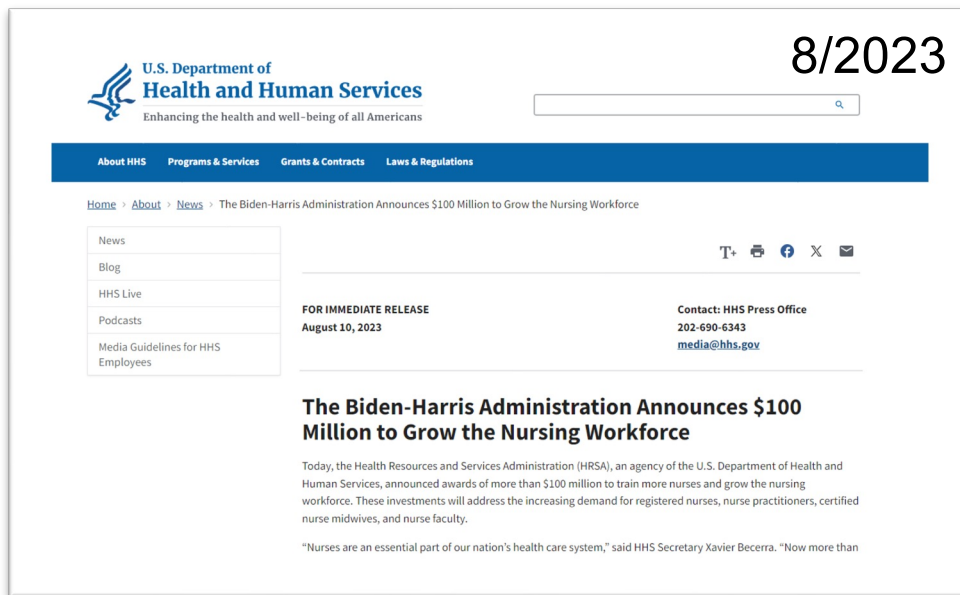
Characteristic	Frequency
Programs with Graduating Cohorts, n	626
Students Enrolled, n (median, IQR)	17,422 (18; IQR 12-30)
Graduated Cohort Categories by Programs [n = 626; frequency (%)]	
1	400 (64)
2	126 (20)
3	47 (8)
≥ 4	53 (8)
Students Enrolled by Cohort Categories [n = 17,422; frequency (%)]	
1	6,493 (37)
2	3,589 (21)
3	2,507 (14)
≥ 4	4,833 (28)

Training Program and Outcomes

Characteristic	Frequency (median, IQR)
Total Months to Completion	12 (12-16)
Total Hours of Instruction	1175 (1069-1305)
Total Hours of Clinical Experience	219 (168-272)
Total Hours of Field Experience	160 (90-240)
Total Hours of Capstone Field Internship	180 (100-250)
Exam Pass Rates	
First Attempt (%)	74 (77, 64-90)
Cumulative Third Attempt (%)	89 (94, 83-100)

Working framework to understand Paramedic Education

Other Allied Healthcare



Priorities:

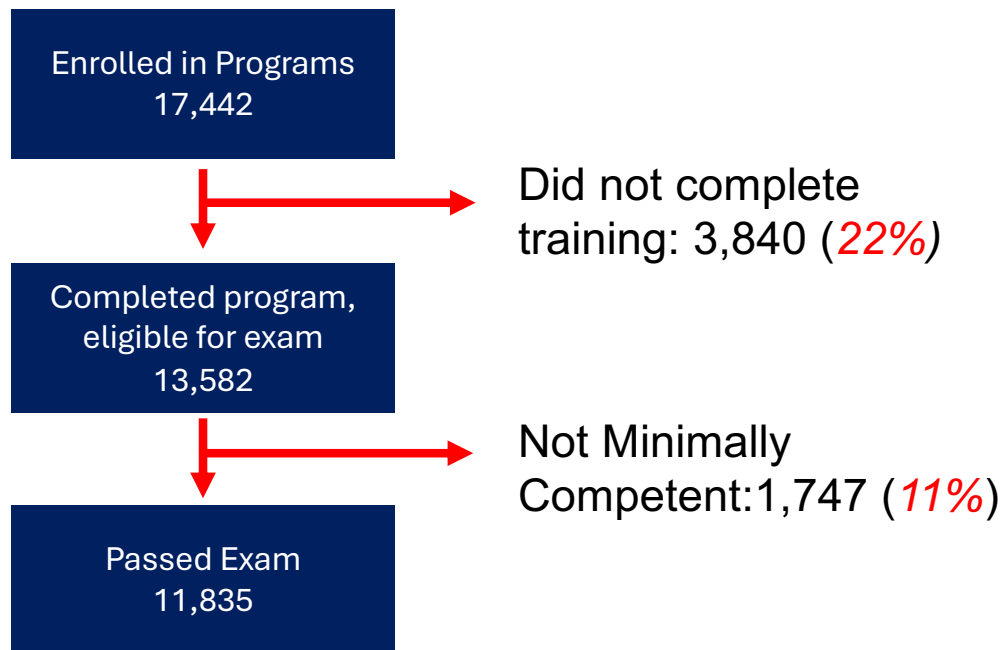
- Take practical nurses to Registered nurses (\$9 M)
- Increase number of trained nurses including advanced practice (\$65 M)
- Support nursing training by supporting nursing faculty (\$27 M)

This type of data sets the stage for the investment!



THE COLLABORATIVE FOR ADVANCING EXCELLENCE THROUGH ACCREDITATION

Examined the pathway...



***Attrition is the
largest challenge
in Entry***

DOI: 10.1002/emp2.12917

ORIGINAL RESEARCH

Emergency Medical Services



WILEY

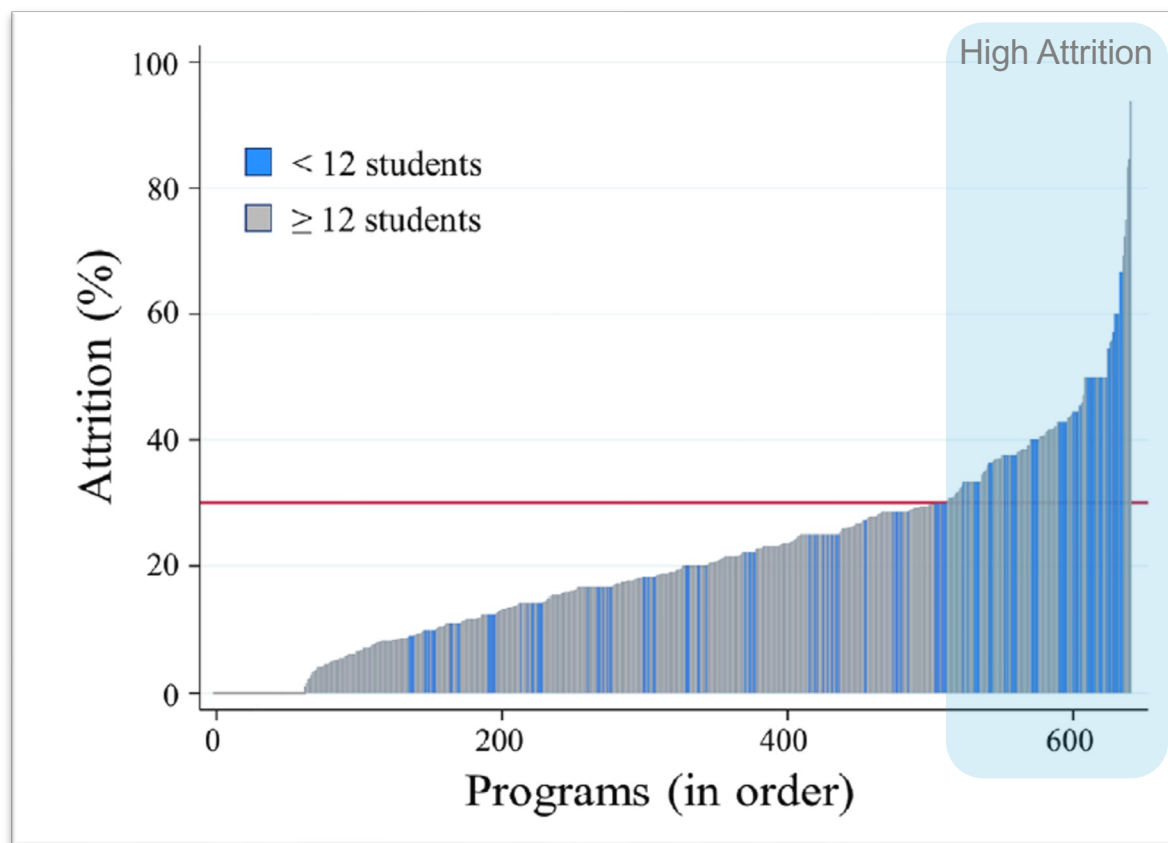
Paramedic educational program attrition accounts for significant loss of potential EMS workforce

Matthew Ball MD¹ | Jonathan R. Powell MPA, NRP^{2,3} | Christopher B. Gage MHS, NRP^{2,3} | Katelynn A. Kapalo PhD² | Jordan D. Kurth PhD² | Lisa Collard AS⁴ | Michael G. Miller EdD, RN⁴ | Ashish R. Panchal MD, PhD^{2,3,5}

JACEP Open 2023;4:e12917.



