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A Consensus Panel Approach to Estimating the Start-Up and Annual Service Costs for Rural Ambulance Agencies

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INTRODUCTION

Many U.S. rural ambulance agencies rely on volunteers to staff their agencies and community goodwill to fund start-up and annual service costs, making it challenging to assess operational costs accurately.[1-6] The service-to-service and year-to-year variability in community-based cost subsidies makes it impractical to survey ambulance agencies for this information. This brief serves to fill this information void by relying on the consensus of a national panel of ambulance service policy and operations experts to estimate the fixed, variable, depreciation, and administrative costs of running an ambulance service. The panel's approach was to first create a standard for defining and staffing ambulance service areas. Since these service areas will have varying population densities and run volumes, the expert panel developed a framework with three population-based service tiers and estimated costs for providing ambulance services to be used for strategic planning purposes.

BACKGROUND

Historically, U.S. ambulance services have been treated as a transportation service and have not been systematically integrated into the health care system. Over time, the evolution of new procedures and technologies has enabled the delivery of more sophisticated health care services outside the walls of a hospital or clinic. While advanced technologies can facilitate improved health outcomes, they are also expensive. These increased expenses have been driving up the fixed costs associated with acquiring vehicles and equipment, as well as the variable costs associated with training and certifying staff members. When communities embark on a mission to set up ambulance services, community members are tasked with finding ways to fund and staff the service. Finding funding sources and community members willing to invest their time and effort as well as the training and certification costs associated with serving on an ambulance crew has not been an easy task for rural communities; particularly sparsely populated, socially vulnerable communities with low run volumes and relatively few local resources to draw upon. Rural demographic and market trends have also contributed to the challenges that rural communities face in putting together financially viable ambulance service(s).

The populations that rural ambulances are serving tend to have high rates of uninsured and publicly insured patients.[7-9] These populations tend to have low levels of health literacy and they tend to delay receiving care resulting in unmet health care needs, particularly in areas with health care provider shortages.[8, 9] Concurrent aging rural

Key Findings

- The expert panel established that ambulances could reasonably serve a maximum 25-minute travel time from the ambulance station that accounts for road conditions.
- A minimum access standard was defined as a single resource consisting of one full-time staffed ambulance, with a second unit "on-call", supported by a chief.
- Based on this minimum access standard, the population density within an ambulance service area, and the expected run volume, the expert panel established three population-based service tiers and estimated corresponding start-up and annual service costs.
- Total annual budgets scale up from approximately $964,200 in 2020 dollars ($1.04 million in 2023 dollars) in low volume service areas (with as few as 25 responses per year) to $2.09 million in 2020 dollars ($2.25 million in 2023 dollars) in high volume service areas (with 1,500 - 2,200 responses per year).
- Breakeven analyses suggest that low volume agencies experience operating costs of approximately $41,500 (in 2023 dollars) per response, while high volume agencies experience operating costs of roughly $1,020 per response.

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populations are also contributing to the increased demands on ambulance services. In 2017, over a third of the population age 65 years and older used ambulance services when visiting the emergency room, compared to 11-18% of the younger adult population.[10]

Public insurance plans such as Medicare and Medicaid tend to pay ambulance services at lower rates than private insurance, and typically reimburse an ambulance run only if the patient is transferred to a hospital emergency department.[11] The "treat and release" ambulance runs are often not billable events and contribute to the service's difficulties in staying financially viable.

The recent trends in rural hospital closures have made the challenge of preserving access to timely emergent health services for rural residents a pressing issue.[12-16] Potential solutions to ensuring adequate access to emergent services in rural areas affected by hospital closures include converting to Rural Emergency Hospitals (REH) and setting up freestanding emergency departments or primary care clinics with ambulance services.[17-20] Within the current environment of hospital closures and conversions, ambulance agencies will play a critical role in providing and coordinating care for community members. When local hospitals close, ambulance services will need to travel farther to transfer patients to hospital emergency departments outside of their local areas. In communities where hospitals convert to an REH, ambulance services play a critical role in facilitating transfers to a tertiary care or trauma center. In addition, in many rural communities, ambulance staff have expanded their community presence through community paramedicine and by participating in mobile integrated health.[18, 21-24]

When local, state, and federal governments consider how best to support their ambulance services, operating costs are a critical decision-making factor. Although previous studies have developed toolkits for estimating costs,[25-27] no studies have addressed the actual costs associated with starting up and providing ambulance services.

