



*Research Article*

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## **Grounded Operations: Exploring Barriers to Drone Program Adoption in Law Enforcement Agencies**

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### **Abstract**

Unmanned Aircraft Systems (UAS) have proven beneficial for law enforcement activities, especially in situations where an aerial viewpoint is advantageous to the officers on the ground. However, proper deployment of UAS programs takes resources and buy-in to succeed. This study developed a survey to benchmark the use of UAS programs for law enforcement activities in the Southeastern United States. The responses from agencies who indicated they did not currently have a drone program were explored to identify perceptions of drone potential, constraints preventing program deployment, and knowledge pertaining to program development. Budgeting constraints and justification of a program's benefits over all use of the resources were of the top concerns. Other barriers included policy development and low call volume to justify the creation of the program.

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**Keywords:** Law Enforcement, Unmanned Aircraft Systems (UAS), drones, barriers, Southeastern U.S.



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## Introduction

In the United States, the use of small Unmanned Aircraft Systems (UAS), or drones, has grown in every industry over the last decade, and law enforcement is no different. Law enforcement utilizes drones for search and rescue operations, accident reconstruction,<sup>1</sup> bomb threats, hostage negotiations, crime scene investigation, responding to boating incidents, managing special events,<sup>2</sup> and marine rescue.<sup>3</sup> They also utilize drones to assist in natural disaster response by providing overwatch, surveying damaged infrastructure, and monitoring floodwaters.<sup>4</sup>

Some common barriers for organizations to adopt drones include lacking skilled human resources, high costs, limited information about the technology available, privacy and security concerns, public perception, and safety concerns.<sup>5</sup> Because of the associated investment in hardware and training, most organizations also want to understand their return on investment and have convincing use cases that provide an acceptable use of the resources required to train or hire new personnel.<sup>6</sup>

This paper presents the findings of the second part of a two-part study where law enforcement agencies from the Southeastern United States were surveyed to document their attitudes towards using UAS, their formal programs (if they exist), and barriers faced. This paper focuses on responses from the respondents who did not currently have a UAS program at their agency. The methodology, questions, and analysis are discussed in detail. Additionally, how the findings relate to barriers found in literature and other drone adoption efforts for law enforcement are discussed.

## Background

### *Regulations*

The FAA defines a UAS as “an aircraft that is operated without the possibility of direct human intervention from within or on the aircraft.”<sup>7</sup> For this study, UAS was defined utilizing the Part 107 definition of an uncrewed aircraft weighing less than 55 pounds. Most drones that fall within this category are configured as fixed-wing, multicopter, or a hybrid of the two.

In 2016, the use of UAS for non-hobbyists was codified as part of CFR Title 14 Part 107. Part 107 provides the regulations for operating small UAS weighing less than 55 pounds and outlines requirements for pilot certification, operational limits, and aircraft requirements. State and local regulations may supplement this. However, the key areas of Part 107 include the need for a certified pilot to pass a general knowledge test, restrictions on operating drones over people, night missions, maximum altitude, and requirements for operating within the visual line-of-sight of the pilot.<sup>8</sup> Part 107 is the most common certification used by pilots flying commercial missions.

Law enforcement officers and other public agencies can also operate a UAS under a Part 91 Certification of Waiver or Authorization (COA). The FAA authorizes COAs for certain public agencies to operate outside the Part 107 rules. Obtaining a COA has additional complications and includes comprehensive safety case analysis, operational procedures, pilot qualifications, and specific use cases for drones. The advantage of a COA is that it allows for greater flexibility in the agency's use of the drone compared to Part 107.<sup>9</sup>

### *Advantages of Drone Use for Public Safety Officers*

The top five common policing uses of drones, according to the Police Executive Research Forum (PERF), are search and rescue, crime scene photography/reconstruction, investigating armed and dangerous suspects, disaster response, and traffic collision reconstruction.<sup>10</sup> They provide enhanced situational awareness, improved response techniques, and increased operational efficiency during emergency response.<sup>11</sup> Drones provide new dimensions of information gathering where access was

previously difficult. Drones can aid situational awareness by monitoring disconnected areas, thus enhancing the response efficiency of police officers.<sup>12</sup> When a single drone is used, the accuracy and safety of clearing a response scene are enhanced, and targets are more likely to be identified without error and with less stress than traditional methods.<sup>13</sup>