THE COLLABORATIVE FOR ADVANCING EXCELLENCE THROUGH ACCREDITATION



Histogram of program attrition rate (%) for all paramedic educational programs in the US

Table 3. Univariable and Adjusted multivariable associations between percent attrition above 30% (high attrition) and months to course completion, total students enrolled, and geographic regions. Abbreviation: CI, confidence interval; *, p-value <0.05.

Characteristics	Univariable Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Total months to completion		
<12 months	0.44 (0.23-0.86)*	0.57 (0.29-1.13)
12 months	Referent	Referent
>12 months	1.81 (1.17-2.79)*	1.91 (1.21-3.00)*
Total Students enrolled		
1-11	2.81 (1.63-4.82)*	2.53 (1.45-4.41)*
12-17	Referent	Referent
18-29	1.07 (0.60-1.92)	1.12 (0.61-2.04)
30 or more	0.96 (0.53-1.73)	1.08 (0.59-1.99)
NASEMSO regions		
East	3.13 (1.28-7.66)*	2.68 (1.07-6.70)*
South	3.33 (1.45-7.62)*	3.24 (1.38-7.61)*
Great Lakes	1.73 (0.70-4.28)	1.63 (0.64-4.14)
Western Plains	2.65 (1.02-6.91)*	2.47 (0.92-6.66)
West	Referent	Referent

Associations with High Attrition

Length of program

Small Programs

NASEMSO Regions

3. Paramedic Educational Program Entry Requirements and Student Resources and Their Association with Attrition

Shea L. van den Bergh, Lakeshia Logan, Kathryn Crawford, Lisa Collard, Christopher Gage, Jonathan Powell, Michael Miller, Ashish Panchal

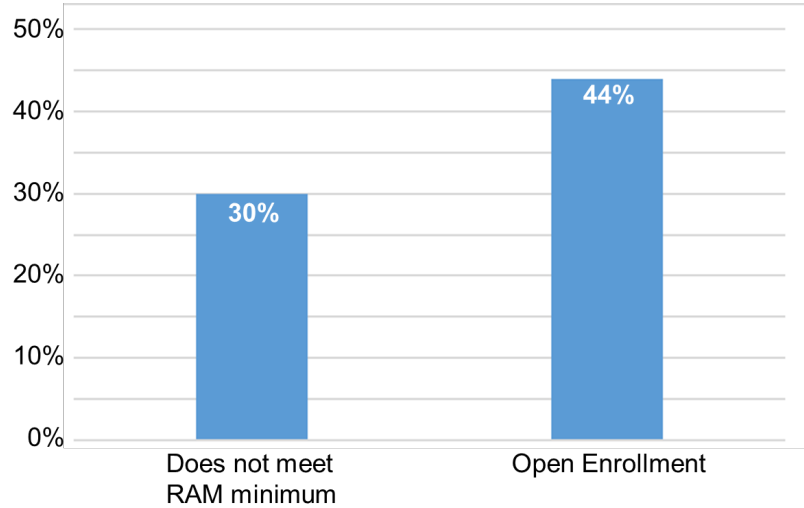
The National Registry of Emergency Medical Technicians, Committee on Accreditation of Educational Programs for the EMS Professions

Introduction: Paramedic educational program attrition contributes to a loss of potential clinicians from the EMS workforce. To mitigate this, programs have developed entry



(2023) The Menegazzi Scientific Sessions: Research Abstracts for the 2024 NAEMSP, Prehospital Emergency Care, 28:sup1, S1-S111.

Entry Requirements



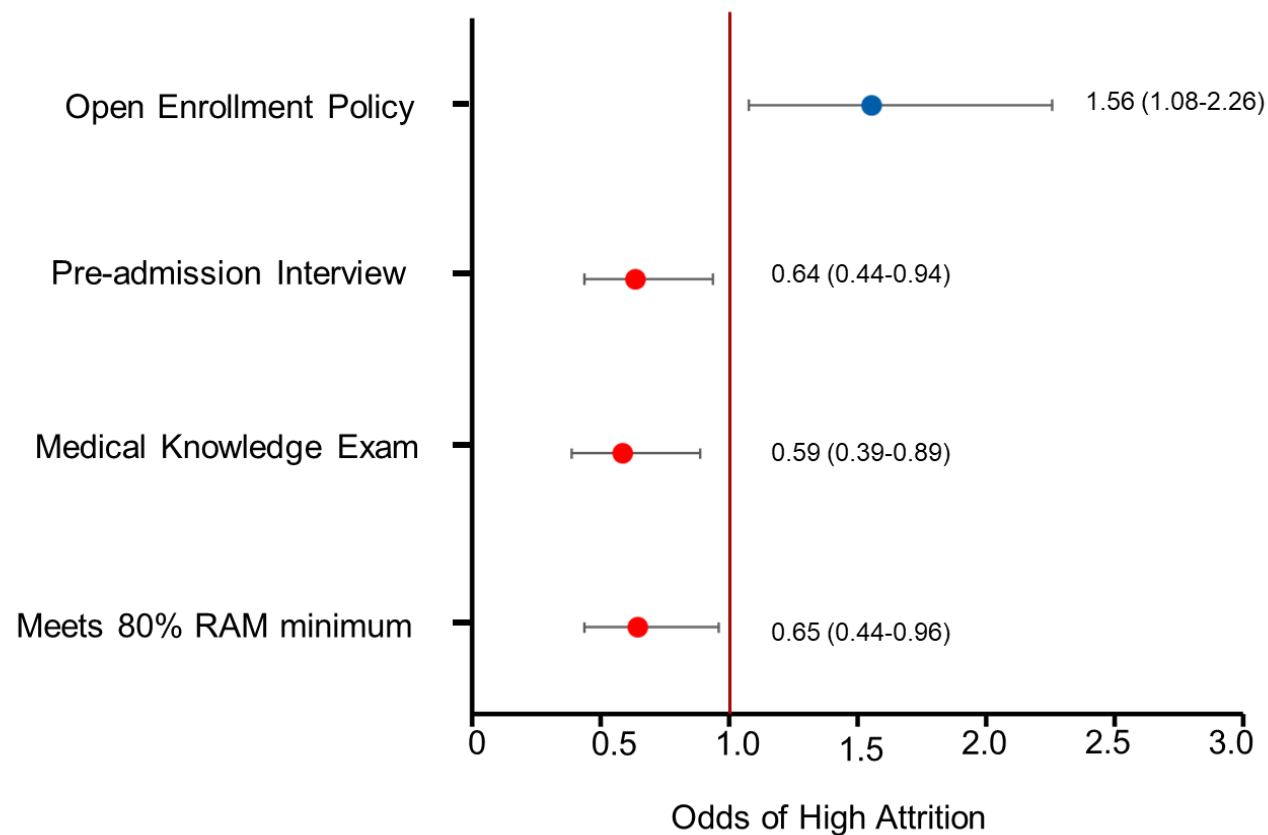
Requirement	2021 Cohort N (%)	
Reading Proficiency	400 (63%)	
Math Proficiency	371 (59%)	
College Level Courses	300 (48%)	
Pre-Admission Interview	259 (41%)	
Medical Knowledge Exam	221 (35%)	

Program Resources

Resource	2021 Cohort N (%)
Tutoring	532 (84%)
Counseling	448 (71%)
Career Planning	449 (71%)
Paid Employment	334 (53%)
Tuition Assistance	278 (44%)
Daycare	35 (6%)

Though critical for the success of students, tutoring, counseling, and career planning were **not** ubiquitous

Univariable Logistic Regression Analysis for Odds of High Attrition





What should be
the rate of
program
attrition?