Calculating operating costs are complicated in part by many communities' reliance on volunteers willing to bear the training and time costs to serve on ambulance crews. In-kind donations and volunteers' time and effort(s) are difficult to track, enumerate, and value. Community and/or EMS organizations have shouldered the expense of hiring personnel and have covered the fixed costs associated with acquiring vehicles and equipment through a variety of funding mechanisms. Funding examples include property taxes, community fundraising activities, and partnering or integrating ambulance services with hospitals and fire departments. In 2011, nationwide, only 6% of ambulance services were hospital-based, 40% of ambulance services were fire department-based, 25% were private non-hospital-based, and 21% were governmental, non-fire-based.[6] Given that many ambulance services in rural areas rely on volunteers, the "ad hoc" strategy of relying on volunteers and community goodwill is proving insufficient for ensuring access to ambulance services in rural areas.[28-30] The decline in volunteerism and the fact that existing volunteers are aging out is contributing to gaps in the provision of ambulance services.[3, 4, 31, 32] A recent study covering 41 of the 50 states in the U.S. found that 4.5 million people live in areas that do not have an ambulance service capable of responding to a 911 call within 25 minutes and therefore live in ambulance deserts.[33]

This brief serves to fill the information void on the costs of running ambulance services for three population-based service tiers and establishes a minimum access standard for ambulances servicing a 25-minute travel time radius from the ambulance station. The model enables policymakers and community stakeholders to develop strategic plans for the financing and provision of ambulance services.

METHODS

Because of the complexity and lack of consistency related to tracking, enumerating, and valuing the time and effort of volunteer staff, rather than surveying ambulance services regarding the costs associated with running their ambulance services, a national panel of ambulance service policy and operations experts was convened. The expert panel consisted of three EMS stakeholders who have dedicated their careers to addressing rural EMS issues (see the expert panel members' biographies in the Appendix). The panel met approximately once a month during 2017-2018, and a few times in 2020 and 2023 to update the cost estimates. The expert panel used a qualitative and iterative method - the nominal group technique - to define ambulance service areas, identify a minimum access standard, and estimate the costs for three population-based service tiers.[34]

Since this project relied on the collective knowledge and consensus of a panel of ambulance service experts, person-specific information or sensitive data were not referenced or analyzed. The expert panel documented the resources needed to run ambulance agencies and gathered publicly available market information on wages and pricing.

Ambulance Service Areas and Minimum Access Standard

To establish a baseline to derive costs, the expert panel first defined what the uniform minimum national coverage area (geographic size) of rural ambulance agencies should be. While shortage area definitions have been established for primary care providers (e.g., Medically Underserved Area (MUA) & Health Professional Shortage Area (HPSA)),[35] they do not exist for ambulance coverage mainly because the ambulance goes to the patient, not vice-versa. The expert panel concluded that ambulance agencies in rural areas could reasonably serve a maximum 25-minute travel time radius from the ambulance station that accounts for differences in conditions on primary roads (e.g. winding roads or steep grades). For road surfaces that accommodate traveling 60 miles per hour, this translates to ambulance service areas spanning a 25-mile radius from the ambulance station (approximately 2,000 square miles of coverage). In the event of multiple simultaneous requests for service, this geographical coverage puts the next closest resource between 25 and 75 miles (at the farthest edge of an adjacent service area).

Given the ambulance service areas outlined above, the minimum access standard was defined by the expert panel as a single resource consisting of one full-time staffed ambulance covering a 25-minute travel time radius, with a second unit paid "on-call" (referred to by the Fair Labor Standards Act as "engaged to wait"),[36] supported by a chief.

Service Tiers

The expert panel identified three tiers of service (Table 1). Based on the expert panel's experience, approximately 10% of the population will use ambulance services in any given year.

Thus, the first tier serves a maximum population of roughly 8,000 people (where 799 represents approximately 10% of 8,000 people); the second tier serves a maximum of 15,000 people, and so forth. The first tier reflects the baseline level of the minimum access model and serves a maximum threshold of 799 annual responses. Over the course of a year, this amounts to responding to slightly more than two calls per day (799/365=2.2 trips per day). Given that ambulances are facing relatively long distances to bring patients to hospitals in rural areas, two runs are the most any one service can practically accomplish in one day. The first tier calls for one primary "on duty" ambulance unit, defined as a unit that is ready for immediate response. While on duty ambulance units increase by one unit per tier, all tiers employ one immediate on-call (i.e. "working to wait") reserve unit and one chief. The second tier is scaled to two primary ambulance units on duty full-time for annual run volumes of 800 to 1,499 responses (between two to four responses per day). The third tier is scaled to 3 full-time ambulance units for 1,500 or more annual responses (over four responses per day). These three tiers primarily reflect differing population size and health care needs.