The use of drones helps ensure the safety of law enforcement officers. Deploying drones instead of police officers in certain situations limits the exposure of physical risk to the officer.<sup>14</sup> Drones can be equipped with advanced imaging and sensing technology, provide real-time surveillance, and be equipped with audio for two-way communication so emergency responders can safely assess the situation.<sup>15</sup> In these situations, police may also be less likely to use excessive force as it limits the need to use force in self-defense.<sup>16</sup> Advanced drones are equipped with technologies to help deliver medical aid supplies and enhance logistical efficiency.<sup>17</sup> When these are used in hazardous terrains during emergency response, they limit the safety concerns for those responding.<sup>18</sup>

### *Public View and Controversy*

The adoption of drone technologies among domestic law enforcement agencies has had mixed reactions from the public. Reactionary applications and using drones for search and rescue, crime scene investigation, and hostage situations have been mostly non-controversial.<sup>19</sup> Deploying armed police drones has raised many ethical questions and has been limited and often prohibited in domestic law enforcement.<sup>20</sup> The use of “proactive policing” in the forms of crowd control and aerial monitoring can provide an advantage to public safety; however, they are often questioned due to possible violations of privacy, free speech, and freedom of movement.<sup>21</sup> The lack of federal regulations protecting privacy related to UAS data gathering does not help the public perception of proactive policing with drones.<sup>22</sup> Public support for law enforcement’s use of drones is impacted by social economics and the police’s relationship with the community.<sup>23</sup> Reflecting on drones becoming mainstream tools for law enforcement and how the people in the community perceive using these tools is critical to understanding how drones will be accepted.<sup>24</sup>

### *Barriers to Getting Off the Ground*

Adopting new technology can be challenging for any organization and even more challenging for a public agency. Understanding the factors that motivate or hinder the adoption is important for agencies seeking to implement new policies. Some barriers to adopting new technology can be linked to citizen complaints and influences of police unions.<sup>25</sup> Beyond simply mandating new technology, it is important to understand how it can impact the community being served by the agency.<sup>26</sup>

Drone technology is constantly changing with continuous development. It requires time to keep up with what is available and what may serve the best purpose for an agency while still working within the practical and ethical aspects of the law.<sup>27</sup> Other factors like environmental complexity and organizational size also influence the willingness of police agencies to invest in new technologies.<sup>28</sup> Past organizational experience and capacity to successfully adopt technology influence the attitude toward or against adopting new practices, technologies, and tactics.<sup>29</sup> There can be hesitation if a real use case and advantage for the technology is not identified. “Magic bullets” to real problems that lack practical use and realistic narratives of technology advantages influence how officers ultimately perceive and use the technology.<sup>30</sup> Agencies that have previously successfully invested or experimented with technology are likelier to do it again.<sup>31</sup>

Other challenges include the possible need for a complex overhaul of operative policing, policy, and connections between units, as adopting drones requires more than just buying a drone and often requires connecting entities within the agencies that were previously not connected.<sup>32</sup> The adoption of drones often aligns with incorporating broader digital technology into an agency’s policing practices, leading to improved security management but a more significant investment.<sup>33</sup> When adopting the technologies as a system, there are also challenges beyond budget and funding. When technologies do not work within a designed system, it can lead to inefficiencies through issues with interoperability.<sup>34</sup>

### *Assistance in Getting off the Ground*

One of the ways to get a program up and running is for agencies to share best practices and experiences through a collaborative platform where they can learn from one another's successes and challenges.<sup>35</sup> Professional organizations are an area to look for advice and support. The Police Executive Research Forum (PERF) has developed a "Roadmap to Implementing an Effective Unmanned Aircraft System (UAS) Program," as well as other support documentation and links to assist agencies in adopting UAS systems.<sup>36</sup> The FAA has the Law Enforcement Assistance Program (LEAP) to assist in the investigation and operational activities related to the legal use of airspace and to understand regulatory policies.<sup>37</sup>

Federal subsidies for adopting new technology and developing an organization are key to initiating change within an agency.<sup>38</sup> Federal grants are also available for drone adoption by law enforcement.