- Open enrollment program
- No entry requirements
- RAM compliant

Why does this happen - Infrastructure

PREHOSPITAL EMERGENCY CARE
2024, VOL. 28, NO. 2, 326–332
<https://doi.org/10.1080/10903127.2023.2245476>



Taylor & Francis
Taylor & Francis Group

FOCUS ON WORKFORCE

OPEN ACCESS Check for updates

Medical Directors, Facilities, and Finances: Resource Deficiencies in Accredited Paramedic Programs

Michael Kaduce^a , Jonathan R. Powell^{b,c} , Lisa Collard^d, Christopher B. Gage^{b,c} , Michael G. Miller^d, and Ashish R. Panchal^{b,c,e}

Why does this happen - Infrastructure

RAM Benchmarks

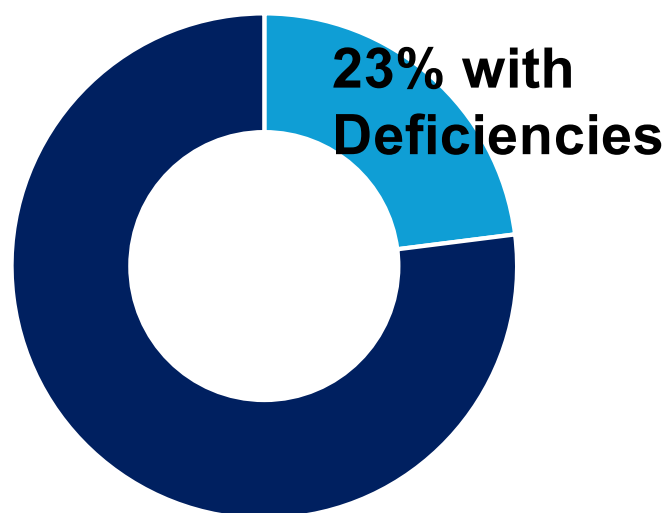


Table 2. Identified RAM deficiency domains and their frequencies ($n = 406$ deficiencies).

	Frequency (%) $N = 406$
Medical director	55 (14%)
Facilities	54 (13%)
Financial resources	51 (13%)
Support personnel	46 (11%)
Physician interaction	43 (11%)
Program faculty	42 (10%)
Clinical resources	32 (8%)
Field resources	29 (7%)
Curriculum	28 (7%)
Learning resources	26 (6%)

Attrition confirmation and more!

- In a state-level analysis of the Commonwealth of Virginia, confirmed high attrition rates
- Also, identified high rates of *failure to affiliate* with an EMS agency

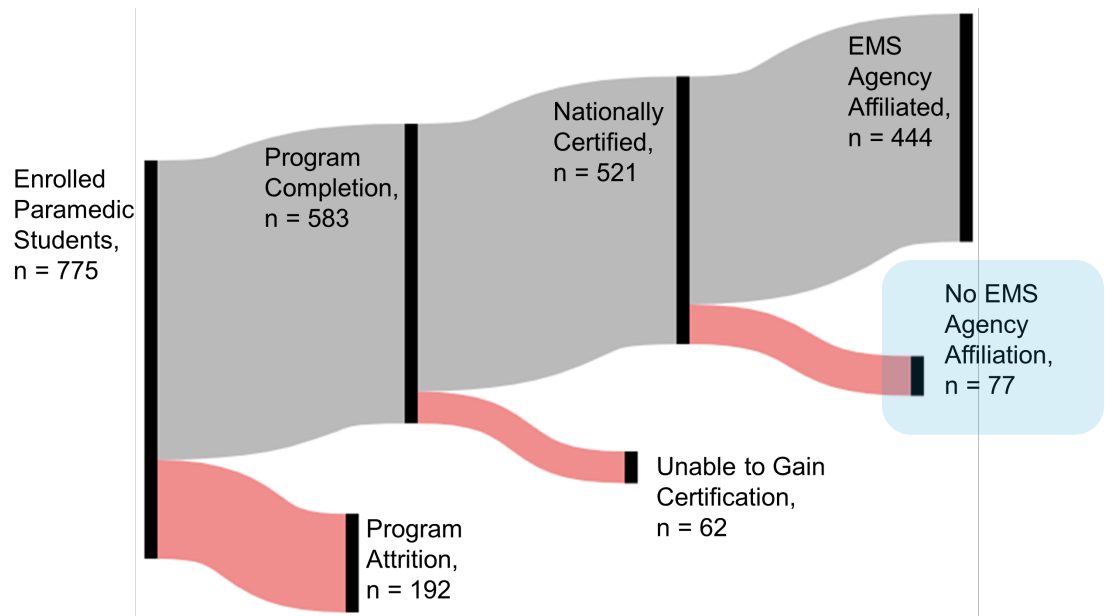
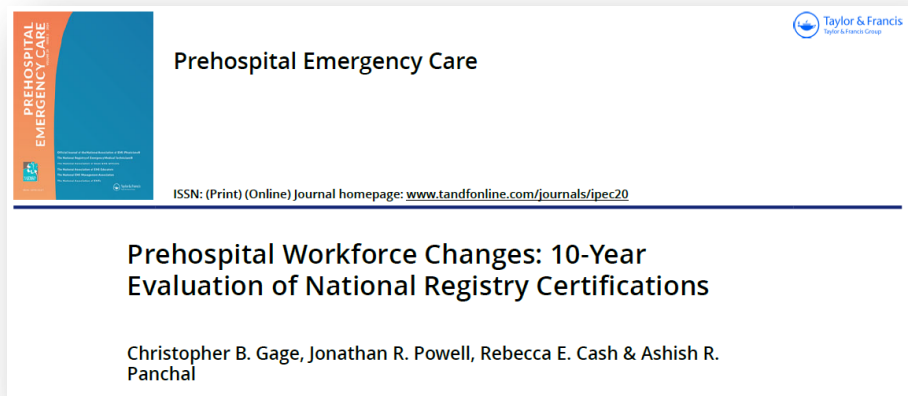


Table 1. Proportion summary of inflection points in the EMS workforce pipeline for 2018-2019 in the Commonwealth of Virginia.

Year	Program Attrition	Unable to Gain Certification	No EMS Agency Affiliation	Cumulative Loss of Workforce
2018	24.8% (192/775)	10.6% (62/583)	14.8% (77/521)	42.7% (331/775)
2019	28.2% (170/603)	17.3% (75/433)	12.8% (46/358)	48.3% (291/603)
Average	26.3%	13.5%	14.0%	45.1%

Now, some

GOOD NEWS

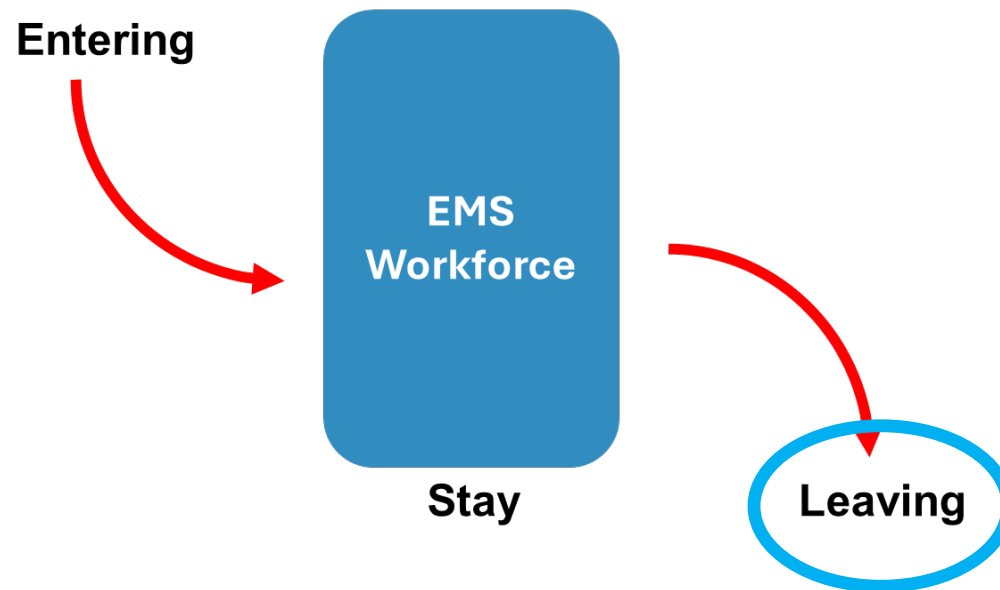


Gage C, Prehospital Emergency Care, 28:2, 333-334

- Consistent growth over 10 years
- Total testing increased by **3.5% annually**
- Total certified per year increased by **4.3% annually**



Dynamics of the EMS workforce



Leaving the Workforce



- This is the true number of EMS clinicians who leave the workforce
- This is challenging to measure, since many leaving takes many forms:
 - Leaves the workforce for different career
 - Leaves the workforce but maintains a “card”
 - Leaves a state to go somewhere else
 - Leaves an agency for another

Leaving Estimates: pre-COVID

- Past estimates with population-based studies estimated a weighted median annual turnover rate = 7.5% (IQR: 5.2%, 10.8%)

THE LONGITUDINAL STUDY OF TURNOVER AND THE COST OF TURNOVER
IN EMERGENCY MEDICAL SERVICES

P. Daniel Patterson, PhD, MPH, Cheryl B. Jones, PhD, RN, Michael W. Hubble, PhD, MBA,
NREMT-P, Matthew Carr, BS, NREMT-P, Matthew D. Weaver, BS, NREMT-P, John Engberg, PhD,
Nicholas Castle, PhD

- Estimates for intention to leave at 1 year and 5 years were also estimated at 6% and 27%.