Table 1. Ambulance Service Tiers

	Tier 1	Tier 2	Tier 3
Ambulance Units	1	2	3
Service Area Population	≤8,000	8-15,000	15-22,000
Responses per year *	≤800	800-1,499	1,500-2,200
Responses per day	≤2	2-4	≥4

* Assuming the ambulance serves a 25-minute travel time radius and that 10% of the population will use ambulance services during the year.

FINDINGS

This section first details ambulance agencies' operational costs for the baseline Tier 1 minimum access model. Tier 2 and Tier 3 levels scale Tier 1 cost data with corresponding increases in line items reflecting the additional use of resources. All costs reflect national averages and are reported in 2020 dollars.

Vehicle Costs

The national bids of the Savvik Buying Group (formerly known as the North Central Emergency Medical Services (EMS) Corporation) were used to calculate vehicle costs. Savvik pricing was used because, in 2020, Savvik had 12,621 EMS agency members, representing all 50 of the United States, Canada, Mexico, Colombia, and four other areas. Based on Savvik's pricing list, a modular ambulance capable of performing ambulance responses requiring paramedic care was chosen. National pricing for an advanced life support level monitor/defibrillator/pacing unit, a self-loading stretcher, and mobile radios were included. For convenience, the actual costs for all other ambulance equipment were obtained from a paramedic All other supplies necessary for the ambulance were derived from a rural ambulance agency that has access to the Savvik Buying Group and other buying contracts. Because fuel prices vary considerably across the country, estimates of average national fuel costs were included in administrative expenses.

Assuming ten-year straight-line depreciation for all vehicles, the second ambulance and spare/replacement ambulances will likely be 25-50% into their useful life expectancy. Straight-line depreciation is calculated by dividing the

acquisition cost by the number of years of useful life. Thus, backup ambulances were devalued by $25,000 and $50,000, respectively. The cost of the agency chief's non-transport vehicle plus equipment was estimated at $57,500 (Table 2).

Building Costs

The cost of construction and land acquisition were obtained by comparing actual costs from rural ambulance agencies in different states housing no more than four vehicles. Ambulance agencies are spending over $1.7 million to construct these facilities in rural areas. These are buildings that house vehicles, and support staff with a kitchen, sleeping quarters, offices, and a meeting room. While buildings and common areas are not required by regulatory agencies, they are needed to maintain vehicles, refrigerate medications, stock supplies, and conduct trainings and meetings. Building depreciation was calculated as 30 years straight-line. While it may be possible for an ambulance agency to use donated space from a city department or hospital, the availability of free or discounted space cannot be guaranteed and may be time-limited. Thus, the model assumes facilities are needed and constructed.

Technology Costs

To assess costs for technology, data were obtained from vendors connected to the federal First Responder Network (FirstNet) Authority.[37] Established by Congress in 2012, the FirstNet Authority is a nationwide broadband network dedicated to emergency responders and the public safety community. Communications equipment costs include a basic dual-band portable 5G/Land Mobile Radio (LMR) band capable device for crew members, and ruggedized laptops for capturing electronic patient report (ePCR) in each vehicle (Table 2). Not included in total costs are the service plans for the portable devices but they are described in Table 2. Services may want to substitute separate portable radios and LTE smartphones/cell phones for crew members based on local equipment and service plans available. Seven-year straight-line depreciation was used for radios, and three years for smartphones and laptops.

Salary Costs

Using 2020 data reported by the non-profit Independent Sector organization,[38] the average earnings of production and non-supervisory workers on non-farm payrolls were used to estimate the value of volunteer time at $27.20 per hour. Thirty percent of that value was assigned to benefits, yielding a cost per hour of $19.04 (i.e., 70% *27.20) for salary and $8.16 for benefits (Table 2). Members of the expert panel considered this rate representative of skilled labor rates in their states.

