Mental Health Call Triage: Coding Systems and Opportunities for Research

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Abstract

Mental health crisis calls to 911 represent a significant opportunity for information systems research. Popular news highlights painful failures, yet we find no clear research guidance in IS related to this problem. This paper presents a literature review and some data collected via interviews with a board of first responders drawn from a multi-county geography. It achieves three primary contributions. First, it identifies coding systems and stages when they are used during 911 calls as an example for those seeking to understand the data likely to exist within any local 911 system. Second, it identifies factors that lead to inconsistency within this domain. Third, it describes current solutions emerging to address the problem of improving mental health crisis call handling. The paper concludes with a discussion of research directions and opportunities.

Keywords: Mental health crises 911 call response, police mental health call response, public safety answering point mental health call, 911 mental health response.

1. Introduction

With the deinstitutionalization of mental health services in the 1980s, American law enforcement agencies have increasingly become the primary responders to mental health crisis calls (Lamb et al., 2014). This change was catalyzed by the uniform implementation of 911 as an emergency number beginning in the late 1960s (Neusteter et al., 2019). Across the US in recent times and especially now subsequent to COVID-19, state and local police are facing significant increases in numbers of mental health crises (Maddy Reinert et al., 2021).

The care of those institutionalized in mental health facilities was to fall upon the community in the new model, and care centers were to be set up. It was thought that mental illness was better addressed in a community, not in large, isolated mental hospitals. Unfortunately, this model has yet to be implemented at a scale or effectiveness level to meet community needs. This has led to adverse consequences. And, it is unclear how police and other first responders process and manage these mental health crisis calls.

This paper presents a literature review addressing this important, current problem by examining how current emergency response systems handle mental health crisis calls. Most importantly, we enumerate various coding systems used and systems that typically implement them. We also identify current topics of innovation and offer guidance for systems researchers wanting to assist in fixing this difficult problem.

2. Methods

This paper used a literature review methodology to understand the 911 call process, attempting to concentrate specifically on mental health related cases. Academic databases along with PubMed, Medline, Psychinfo, Google Scholar were utilized, along with assistance from a Research Librarian. The queries included “call centers and mental health”, “public safety answering points mental health”, “police mental health”, “911 mental health” and “mental health crisis 911 call.” This search led to numerous articles specifically discussing mental health of first responders, or the services offered after police response. Out of all of these searches, 42 articles directly and indirectly applied to 911 and mental health. Even out of these 42 articles, very few

analyzed how call centers processed mental health calls, and none followed a mental health call from initial call to final disposition.

Subsequently, the authors reviewed online news and research reports as well as related policies to complement the understanding from peer-reviewed articles. An advisory council of police, fire, and 911 leaders guided this effort and provided input about processes and systems in four different stages. This led to some interviews sampled from multiple counties.

3. Overview of Emergency Response Systems

When an individual calls 911, they are connected to a public safety answering point (PSAP) also known as a 911 call center (Figure 1). As of 2019, there were over 6000 independently operated PSAP's in the US (Neusteter et al., 2019). These facilities can be run by law enforcement, fire departments, emergency management agencies, or by local and state governments. Some of these facilities double as dispatch centers instead of just answering points. Ones that just receive the calls then forward them to secondary call centers that handle the dispatching.

There is no uniform coding system for categorizing calls or dispatches across the US for these centers, though the system developed by the International Academies of Emergency Dispatch (IAED) protocols are attempting to provide such a system grounded in the scientific study of call processing efficacy (*Home - IAED*, 2021). They claim to have over 70,000 call handlers in 50

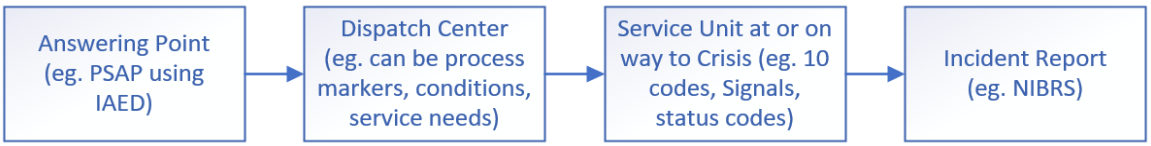

Figure 1 911 Crisis Response Coding Stages

countries currently using their approach. These call-takers will ask a series of questions, with each set of questions potentially varying from each PSAP. These questions are designed to identify the situation and alert the correct emergency service. In the IAED approach, the questions direct calls into protocol cards that then direct call-takers through a process for identifying the severity of needs as well as follow-up instructions if needed.