Patterson et. al. J Allied Health 2009: 38, e84-e91
Rivard et. al. PEC 2020: 24(5), 657-664

Types of services employed were:

38-41% Fire, 22-23% Private, 12-14% Governmental, 9-12.7% Hospital



THE COLLABORATIVE FOR ADVANCING EXCELLENCE THROUGH ACCREDITATION

Agency Level Evaluation

- Quantitative analysis by AAA surveyed
 - 119 agencies (RR=17%) with leadership responding
 - Representing primarily private (66%) and public (33%) EMS
 - Rates ranging from 9% - 33% depending on role
- Limited by being qualitative, agency level evaluation, and over-representation

Turnover rates (2021, 2019)

Occupation	Overall Turnover
Full-time EMT	24% (28%)
Part-time EMT	33% (47%)
Full-time Paramedic	15% (19%)
Part-time Paramedic	27% (37%)
Supervisor	9% (8%)
Dispatch	21% (31%)

2021-AAA-EMS-Turnover-Study.pdf (ambulance.org)

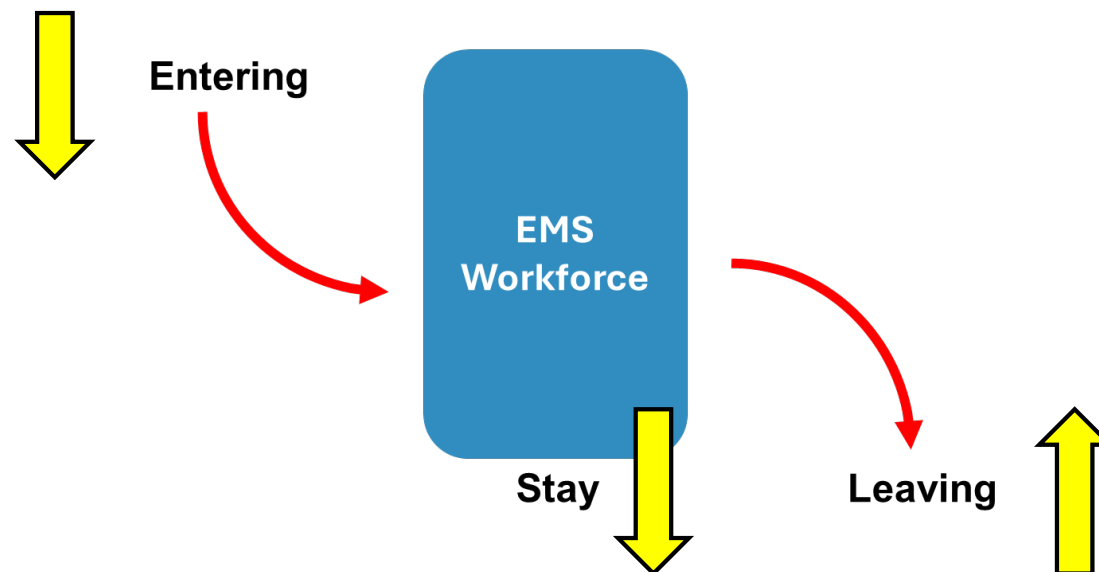
Leaving the Workforce

- We know that the rate varies by service type
- Range appears to be from 5% to 24% for full-time, per agency type

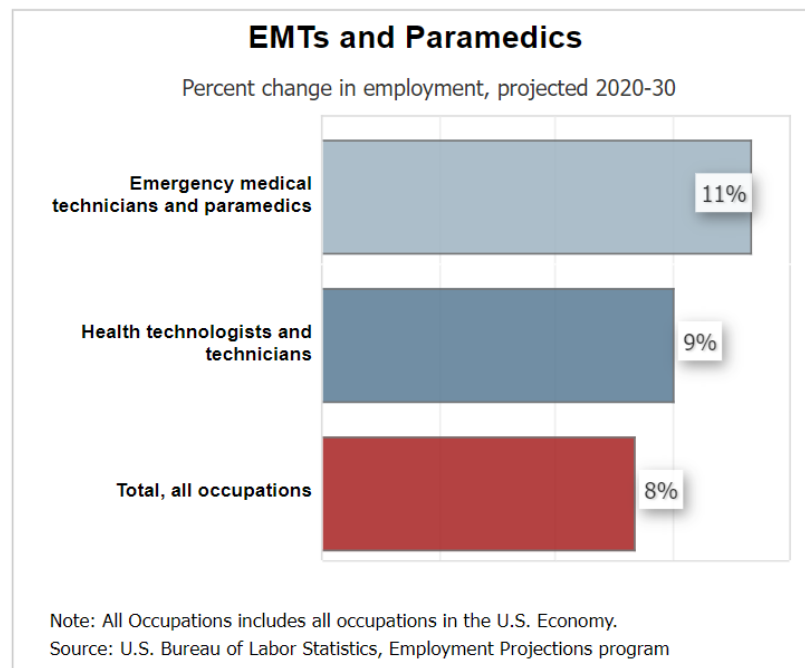
***NEED UPDATED POPULATION BASED
EVALUATIONS***

How does all this relate to the Workforce?

Workforce Dynamics and Education



The EMS Workforce – LARGER FRAME



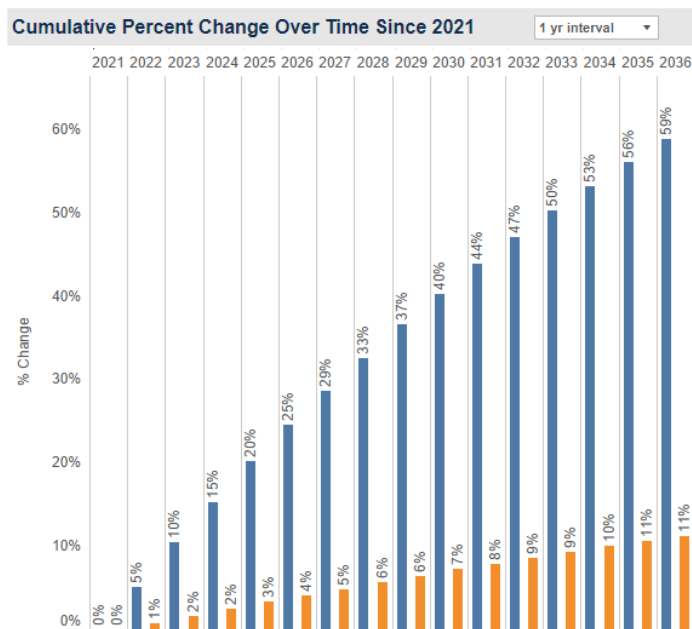
- From 2014-2060, population will increase by 31%
- To meet the growing population needs for 2030, estimated workforce demand may increase by 11%

Federal Forecasting...

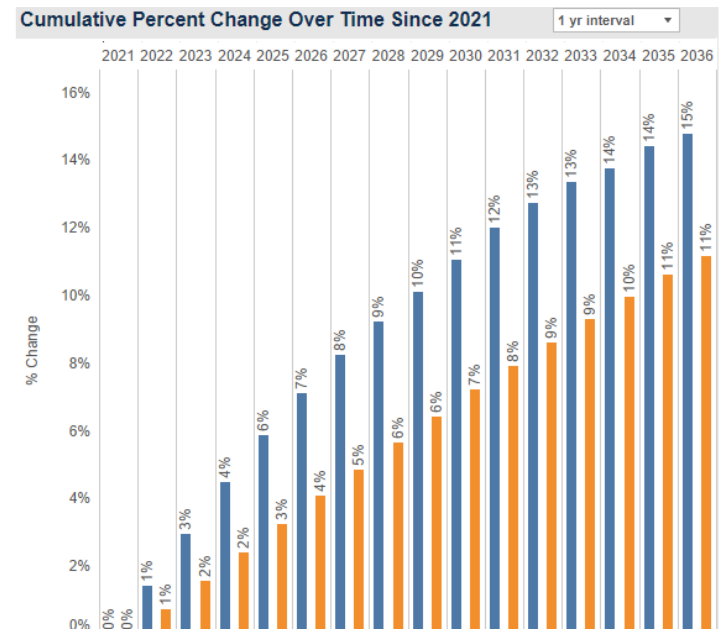
The screenshot shows the 'data.HRSA.gov' website. The header includes the HRSA logo and 'U.S. Department of Health & Human Services'. A search bar and 'A-Z Index' link are present. A navigation menu lists: Home, Find Health Care, Data, Maps, Tools, Topics, and Help. The breadcrumb trail reads: Home > Topics > Health Workforce > Workforce Projections. The main heading is 'Workforce Projections' with a red circular icon of three people. Below it, text states: 'View [National Center for Health Workforce Analysis](#) projections of the future supply of and demand for healthcare occupations. Projections were generated using some data from the period of the pandemic. See the "About this Dashboard" for more details about the projections.' A section titled 'Use this tool to:' lists four bullet points: 'Note: Projections for nursing occupations will be published soon.', 'View projection of the supply of and demand for health care workers at the state and national level', 'Analyze supply and demand trends by discipline', and 'Analyze projected "What if?" scenarios in the event of changes in the health care landscape'. To the right, links for 'About this Dashboard PDF' and 'View Workforce Projections Dashboard Webinar' are shown. The 'Explore Workforce Projections' section has a title 'Projected Supply and Demand of Healthcare Workers Through 2036' and a row of seven tabs: 'All Health Workforce', 'Allied Health', 'Behavioral Health', 'Long-Term Care', 'Oral Health', 'Primary Care', and 'Women's Health'.