## **Methods**

The overall objective of the research study was to benchmark the development and implementation of UAS programs by law enforcement agencies at the local level in the Southeastern United States. The study utilizes the PERF Best Practices<sup>39</sup> as a benchmarking document. A Qualtrics survey was developed by the researchers to collect data related to drone usage, challenges, and barriers. The survey was developed along two tracks utilizing skip logic. This enabled respondents with and without a UAS program to participate in the survey. The survey, once drafted, was revised by two experienced law enforcement UAS program coordinators to evaluate its appropriateness and relevance. It was then pilot-tested by a small sample of police departments and sheriff's offices in each of the six targeted states ( $n = 48$ ). The survey was completed by seven agencies (14.6%) that provided valid data and had no issues in completing the survey.

The online survey was distributed to 1,334 police department chiefs and county sheriffs whose email addresses were collected by data mining of 2,300 police department and sheriff's office websites. The geographic area reviewed for this study included Florida, Georgia, North Carolina, South Carolina, Tennessee, and Virginia. 204 completed responses were received for a response rate of 15.3%. Of the 204 responses, 67 (33%) answered that they did not have an operational UAS program. This paper focuses on those respondents' answers for answering the following research questions:

1. How do law enforcement agencies without drone programs perceive the use of UAS in policing activities?
2. What are the constraints preventing program implementation for these agencies?
3. What do these agencies know about potential drone uses and benefits?

## **Data Collection**

The survey utilized absolute responses, open-ended responses, and 3-point Likert scale questions to collect the data. Skip-logic, in Qualtrics, was programmed to direct those who indicated that they did not currently have a UAS program to answer a series of 12 questions pertaining to the research objectives listed above. 67 completed responses were identified as not having a drone program at their current agency. Of these, 12 agencies were identified as county-level Sheriff's Departments, while the remaining 55 were local municipality or city police departments. The average agency size was 54 sworn officers, with a range of 1 – 1,400 sworn officers. The agencies were located throughout the Southeastern United States (Georgia – 21%, Florida - 6%, North Carolina - 28%, South Carolina – 13%, Tennessee – 9%, and Virginia – 22%). 36 respondents identified the area they covered as rural, 16 as suburban, and 15 as urban.

## **Analysis**

The first question posed in the “non-flyer” path of the survey was for the respondents to provide a written response, in their own words, as to why they did not have a UAS program. An open-response question was used to ensure that other survey questions did not bias the responses. The qualitative responses were coded for common themes, as shown in Table 1. Not surprisingly, cost (lack of budget/funding) was listed as the most common response by 45% of the respondents. The next three were lack of justification (18%), Access through a partner agency (12%), and Lack of manpower (10%). The other reasons are also identified.

**Table 1. Reasons for not having a UAS program**

Reason	Rural <i>n=36</i>	Suburban <i>n=16</i>	Urban <i>n=15</i>	Total <i>n=67</i>
Cost (lack of budget/funding)	61%	31%	20%	45%
Lack of justification	14%	31%	13%	18%
Access through a partner agency	8%	25%	7%	12%
Lack of manpower	11%	31%	13%	10%
Small agency	8%	-	-	4%
Lack of pilot/certification	-	13%	7%	4%
Lack of knowledge	6%	-	7%	4%
Other agency priorities	-	-	13%	3%
Operation regulation challenges	3%	-	-	1%
Local flight restrictions	-	-	7%	1%
Complex area (urban with high-rises)	-	-	7%	1%

When examining responses with respect to the type of agency based on the density of the area served, the cost was still the top reason for not having a UAS program; its rate of response was lower in the Suburban and Urban agencies. In these agencies, lack of justification and other agency priorities were also more frequently identified reasons for not having a UAS program.

#### *Past and Future use of Drones*

The past experience and future intentions of agencies with UAS programs were explored. 65% of the agencies stated that they attempted to use drones in the past. An open-response question followed for those who responded yes to “Did your agency ever use or attempt to use drones in the past?” Some of the reasoning was that the cost was too prohibitive to continue, the pilot retired and no one certified to continue the effort, did not have a suitable call volume to keep it in the budget, and finally, because of manpower limitations, it made more sense to partner with area agencies for when a drone was needed.

When asked about plans to establish a UAS program in the future, over half of the respondents expressed their intention to develop one within the next three years. (Table 2).