At this point, some PSAPs will dispatch the emergency service themselves or transfer the calls to an emergency dispatcher. These dispatchers then assess the alerts or use computer-aided dispatch (CAD) to assess and inform responders on what response is recommended and how quickly a response is needed. CAD can help assess the service, the response time, and the priority of the call. Some CAD systems can be integrated with the 911 call-taking software to enable digital transfer and sharing of notes and assessment information in order to speed up processing and improve accuracy. While there is no standard CAD coding system, there are organizations that are trying to set one up.

4. CAD Coding Systems

Computer Aided Dispatch (CAD) systems aim to simplify and optimize emergency response communication for every department throughout the United States. Many of these systems implement a coded language with a combination of letters and numbers specifying types of emergencies. For example, you can see how Rogers, Arkansas arranges their codes in Figure 2. In this case, abdominal pains are code 1. Levels indicate the degree of emergency, and there are

subset options leading to a composite 5-digit overall coding for every emergency. Their coding

Complaint	Code	Level	Subset	Determinant Descriptors	Codes	*Call Type*	Mode
Abdominal Pains/Problems	1	D	1	**Not** alert	01D01	*Pri 1, Med Emer*	
		D	0	**Override**	01D00	*Pri 1, Med Emer*	
		C	0	**Override**	01C00	*Pri 2, Med Emer*	
		C	1	**SUSPECTED** aorting aneurysm (tearing/ripping pain) ≥ **50**	01C01	*Pri 1, Med Emer*	

Figure 2 CAD codes for Rogers, AR (Retrieved March 1, 2021 from https://www.rogersar.gov/DocumentCenter/View/1022/EMD-With-Response-Codes-42010-PDF)

system includes 36 different code categories or protocols, mostly modeled on the IAED approach.

In order to direct calls into appropriate protocols, call-taking systems, including a popular one from Priority Dispatch, use a strict question-answer process. This process is guided by cards which call-takers read and follow while speaking with the caller (Figure 3). Notice from the figure how answers to specific questions will guide the call into specific codings. Post-dispatch instructions are also included with specific text for call-takers to use.

We can use the IAED system as an example to analyze how mental health issues would be captured within a 911 call system (call-taking coding). In the IAED system implemented by Priority Dispatch, we find mental health represented in a few specific, explicit codings such as:

- All of code 25: Psychiatric / Abnormal Behavior / Suicide Attempt
- Some of code 23: Overdose / Poisoning (Ingestion), especially C 3 Antidepressants (tricyclic); Cocaine, methamphetamine (or C 4 derivatives), OVERDOSE (without priority B 1 symptoms)

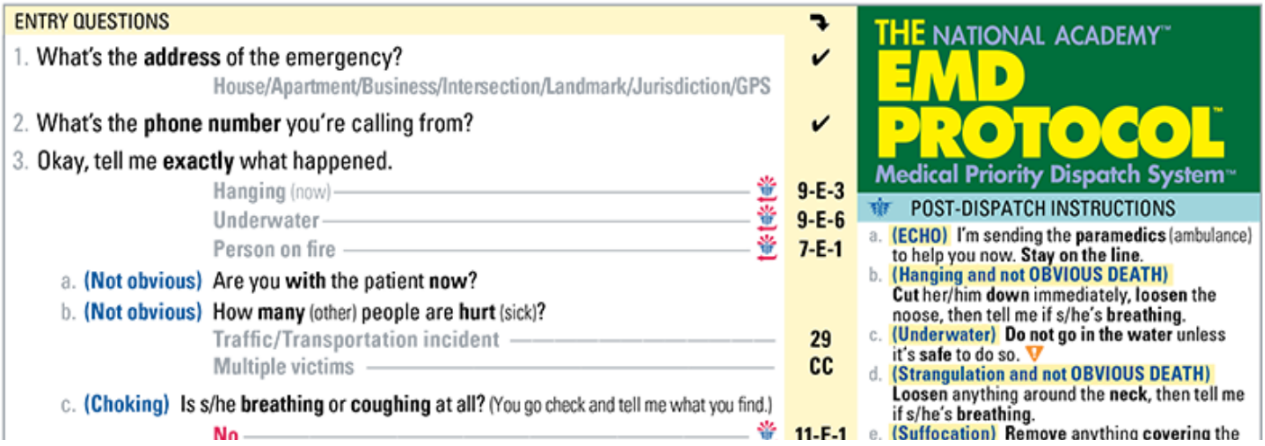

Figure 3 Priority Dispatch system entry card example.