HRSA Forecasting

Supply
Demand



Paramedic



EMT





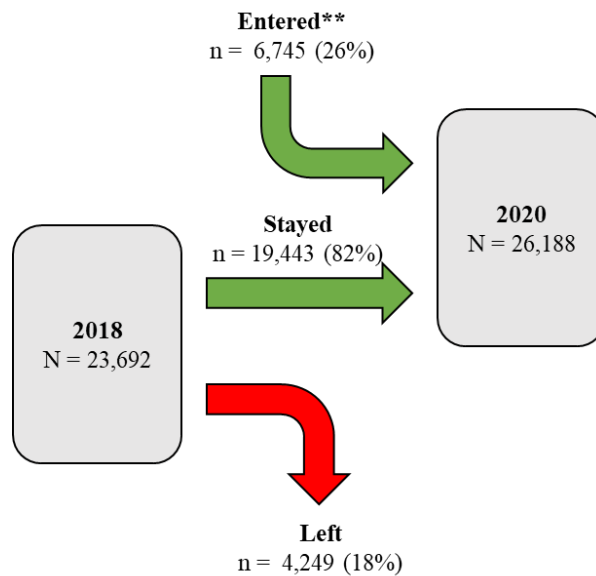


That's what we did!

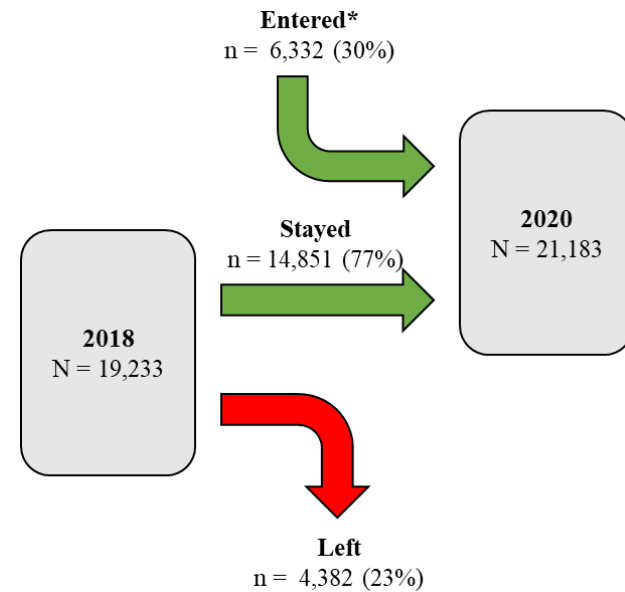
Multi-state Population Based

- Nine states that required National Registry recertification
- Looked at EMS clinicians entering, leaving and staying
- Made estimates based on the recertification process for each state
- Overall goal:
 - Build a reproducible method for population-based analyses of workforce
 - Start understanding the state-by-state variability in workforce dynamics