**Table 2. Future drone program**

<i>Do you plan on using drones in the future:</i>	
Yes, within the next year	17 (23%)
Yes, within the next three years	19 (26%)
Yes, but longer than 3 years away	5 (7%)
No	33 (44%)

#### *Barriers to Implementing Drone Programs*

A literature review was conducted to identify documented barriers of law enforcement agencies to implementing drone programs. These were utilized to form multiple response questions where respondents were able to identify “yes” or “no” that each was a barrier they experienced when considering a drone program. Similarly to the earlier open response, Cost/Department budget was the top rated barrier by 79% of the respondents (Table 3).

**Table 3. Barriers to the adoption of a UAS program**

Barrier	Rural <i>n</i> = 36	Suburban <i>n</i> = 16	Urban <i>n</i> = 15	Total <i>n</i> = 67
Cost/Department budget	94%	69%	57%	79%
Training difficulty	19%	31%	29%	24%
Legal or regulatory concerns	17%	6%	43%	19%
Lack of knowledge to develop a program	31%	-	14%	19%
Restricted air space in the jurisdiction	3%	13%	36%	12%
Privacy concerns	3%	31%	29%	9%
Safety concerns	3%	-	14%	4%
Lack of political support	6%	-	-	3%
Procurement restrictions from city/county/state	-	-	7%	1%
Other	14%	25%	7%	15%

Other barriers include staffing/manpower limits to become certified and fly (mentioned by 8 respondents), a low need where the budget cannot be justified (2 respondents), and finding a drone that fits the specification needs while working within the restrictions of whom the agency can procure it from (1 respondent).

When asked if they would create a drone program if these identified barriers did not exist, roughly a third (37%) responded "Yes." The respondents who stated "no" were provided the option to explain their reasoning through an open-response question. The answers were compiled and analyzed for themes. The most common theme, identified by seven (7) respondents, was that they had a partner agency agreement and drone support, so it did not make sense to duplicate efforts. Six (6) stated that their agency was too small and that it would not be useful or that the call volume for the agency was too low to justify it. Other reasons included not identifying a need or not looking into the justification for why their department would need a UAS program.

#### *Compensating for the Lack of a Program*

Partnering with another agency or sharing resources has been identified as a method for implementing UAS programs.<sup>40</sup> The respondents were asked if they had access to other agency drone support (Table 4). 90% of the respondents indicated they have access to another agency with drone support.

**Table 4. Access to other agency drone support**

Access to other agency drone support	Rural <i>n</i> = 36	Suburban <i>n</i> = 16	Urban <i>n</i> = 15	Total <i>n</i> = 67
Yes	86%	94%	93%	90%
No	14%	6%	7%	10%

The respondents were asked to expand on what missions they used drones for. The question was open response and the qualitative written responses were reviewed for common themes. As shown in Table 5, the top uses were reactionary in nature, with searching for missed/lost persons, looking for wanted and fleeing subjects, and search and rescue activities being the most common uses.

**Table 5. Mission types**

Mission Type	Count
Lost or missing persons	16
Wanted and fleeing Subjects	13
Search and rescue	10

Situation monitoring and intelligence gathering	5
Crime scene overview and mapping	4
Public event security and observation	4
Accident/crash recreation	3
Tactical support	2

The respondents were asked to clarify how the agreements with other agencies were set up. There were three common methods. The most common was an informal call and request through dispatch as needed, and if the resources were available, they were provided (mentioned by 15). Some of the notes associated with this were that the time of response could be slow, and the situation may be cleared by the time the resources become available. Formal Mutual Aid Agreements or Memorandum of Understanding were mentioned by 13 agencies. Seven (7) agencies said they had a mutual aid response call based on the type of situation. In these cases, the deployment of a pilot with a drone was one of the call types. As soon as the call came in, the resources from multiple agencies were dispatched, based on the type of call. The formal agreements often included how the agency and operator would be reimbursed for costs when they were not part of the same municipality budget.

The last item related to compensating for the lack of their own program was to identify where the support was coming from. Only 6% have utilized a paid consultant for services. More commonly, the support came from other agencies (Table 6).