Other codes may also mask mental health conditions. For example:

- Suicides or other violent incidents may get reported within specific codes related to legal or medical conditions like assault/sexual assault (4), breathing problems (6), burns (7), carbon monoxide inhalation (8), heart attacks/problems (9, 19), choking (11),

convulsions/seizures (12), drowning (14), other overdoses, electrocution (15), falls (17), heat/cold exposure (20), hemorrhage/lacerations (21), sick person (26), stab/gunshot/penetrating trauma (27), traumatic injuries (30), unconscious (31), unknown problem (32), or even traffic incidents (29 – we had an officer directly relate a specific example of this in the course of our research).

This problem gets more complicated by the use of older versions of IAED or other custom coding systems, such as the one used by the State of New Jersey (Figure 4). Their card system makes no reference to codings, though many of the topics overlap with IAED.

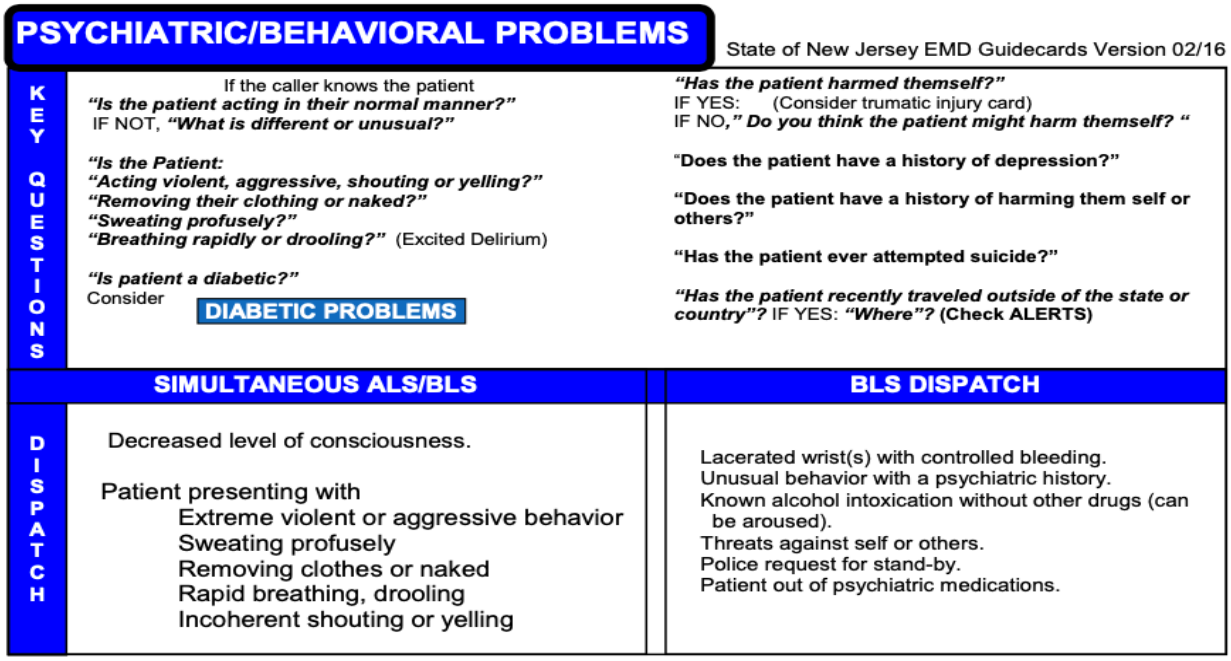

Figure 4 Example of protocol card from New Jersey system (Retrieved 2/15/2021 http://www.nj.gov/911)

Roughly speaking mental health crises seems to segment into a two overarching types: individual crisis (like suicide or breakdown episode) and social crisis (like violence against others or property transgression). Identifying these calls using the existing coding systems become difficult as the systems seems primarily optimized to medical and legal responses with some infrastructure services like power companies included in specific areas. Perhaps the lack of unified mental health response services leads to such calls not being identified across their many possible manifestations. This leads to individual officers responding to calls often having to assess for mental health factors once they arrive at a crisis response location.