Multi-state Evaluation

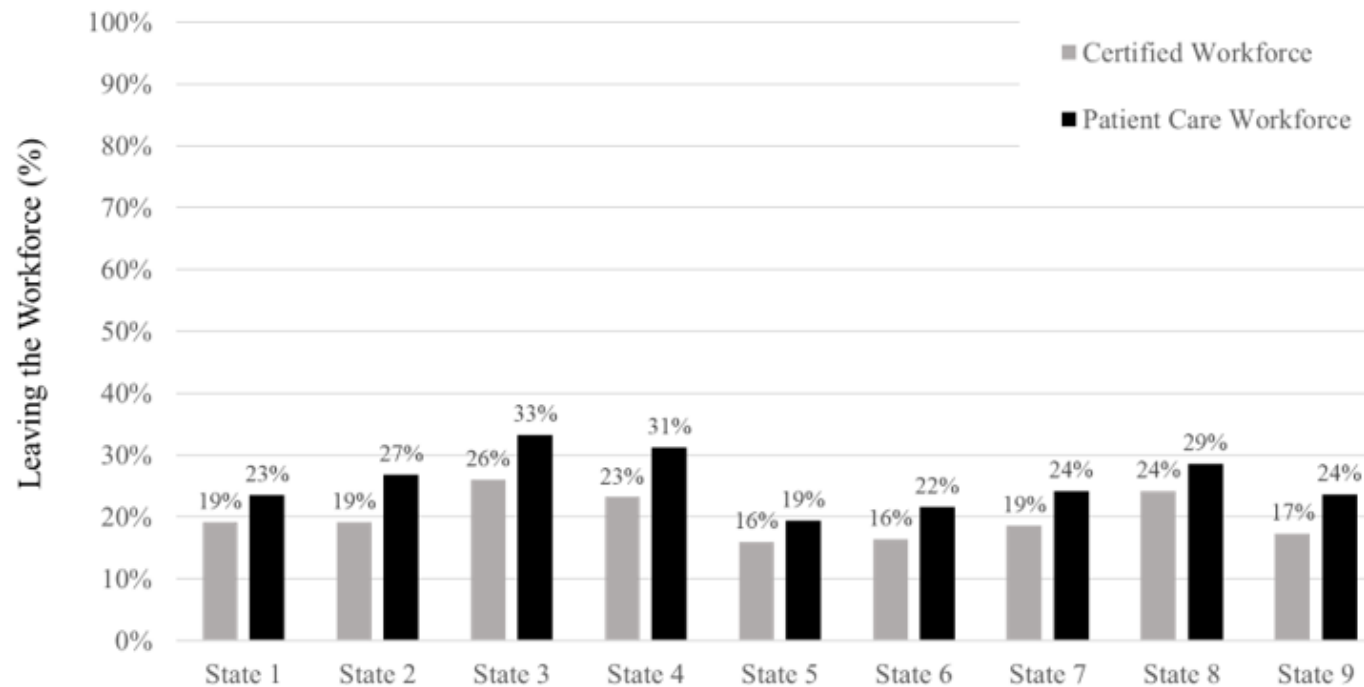


Certified Workforce

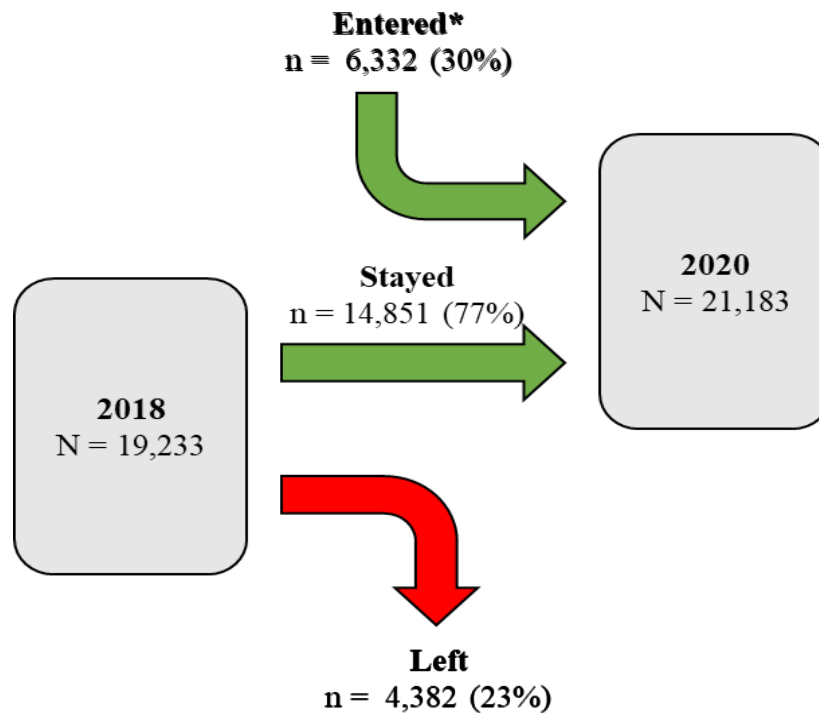


Patient Care Workforce

Variations per State



Patient Care Workforce



Entry is keeping the workforce going

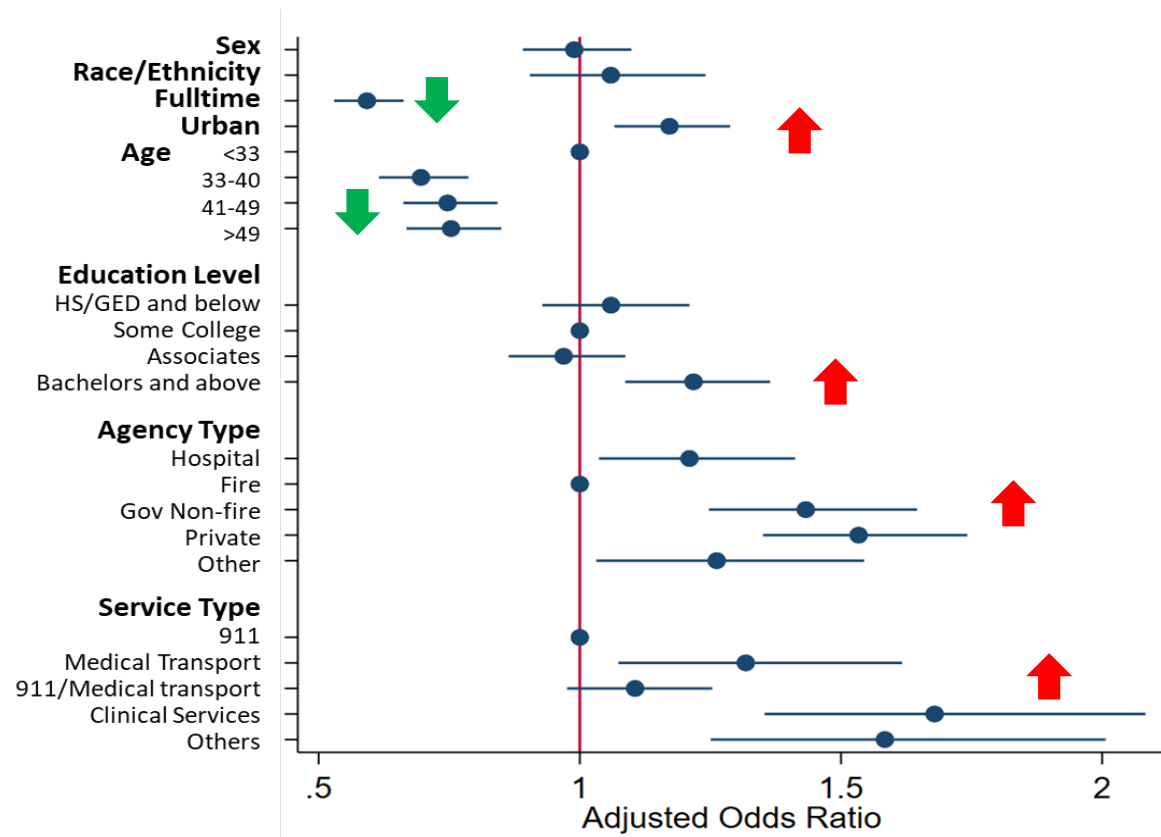


THE COLLABORATIVE FOR ADVANCING EXCELLENCE THROUGH ACCREDITATION

Who's leaving and why?



Odds of Leaving EMS in 12 months



Better Understand Our Leavers?

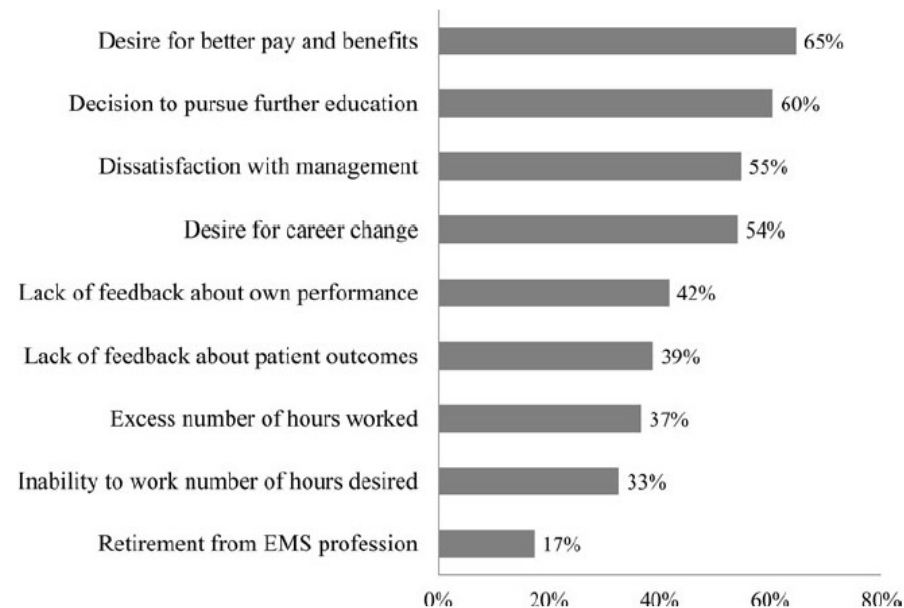


FIGURE 1. Percentage of respondents reporting that each factor was important in the decision to leave EMS. Respondents rated each factor independently, therefore percentages are not additive.

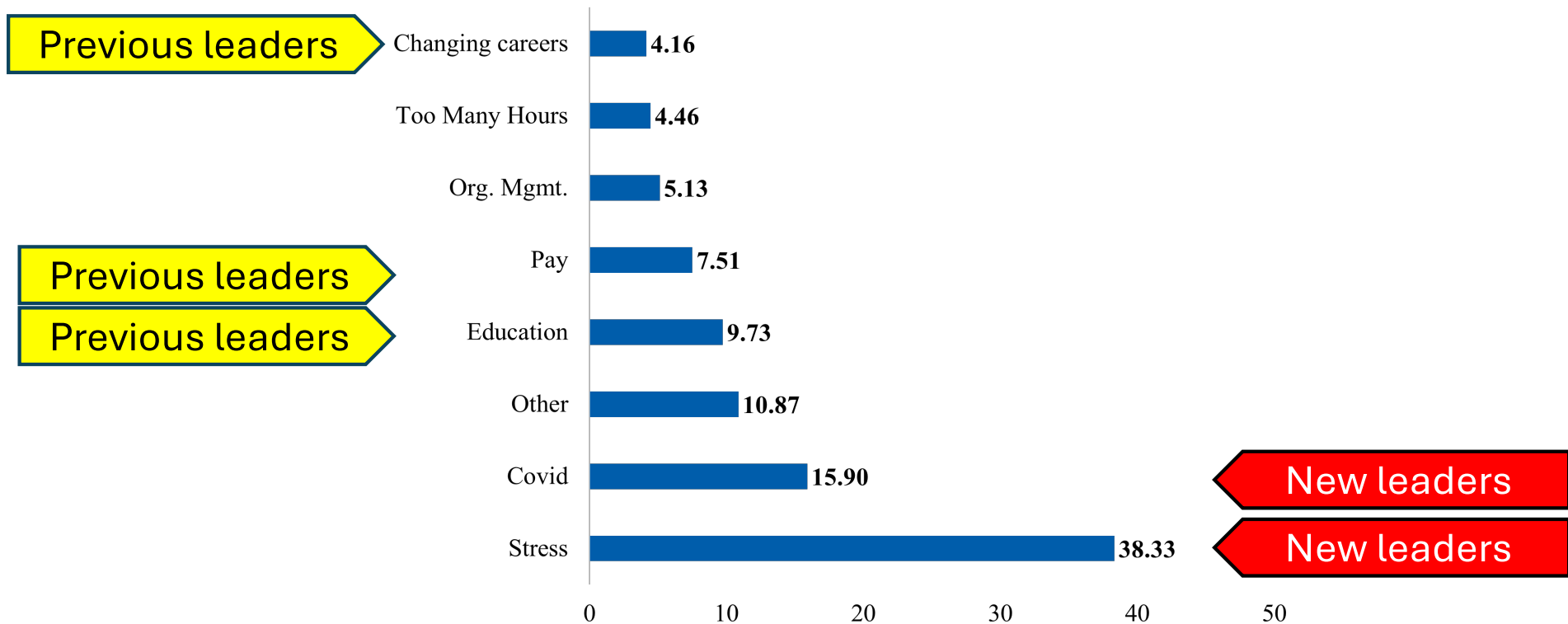
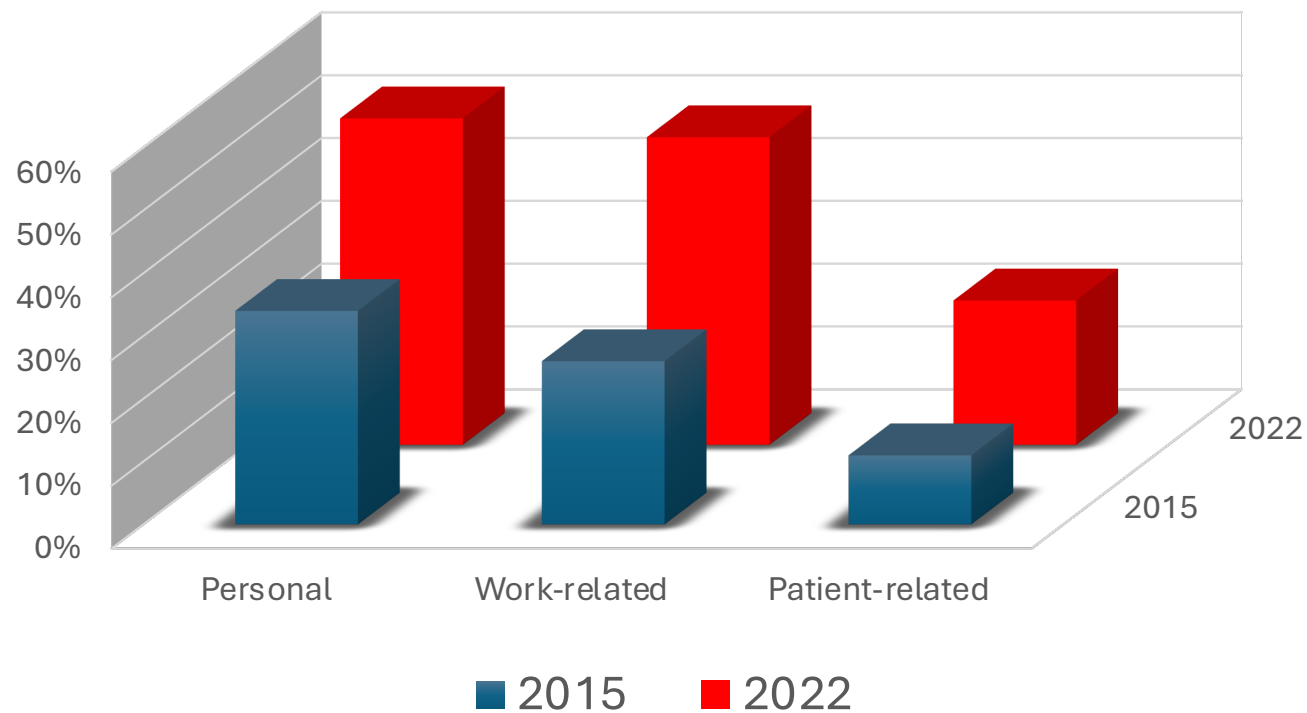