**Table 6. Source of drone support**

Source	Count
Multiple Agencies	15
County Sheriff	15
State Police or Law Enforcement Agency	5
Paid Consultants	4
Local Fire Department	3

### **Familiarity and Perceived Value of UAS in Law Enforcement**

To better understand the respondents' knowledge level and their perceptions of drone usage, they were asked a series of Likert scale questions. The first series of questions was designed to gauge their knowledge of key concepts related to a UAS program. These include the FAA Law Enforcement Assistance Program (LEAP), Part 107 (unmanned aircraft pilot certification), Part 91 Certification of Authorization (COA), general mission types, and remote identification. On a 3-point Likert scale, with 1 being "unfamiliar," 2 being "basic knowledge," and 3 being "very knowledgeable," all areas fell below the neutral mean of 2. The only item that received a majority of respondents indicating "basic knowledge" or better was dealing with "mission types" (Table 7).

**Table 7. Familiarity with UAS Program Concepts**

	Unfamiliar	Basic Knowledge	Very Knowledgeable	Mean
<i>FAA LEAP</i>	55%	37%	4%	1.48
<i>Part 107</i>	63%	24%	10%	1.46
<i>Part 91 COA</i>	60%	28%	9%	1.48
<i>Mission Types</i>	27%	60%	9%	1.81
<i>Remote ID</i>	66%	27%	4%	1.37

Additionally, the respondents were asked if they perceived any value in using drones for the mission types listed in Table 8. The responses were based on a 3-point Likert scale, with 1 being "no value," 2 being "some value," and 3 being "great value." The respondents indicated a very high level of agreement that drones provided great value with all mission types listed with the highest being for "search and rescue" (2.94 out of 3).

**Table 8. Value of using drones for different mission types**

<b>Mission Types</b>	<b>No Value</b>	<b>Some Value</b>	<b>Great Value</b>	<b>Mean</b>
<i>Search and rescue</i>	0%	6%	93%	2.94
<i>Crime scene photography and reconstruction</i>	1%	18%	79%	2.79
<i>Investigating armed and dangerous suspects</i>	1%	9%	88%	2.88
<i>Disaster response</i>	0%	9%	88%	2.91
<i>Traffic collision reconstruction</i>	6%	25%	66%	2.62
<i>Bombs and hazardous material observation</i>	0%	13%	85%	2.86
<i>Fugitive apprehension</i>	0%	19%	78%	2.80
<i>Crowd monitoring</i>	4%	15%	79%	2.76
<i>Surveillance</i>	0%	18%	81%	2.82
<i>Supporting officers serving warrants</i>	6%	21%	72%	2.67
<i>Hostage negotiations</i>	3%	19%	76%	2.74
<i>Assisting other government agencies</i>	0%	21%	78%	2.79
<i>Obtaining video footage for recruitment and other materials</i>	13%	27%	58%	2.45
<i>K-9 backup</i>	12%	24%	63%	2.52
<i>Inspections of police radio towers</i>	15%	28%	55%	2.41

#### *Looking to the Future*

The respondents were asked if they were to describe what they would first do if they were to start their drone program. The question was open-ended and allowed for a written response. The written responses were analyzed and coded for common topics. The top responses were training and certification for officers (21) and procurement of grant funding to support the program (17) (Table 9).

**Table 9. First action to start a UAS program**

<b>Theme</b>	<b>Count</b>
Officer training and certification	21
Grant funding	17
Develop program policies	10
Research to identify best use, best tech, ROI, etc.	9
Reach out to established agencies for guidance – review existing policies	9
Contact vendors for support and pricing - review available technology	5
Council approval for budget	4
Use a third-party consultant for the training and certification process	4
Hire someone trained or familiar with drones	4
Cooperative efforts/partnering with other agencies to share resources	3
Gradual implementation	1

The respondents were also asked what resources within their jurisdiction would need to change in order to allow for a UAS program. The question was open-ended and the responses were coded for common themes (Table 10). Not surprisingly, when compared to other findings already discussed,

budget and funding were the top resources (34). Items like public and political awareness and agency buy-in were relatively low on the list, indicating that these are either not concerns agencies are aware of, or that there is general acceptance of the potential of UAS for law enforcement. Further study in this area is warranted.