5. Identifying Mental Health Calls

A challenge for any law enforcement officer is successfully assessing for mental illness or any type of situation they walk into. One study showed that officers make this assessment from information provided by dispatch, behavioral observation at the scene, and by information gathered from contacts around the scene. This same study also found that neighborhood context (affluency, social status) helped officers form their assessment of the situation (Bohrman et al., 2018). Officers reference past locations with instances of mental health calls when assessing

whether it might be a mental health call. If a location is close to a mental health facility, or if a house has a mentally ill individual whom they know of, it is likely they will label it as a mental health call and act accordingly. In many instances in which officers don't know or its not apparent if it's a mental health call, they say that something feels "not right." Officers look for a "common sense element" to detect for mental illness. (Bohrman et al., 2018)

One common element for officers when responding to these calls is the development of "recipe rules" when dealing with mental health situations. These rules are developed through experience and training. One aspect of which is trained into officer is intuitive response. While the above combination dispatch information, behavioral observation, and collateral information is useful, officers do tend to generalize. They did say that it was hard to articulate when describing how a mentally ill person appeared, the overall sentiment was that "…they have a look to them." (Bohrman et al., 2018)

6. Jail, Substance Abuse & Mental Illness

Substance abuse and mental illness typically co-occur (Abuse, 2021). Half of prison inmates have substance abuse disorders, and the rate of mental illness in prison is 3-4 times higher than outside of prison (Peters et al., 2015). The implication here is that many people with mental illness and substance abuse issues end up in jail (H. J. Steadman et al., 2009). Conversely, being in jail can also cause stress that aggravates mental illness (Lorna Collier, 2014). Thus, correctly identifying mental illness during a crisis response for a law enforcement agent offers a chance to customize responses to substance abuse and mental health. Or, if detection and diversion fail, sending such a person to jail can aggravate mental illness.

Perhaps the clearest demonstration of the potential to quickly change the outcome of a substance abuse crisis by officer intervention is the drug Naloxone. Naloxone is a drug which quickly treats opiate drug overdose. Officers trained in the detection of symptoms and characteristics typical of drug overdose give Naloxone as needed while calling for emergency medical services. One study examined the departments which began this Naloxone program, finding that 96.8% of patients were sent to the hospital after taking Naloxone rather than dying or perhaps being sent to jail (Fisher et al., 2016). This type of solution joins other current solutions being tried to improve mental health crisis responses.

7. Traditional Police Methods

Individuals undergoing a mental health crisis many times do not respond in the same way a mentally sound person will to police commands and protocols. A simple command, intimidation, or show of force in any way may aggravate a mentally ill individual, which can increase the time required during response. The amount of time involved in dealing with such an individual can relate to the safe resolution of the situation. (Watson et al., 2008) A lack of understanding of mentally ill individuals has led to ineffective resolutions, especially when the individual cannot understand the orders relayed to him or her.

8. Current Solutions

The quantity of mental health calls received by PSAPs has increased dramatically. The CDC found that between the years of 1999 and 2016 suicide rates increased in 44/50 states, with suicide being one type of call easily identified with mental health crisis. In about half of these states, there was a suicide rate jump greater than 30% (Stone et al., 2018). For example, in 2007 the Houston police department reported 15,122 calls related to mental health crises (*Crisis Call Diversion Program (CCD) | Houston Police Department*, 2017). This number doubled to 37,032 by 2014. The population of Houston city in 2007 was 1.9 million and jumped to 2.17 million in 2014, indicating that not only had the number increased but so had the rate per capita.

A few states have implemented systems in which non-emergency mental health crisis calls are transferred over to counselors, therapists, or people who have been trained to help. In Houston, they created a 9-1-1 Crisis Call Diversion (CCD) Program in which these calls are diverted from law enforcement to a phone counselor. The CCD handled more than 7,000 calls in 2017, with more than 2,000 calls successfully diverted away from police officers.

In another case, the Boston Police Department created a co-responder program in which a clinician with a Master's degree rides along with the police officer in handling mental health crisis calls (Morabito et al., 2018). In both the Boston and Houston programs, it is unclear how they are coding the calls or identifying them. Similar programs are developing around the US right now, but the existing coding standards do not meet the needs for building these systems. And, as a result, the systems implementing the coding processes lack focus on mental health.

9. Mental Health Crisis Call Diversion Programs

In the past three decades, mental health calls commonly result in admission to jails or hospital emergency rooms (ERs). Jail experiences may exacerbate the underlying cause of mental illness, while not all emergency rooms employ trained psychiatrists, therapists, or counselors who can handle such crises. Additionally, ERs tend to have a variety of people waiting together for long periods and adding a person in mental health crisis to that mix can cause wider trauma. These two choices are not financially sensible nor are they effective treatment options (Kim et al., 2015). Cost estimates for housing and treating mentally ill exceed the cost of mental health prevention with the cost for housing the inmate being around $31,00 versus $10,000 for prevention (Giliberti, 2015). The tricky problem then is to identify which cases deserve preventative intervention, as the costs are still significant.