Figure 1. Reported reasons for leaving the EMS profession since COVID-19 (%). Abbreviations: Org. Mgmt., Organizational Management.

Burnout Prevalence Comparison

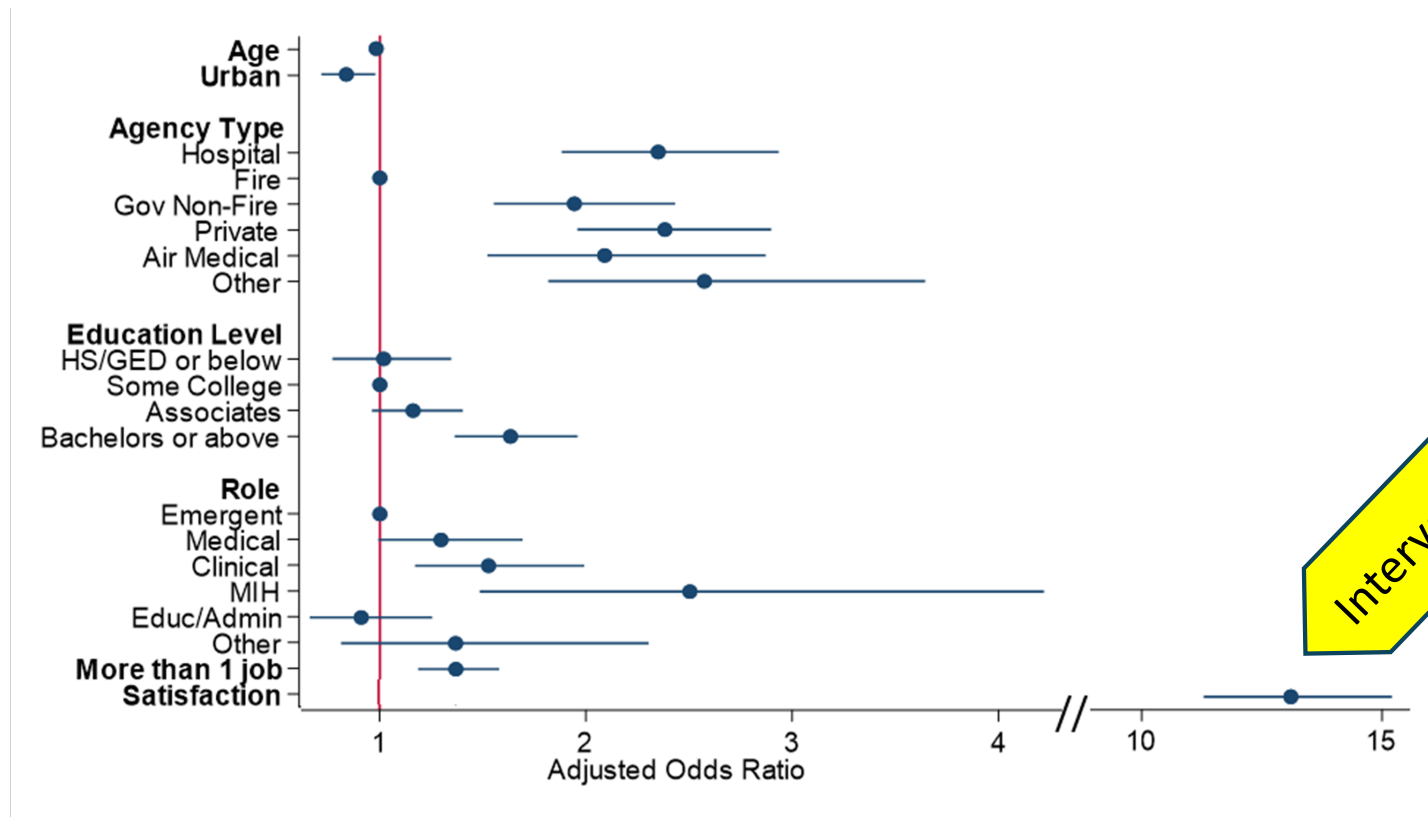


Action: Job Satisfaction



Huge impact from Satisfaction!

Odds of
Leaving in
12 months



Intervenable!

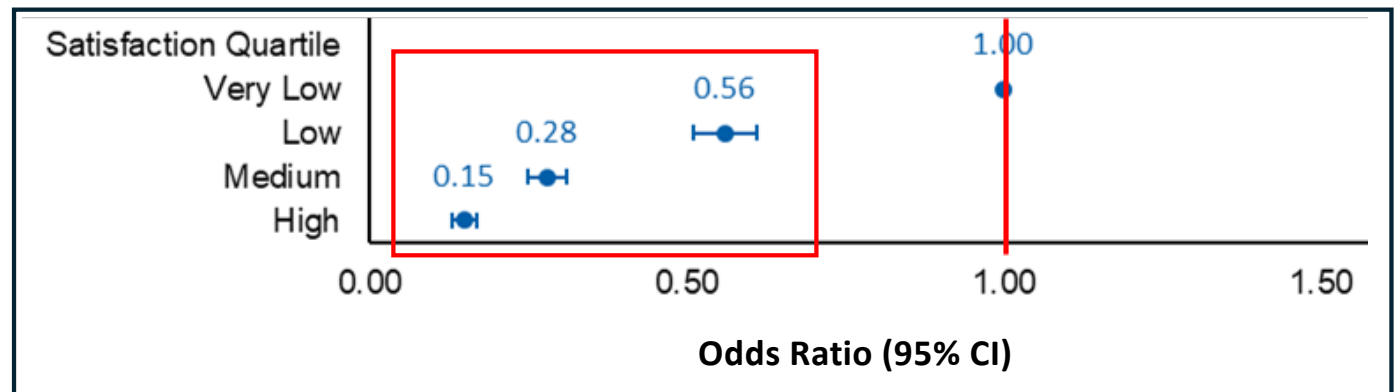
Evaluating Satisfaction

- We evaluated satisfaction in EMS jobs
- This was done by service type, agency type, and organizational culture
- Used a **VALIDATED** Job Satisfaction survey (Spector 1994) evaluating 9 dimensions of satisfaction
- We have over 39,000 responses!!!