**Table 10. Resources needing to be changed**

Resource	Count
Budget/Funding	34
training assistance/instructor	12
Guidelines/policy development assistance (model policy)	8
Public (political) awareness/education for support	8
Drone champion within the agency	6
Support and resource programs	5
Knowledge/ Assistance to start	4
Mentor department for assistance	3
Agency buy-in	1

## Discussion

Throughout the survey, the cost of implementing the technology and having a budget line item to procure and maintain the program was a repetitive barrier and concern. The issue is often not easy to overcome, especially for public agencies and law enforcement, where budgets depend on taxes and other grants from the state and federal governments. This would often require political and public buy-in to make them successful. However, federal support is available for law enforcement agencies to assist in procuring drones. For instance, the Defense Logistics Agency's 1122 program allows state and local agencies to take advantage of the discounted rates that the federal government receives due to large-volume purchases when the equipment is purchased to support counter-drug, homeland security, and emergency response operations.<sup>41</sup> What was not determined by this study and would require additional investigation is if the respondents knew that these funding programs were available or if they needed assistance (e.g., resources and manhours) to fill out the paperwork required to obtain the funding.

Some other suggestions for starting a UAS program without needing a significant budget could be to start small with only the necessary equipment to accomplish the agency's missions or to discuss pursuing joint efforts with other agencies in a nearby jurisdiction or share resources with local agencies such as fire departments or county sheriffs.<sup>42</sup>

Training assistance was also identified as a need. Matel (2020) outlines some areas that should be included within a drone training program for law enforcement agencies. The FAA also has resources available to help support drone program development, including training on laws and policies and support for receiving appropriate certifications.<sup>43</sup> Other organizations provide training specifically for law enforcement agencies, such as the Pilot Institute (<https://pilotinstitute.com/course/coa-made-easy>).

Model policies for standard operation procedures were a resource identified as needed in this study. The Police Executive Research Forum (PERF) has created a template of a model SOP for UAS implementation based on examining documentation from multiple agencies. This information is freely available to agencies to get a jump start on creating their own document and program policies.<sup>44</sup> Other standards are also available for reference from the Law Enforcement Drone Association (LEDA) and the FAA.<sup>45</sup>

Several agencies identified a need for public relations and community awareness. Documented methods for outreach that have worked include UAS program information being published on a

webpage, presentations and demonstrations to the community, conducting direct outreach with community stakeholders, and posting information about the UAS program on social media.<sup>46</sup>

For some agencies, it is understandable that they would not look to pursue implementing a drone program. Beyond resistance to change and feeling uncomfortable with the technology, which often leads agencies to resist innovation,<sup>47</sup> there are legitimate reasons why not creating a drone program is the appropriate decision. The agencies cited lower call volumes, fewer personnel, and access to the technology through partnering agencies as reasons for believing they would not pursue a program in the future. For them, there are more effective and meaningful ways to utilize their time and resources since drones would not provide them with a positive value chain proposition. As stated in some of the literature, implementing technology often requires a rework of policing techniques and policy for it to aid law enforcement in their duties fully.<sup>48</sup>

### *Limitations*

This study examined agencies in the Southeastern United States only with a small sample size compared to agency representation from throughout the U.S. Therefore, the results may not be generalizable to other areas of the country.

Other limitations are related to the nature of the research in using only survey instruments to collect data. Follow-up questions to gauge the depth of understanding related to certain concepts cannot occur in this type of research. This leaves the potential for response and interpretation bias when trying to understand open-ended questions. To limit the effects of this limitation on the findings, the open responses were coded and placed in categories. The researchers did not expand on the interpretation beyond presenting a quantitative representation of what was identified in the coding. This limits the types of qualitative analysis methods applicable to this type of research.

### **Conclusion**

The use of UAS for law enforcement has grown in potential and popularity. This study focused on documenting barriers preventing agencies from using drones. Some of the largest barriers identified include budgeting, lack of policies and use cases, and the need for training. There are resources available to police agencies to assist with these issues. Part of the issue could be the general awareness of many of these resources. This would need to be investigated further as the survey questions did not collect information to that extent.

Despite not having an existing drone program, most agencies still recognize the significant value of employing drones for various operations. This indicates a general awareness of the potential value of having a UAS program, though barriers to funding have not been overcome. Only a few agencies did not see the value in utilizing drones due to a lack of call volume and manpower.

### **AI Disclosure Statement**

Artificial intelligence (AI) tools were used to aid in writing clarity and conducting the literature review. All literature review sources were independently verified by the authors before they were included in the manuscript.

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