A second "on-call" crew must be ready to move the ambulance in ten minutes or less. The 2020 federal minimum wage of $7.25 per hour was used to represent this crew's on-call pay rate while "working to wait" for the next 9-1-1 call. The expert panel also concluded that, on average, this second crew would be used for 15% of the total hours they were on-call. The higher pay rate of $27.20 per hour ($19.04 + benefits) for 15% of on-call hours was used. The chief's hourly wage was estimated at 125% of the crew pay with an additional 30% to cover employee benefits. Based on these assumptions, the annual employee costs to operate an ambulance covering 2,000 square miles with one staffed and one ready backup crew plus a chief is $726,713 (Table 2).

Certification/Licensure/Education Costs

The initial certification exam, re-certification, and continuing education costs are not depreciated because they are ongoing. States vary in their licensing requirements but most commonly require re-certification every two years (Table 2). An active rural ambulance agency roster consisting of 18 people to cover both the full-time crew and on-call staff was used. Approximately half the team (i.e., nine people) would recertify each year. According to the 2015 report by the National Association of State EMS Officials (NASEMSO), licensure fees vary by state for EMS personnel and range from under $100 for EMTs to $300 for paramedics.[39] The National Registry of Emergency Medical Technicians (NREMT) initial testing is $80 for EMTs and $125 for paramedics. Their renewal fee is $20 for EMTs and $25 for paramedics. [40, 41]

Assuming two staff positions turn over each year, an agency would incur costs related to their new staff's initial certification exam. According to estimates from the National Organization of State Offices of Rural Health (NOSORH), total reimbursable expenses for sponsoring an employee for their initial paramedic exam and travel is just over $800 per person (Table 2). All states require some level of continuing education for re-licensure. Many states are adopting a new continuing education model created by the NREMT that accounts for local, regional, and state-level continuing education. According to NOSORH's estimates, ongoing training costs approximately $1,200 per person per year (Table 2).

All Other Administrative Costs

The expert panel estimated that other administrative costs account for roughly 9% of an ambulance agency's total budget. For Tier 1, 9% of $884,600 is $79,600 (Table 2). This expense category accounts for such things as office supplies, liability insurance, restocking supplies, uniforms, and cleaning equipment.

Scaling up for Tiers 2 and 3

These analyses estimate the cost to operate a rural ambulance agency in the United States under a minimum access policy that includes one ambulance on duty and one ambulance on immediate call to cover 2,000 square miles with 799 or fewer responses per year (Tier 1) of approximately $680,300 in vehicle and equipment costs. Adding in staff salaries, benefits, and training costs, total fixed and annual costs were $884,600. Finally, with the addition of 9% administrative costs, the total annual costs were $964,200 in 2020 dollars ($1.04 million in 2023 dollars) (Table 3).

Scaling up to Tier 2 to cover between 800 and 1,499 yearly response calls for two primary ambulances with two 24-7 crews, one on-call ambulance, an additional ambulance back-up unit, and one non-transport chief's unit that yield total vehicle and equipment costs of $910,600. Adding in staff salaries, benefits and training costs, total fixed and annual costs were $1.40 million. Finally, with the addition of 9% administrative costs, total annual costs were $1.53 million in 2020 dollars ($1.64 million in 2023 dollars).

Increasing capacity to Tier 3 to cover more than 1,500 yearly responses requires three 24-7 crews and ambulances, one on-call ambulance, an additional ambulance back-up unit, and one non-transport chief unit that yield total vehicle and equipment costs of $1.14 million. Adding in staff salaries, benefits, and training costs, total fixed and annual costs were $1.91 million. Lastly, with the addition of 9% administrative costs, the total annual costs were $2.09 million in 2020 dollars ($2.25 million in 2023 dollars).

In summary, the total annual budget for each of the Tiers 1-3 is approximately $964,200, $1.53 million, and $2.09 million in 2020 dollars, respectively (or $1.04 million, $1.64 million, and $2.25 million in 2023 dollars).

Breakeven Analyses

Given the annual budgets for Tiers 1-3, varying the number of responses (including transports) ambulance agencies experience illustrates the level of reimbursement required to breakeven. Breakeven costs for Tier 1 agencies range from a high of $41,500 to $1,300 (in 2023 dollars) per response for volumes ranging from 25 to 799 responses per year, respectively (Table 4). Tier 2 agencies range from $2,050 to $1,100 per response if they average 800 to 1,499 responses per year. Tier 3 agencies have a greater chance of realizing positive operating margins, with breakeven costs ranging from $1,500 to $1,020 per response for volumes of 1,500 to 2,200 responses per year, respectively.