Dimensions of Job Satisfaction
Pay
Promotion
Supervision
Fringe Benefits
Contingent Rewards
Operating conditions
Coworkers
Nature of work
Communication

Impact of Satisfaction

**Odds of
Leaving EMS
in 12 months**



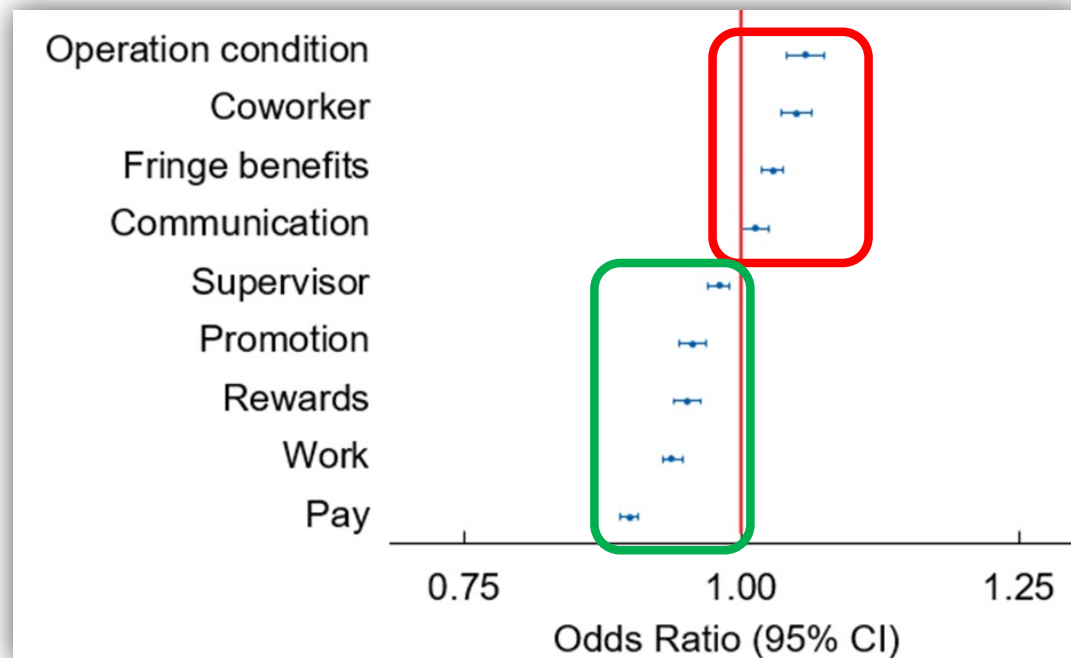
Adjusting for: Volunteer and full-time statuses, Number of EMS jobs, Certification level, Categorical age, Number of certification years, NASEMSO region, Race, Education level

*Satisfaction is **DRAMATICALLY** protective!*

Dimensions of Satisfaction

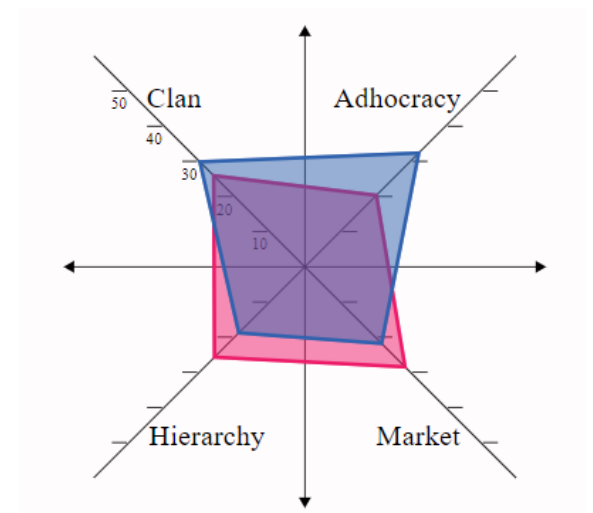
Likelihood of Leaving EMS

Adjusted for Age, gender, race, patient care role, education, ALS provider, urbanicity

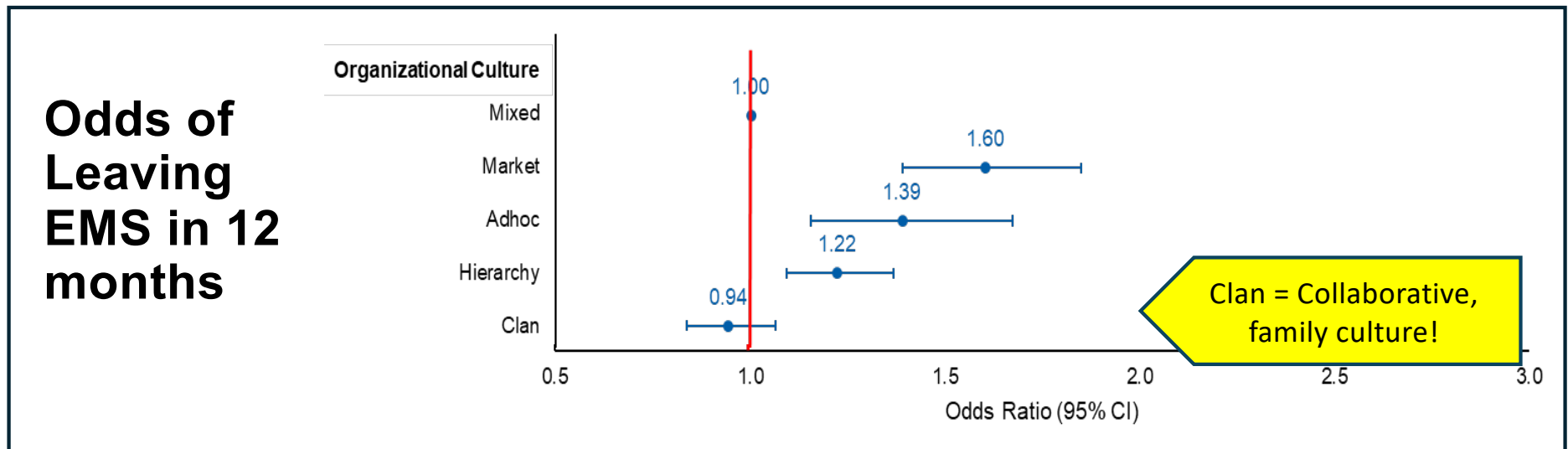


Action: Organizational Culture

- Organizational culture can be categorized:
 - Adhocracy (adaptable, risk-taking)
 - Clan (collaborate)
 - Hierarchy (control)
 - Market (compete)
 - Mixed (>2 cultural descriptions)



Develop a Collaborating Culture



Adjusting for: Volunteer and full-time statuses, Number of EMS jobs, Certification level, Categorical age, Number of certification years, NASEMSO region, Race, Education level

Final Thoughts



Bridging the Gap

- Multifactorial
- Each aspect depends on the other!
- Many opportunities, but the data is KEY!



Next Steps!



WE ARE STARTING TO
DEFINE THE PROBLEM



WE HAVE
COLLABORATIONS TO
HELP US GET THERE



WE MANY
OPPORTUNITIES TO
ADDRESS THE PROBLEM

Thank you!

Questions?





PREHOSPITAL EMERGENCY CARE
<https://doi.org/10.1080/10903127.2024.2379879>



Taylor & Francis
Taylor & Francis Group

OPEN ACCESS

Check for updates

Examining the Reliability and Validity of the ALS Certification Examinations with the Inclusion of Clinical Judgment: An Update on the ALS Examination Redesign

Brent A. Stevenor^a, Yin Burgess^a, Greg Sampson^a, Nadine LeBarron McBride^a, Mihaela R. Gugiu^a , Jenna Copella^b, James Davis^b, Brad Wu^b, and Ashish R. Panchal^{a,c}

^aNational Registry of Emergency Medical Technicians, Columbus, Ohio; ^bPearson VUE, Bloomington, Minnesota; ^cDepartment of Emergency Medicine, The Ohio State University Wexner Medical Center, Columbus, Ohio

Conclusion: We demonstrate strong reliability and validity evidence to support that the integrity of the examinations is upheld with the addition of clinical judgment items, while also providing a more robust candidate evaluation. Most importantly, the pass/fail decisions that candidates receive accurately reflect their level of ALS knowledge at the entry-level.

Thank you!

Questions?