DISCUSSION

This study utilized a qualitative and iterative method known as the nominal group technique to enlist the advice of a panel of EMS experts and define ambulance service areas, identify a minimum access standard, and estimate the costs for three population-based service tiers. Due to the variability in ambulance agency types, funding streams, staffing, and agency volumes, the costs per transported patient can also vary significantly. This study offers a framework that can accommodate the complexity associated with various operating environments and geographic locations. Several key modeling assumptions could be modified and tailored to specific state environments.

For example, although the expert panel estimated that, on average 10% of the population would need ambulance services, a more precise means of estimating a given population's demand for ambulance services can be performed using existing datasets such as the National Emergency Medical Services Information System (NEMSIS). Although analyzing this dataset was outside of the scope of this study, data regarding current run volume(s) for existing ambulance services within each of the states can be used to estimate the number of ambulance runs typically performed. In the U.S., ambulance agencies submit patient and systems data to their state EMS offices, which in turn provide these data to a national data repository (NEMSIS).[42]

In addition, to create more precise estimates state policymakers could obtain socioeconomic data from public use datasets such as the U.S. Census. Based on population density within census blocks, and run data from state EMS offices, the number of ambulance runs typical of the socioeconomic and health risk profile(s) for the population within the ambulance service area(s) can be estimated.

Based on these estimated run volumes, ambulance service tiers can be identified, and the respective costs of starting up and providing ambulance services can be estimated using the framework outlined within this brief. Finally, the regional

Table 2. Fixed, Depreciation, Variable and Administrative Costs for the Ambulance Uniform Minimum Access Standard

Expense Category	Start-up Costs	Annual Costs	Assumptions
	Fixed	Depreciation	
Ambulance and Equipment Costs	**230,336**	**23,034**	The useful life of the equipment is ten years. Straight-line depreciation of 10 years was used for ambulances and medical equipment.
Vehicle	128,787		
Defibrillator	38,979		
Stretcher/Loading System	45,783		
All other supplies	16,787		
Secondary Ambulance Back-up	**208,736**	**20,874**	
Additional Ambulance Back-up	**183,736**	**18,374**	
Chief/Supervisor Unit	**57,500**	**5,750**	
Building	**1,725,000**	**57,500**	Straight-line depreciation of 30 years was used for buildings
Technology	**91,200**	**17,829**	Straight-line depreciation was used for communications equipment: portable radios (7 years), smartphones and laptops (3 years)
Router/modem (high power FirstNet capable)	3,600		$1,200 per truck.
Mobile VHF P25 radio	6,600		$2,200 per truck. Mid-range, 50 - 100 Watt. Add $8,000 per unit for vehicular repeater function to enhance range of portables on scene.
Portable dual-band smartphone/radio devices: First "band" is FirstNet LTE Second band is a P25 standard VHF Land Mobile Radio (LMR) capability (700/800 trunking) *	66,000		$2,200 per user. Cost includes single bay charger(s) and basic accessories. Multibay LMR battery charger/conditioner, extra batteries and replacement accessories are extra.
Ruggedized laptops for ePCR in each vehicle	15,000		ePCR = electronic Patient Care Report. Based on PC Magazine "as tested" prices of top end recommended units. Assumes using router/modem hotspot for broadband connection.
Total Start-up Fixed Costs	**2,496,508**		
Total Annual Depreciation Costs		**143,360**	

Table 2. Continued

Expense Category		Salaries & Benefits	Assumptions
Annual Employee Salaries		**726,713**	
On duty crew of two		333,581	24 hours a day assumptions; $19.04/hr = 70% of $27.20 volunteer time cost
On duty crew benefits		142,963	30% of $27.20 volunteer time cost
"On-call" crew of two on a pager		127,020	min.wage of $7.25/hr, available 24/7, paid on-call
"On-call" crew performing transports		52,429	15% of call time at the higher duty pay rate of $27.20/hr
Chief's salary		49,504	125% of the duty crew's wages
Chief's benefits		21,216	Benefits are calculated at 30% of wages or salary
		Training & Subscription Costs	
Annualized Training Costs		**13,017**	
Ongoing biennial re-certification costs		725	$81.50/person; half of the staff (9/18) are recertified each year
Initial certification exam		1,622	$810.75 for each of 2 new positions per year
Biennial continuing education		10,670	$1,185.65 for each of 9 staff each year
Subscription costs		**1,530**	$40/month for each FirstNet subscription.
		Total Annual Costs	
Total Annual Costs (Depreciation + Salaries + Operating)		**884,620**	
Administrative Costs (9% of Annual Budget)		**79,616**	
Grand Total Annual Budget		**964,236** [20] [£]	
		1,038,176 [23]	

* LMR radio and broadband communications can be had in many ways with many devices. The most basic is either a combined dual-band device (available through FirstNet or others), or a low-end single-band P25 VHF,UHF, or 700/800 trunked band radio and a separate smartphone.

[£] Adjusting for inflation using the Consumer Price Index (CPI) from January 2020 to June 2023, the grand total of $964,236 in 2020 dollars is equivalent to $1,038,176 in 2023 dollars (https://www.bls.gov/cpi/data.htm)

Table 3. Costs Associated with Ambulance Service Tiers: Fixed, Depreciation, Variable, and Administrative

	Tier 1 (<800 Responses/Year)		Tier 2 (800-1499 Responses/Year)		Tier 3 (1500-2200 Responses/Year)	
	Start-up Costs	Annual Costs	Start-up Costs	Annual Costs	Start-up Costs	Annual Costs
	Fixed Costs	Depreciation	Fixed Costs	Depreciation	Fixed Costs	Depreciation
Ambulance and Medical Equipment *	1 Primary Ambulance		2 Ambulances		3 Ambulances	
Primary Ambulance and Equipment	230,336	23,034	460,672	46,068	691,008	69,102
Secondary Ambulance Back-up	208,736	20,874	208,736	20,874	208,736	20,874
Additional Ambulance Back-up	183,736	18,374	183,736	18,374	183,736	18,374
Chief/Supervisor Unit	57,500	5,750	57,500	5,750	57,500	5,750
Total Vehicle & Equipment Costs	680,308	68,032	910,644	91,066	1,140,980	114,100
Building **	1,725,000	57,500	1,725,000	57,500	1,725,000	57,500
Technology ***	91,200	17,829	115,847	22,452	140,494	27,076
Variable Costs: Ambulance Crews						
Salary & Benefits	1-24x7 crew	726,713	2-24x7 crews	1,203,257	3-24x7 crews	1,679,801
(n-24x7, 1-on-call, 1-transport; 1-chief)		13,017		22,591		30,543
Training (Initial & re-certification, CE)		1,530		3,060		4,590
Total Fixed & Annual Costs						
Fixed, Annual = Depreciation + Variable	2,496,508	884,620	2,751,491	1,399,926	3,006,474	1,913,610
Administrative Costs						
Other Administrative (9% of budget)		79,616		125,993		172,225
Grand Total Annual Budget						
Depreciation + Variable + Administrative		964,236[20 £]		1,525,919[20]		2,085,835[20]
		1,038,176[23]		1,642,931[23]		2,245,782[23]

* Straight-line depreciation over ten years was used for ambulances and medical equipment

** Straight-line depreciation over 30 years was used for buildings

*** Weighted straight-line depreciation was used for communications equipment: radios (7 years), cell phones and laptops (3 years)

£ Adjusting for inflation using the Consumer Price Index (CPI) for medical care, the grand total of $964,236 in 2020 dollars is equivalent to $1,038,176 in 2023 dollars (https://www.bls.gov/cpi/data.htm).

Table 4. Breakeven Analyses: Costs per Response*

	Tier 1 (<800 Responses/Year)		Tier 2 (800-1499 Responses/Year)		Tier 3 (1500-2200 Responses/Year)	
Range of Responses	**Minimum**	**Maximum**	**Minimum**	**Maximum**	**Minimum**	**Maximum**
	0	799	800	1499	1500	2200
Annual Budget		1,038,176[£]		1,642,931[£]		2,245,782 [£]
Distribution of Responses	**Annual No. of Responses**	**Cost per Response**	**Annual No. of Responses**	**Cost per Response**	**Annual No. of Responses**	**Cost per Response**
	25	41,527				
	50	20,764	800	2,054	1500	1,497
	100	10,382	900	1,825	1600	1,404
	200	5,191	1000	1,643	1700	1,321
	300	3,461	1100	1,494	1800	1,248
	400	2,595	1200	1,369	1900	1,182
	500	2,076	1300	1,264	2000	1,123
	600	1,730	1400	1,174	2100	1,069
	700	1,483	1499	1,096	2200	1,021
	799	1,299				

* The number of responses includes transports and refers to the number of calls to which the ambulance crew responds.
[£] Annual budgets were adjusted for inflation using the Consumer Price Index (CPI) for medical care and stated in 2023 dollars (https://www.bls.gov/cpi/data.htm).

variation in the costs of providing ambulance services can be adjusted for using the non-facility practice expense component of the Geographic Practice Cost Index (GPCI).

With median Medicare payment rates less than $1,000 per transport,[43] the model demonstrates that the majority of rural ambulance agencies may not breakeven, particularly when agencies employ paid versus volunteer staff and/or serve in sparsely populated rural areas and/or in areas with a majority of publicly insured residents.[7, 44] In fact, based on a 2010 survey of EMS directors in 23 states, over 80% of rural ambulance agencies rely on multiple sources of funding, with over half receiving one-time state, local, or grant funds.[2, 32, 45-50]

Although this study does not encompass the entire EMS system (e.g., enlisting first responders or running emergency departments), this study facilitates an informed discussion regarding the costs associated with maintaining and running ambulance agencies.

POLICY IMPLICATIONS

These data provide timely information to rural communities, states, and regional policymakers facing critical access to care issues resulting from rural hospital closures, low patient volumes, high rates of uninsured and publicly insured patients, provider shortages, low federal payment rates, and last but not least, a declining volunteer ambulance workforce.

From a policy perspective, the cost data provide a basis for formulating state and regional strategic plans for the financing and provision of ambulance services, ensuring access to emergency health care services, filling ambulance coverage gaps, revamping reimbursement policies, and formulating workforce incentives.

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APPENDIX. EMS Expert Panel Short Biographies

Gary Wingrove, FACPE, CP-C

Gary Wingrove started his ambulance career as a volunteer with a rural municipal ambulance service in central Iowa. Since that time he has served in every role at ambulance services. Gary is an invaluable advocate for the EMS community. The biggest change he has witnessed is the explosive growth of Community Paramedicine, which he has played an instrumental role as the Chair of the International Roundtable on Community Paramedicine. Gary is President of The Paramedic Foundation and is a former Minnesota state EMS director. He serves as the Chief Commissioner and Fellow of the American College of Paramedic Executives and serves on Community Paramedicine committees of the National Association of EMS Physicians, the National Association of EMTs and the National Association of State EMS Officials.

Gary is quasi-staff at the Technical Assistance Services Center (TASC) and looks for opportunities to organize or create EMS companion/complementary work products that are being done by Critical Access Hospitals. He has co-authored several publications including Template for Emergency Medical Services Informed Community Self Determination (ICSD) with Kevin McGinnis (2020) and Frontier and remote paramedicine practitioner models with Peter O'Meara and Michael Nolan (2018).

Nick Nudell, MS, MPhil, NRP, FACPE

Nikiah "Nick" Nudell is a paramedic scientist for The Paramedic Foundation and is a Trauma Research Manager and practicing paramedic for UCHealth in Northern Colorado. He volunteers to serve on multiple state and national association boards. He has spent much of his career working with state and federal organizations that support health integration in low-resource settings. He has a master's degree in computer science and is completing a Ph.D. in public policy to further this work.

Kevin McGinnis, MPS, Paramedic Chief (Retired)

Kevin McGinnis has been an EMS system builder and provider since 1974. He has served as program manager for rural EMS, community paramedicine, and other programs for the National Association of State EMS Officials for the past 20 years. In 1999, he coined the terms "community paramedic" and "community paramedicine". He created the EMS informed community self-determination (ICSD) process to assist jeopardized rural EMS coverage.

Kevin received undergraduate and graduate degrees from Brown University and Cornell University in health care delivery systems and hospital administration. He has been a paramedic chief for volunteer, private, and hospital-based services, a hospital emergency department director, and Maine's state EMS director. He also served as the country's first state community paramedicine coordinator.

Kevin authored the National Rural Health Association book The Rural and Frontier EMS Agenda for the Future, which helped launch community paramedicine, and its follow-up, the Rural and Frontier EMS Tactical Plan 2020-2023. He was named by the Government Technology/Solutions for State and Local Government magazine as one of its "Top 25 Doers, Dreamers & Drivers in Public-Sector Innovation".