Research on this topic since the 1990s has shifted towards treatment and prevention. Diversion programs vary, with some occurring before police booking of the person/patient and some happening after booking. Some of these post-booking programs occur before jail, while some occur after or concurrent with the individual being sent to jail (Sirotich, 2009). Prebooking diversion programs are divided into three categories all related to improving detection and diverting responses to alternate resolutions when possible: First, Police Crisis Intervention Teams (CITs). CIT's have officers who have been trained in mental health detection and response. They also act as contacts with the mental health system for the ill individual. Second, police-centered mental health programs involve mental health professionals employed directly by police departments. These professionals assist officers in-person or over the phone when dealing with individuals in a mental health crisis. Third, some state and local agencies have

formed mental health mobile crisis intervention teams composed of mental health specialists who work together with law enforcement or other intervention agents (Sirotich, 2009).

10. Crisis Intervention Teams (CITs)

Crisis Intervention Teams (CITs) were created in response to the marked increase in mental health calls received by law enforcement. These teams contain officers who are trained in mental health crises response and are able to rectify the situation/crises in the safest way possible. As of 2015, there were 2800 CIT programs throughout the United States. While this sounds like a large number, it only makes up about 15% of the police jurisdictions in the US (Giliberti, 2015). CIT concentrates on de-escalation methods in situations dealing with mentally ill individuals.

CIT programs contain three core components that every training program consists of. First, officers undergo training with mental health professionals, consumers, and families. They learn about mental illness, psychiatric medication, and techniques developed to respond to mental health crises. This step of the program immerses officers into the mental health community by meeting patients, visiting facilities, and having discussions with those patients. This leads to the second part of the program, developing partnerships between law enforcement stations and mental health providers. This helps law enforcement build up a database of locations to which mentally ill individuals can get referred. Last, the CIT program suggests that trained officers create and enlist in a new role in their police station (Canada et al., 2012). This specialized unit can better respond to mentally ill individuals throughout their neighborhoods.

11. Results of CIT Response vs non-CIT Responses

The results of CIT training are apparent when analyzing police populations that have gone through the program. One example in Akron, Ohio found that the number of mental health calls had increased, transport of mentally ill individuals to facilities by CIT trained agents had increased, but no significant change in the amount of arrests (Teller et al., 2006). Another study found that departments with CIT units had lower arrest rates due to these specialized CIT squads. This study analyzed three different cities, Birmingham, Knoxville, and Memphis. It found a higher number of calls which needed a specialized CIT response along with lower arrest rates resulting from the program (H. Steadman et al., 2000). While the CIT responses and related detection and diversion programs show promise, the systems supporting such interventions remain undeveloped. Coding systems continue to use codes focused on criminal or medical needs rather than mental health. As a result, crisis protocols also remain useless for crafting better mental health crisis interventions. While many hotlines exist, these take too long and are not reliable enough for police in the heat of the moment responding to a mental health crisis call. Recognition of this problem has led to a national effort to establish a unified mental health crisis hotline (“New Law Creates 988 Hotline For Mental Health Emergencies,” 2020).

12. Dedicated Mental Health Line

The United States government has recently been looking into developing a dedicated hotline to address suicide prevention and mental health crises. This law, H.R. 2345, named the National Suicide Hotline Improvement Act of 2018, calls for a 3-digit number, with 988 being the current recommendation, for instant access to a hotline specialized in mental health crises response and suicide prevention (Designating 988 for the National Suicide Prevention Lifeline, 2020).

One essential component in the creation of this dedicated hotline is the establishment of a system (call systems, technology, in-person response) to help mentally ill and suicidal individuals. SAMHSA (Substance Abuse and Mental Health Services Administration) makes an important remark in one report, stating about this hotline "has the potential to play a key role in improving national crisis intervention and suicide prevention efforts [,] if the launch of a new number is accompanied by efforts to develop a more coordinated crisis system with greater capacity and access to sophisticated data and technology systems…"(Office of Economics and Analytics & Wireline Competition Bureau, n.d.). This shows the clear absence of an established and dedicated system to help combat the serious mental health issues that are becoming more common across the country.

13. Discussion

High pressure situations are stressful and complicated to deal with, without adding the additional factor of mental health. Yet, these mental health crisis calls are becoming more common for first responders. Although there are currently crisis intervention teams which are specifically trained to respond to mental health crises, the capacity of these teams is too low to meet existing needs. In one county we analyzed, for example, we found one team capable of responding to four calls per day at most. Meanwhile, the demand exceeded 100 calls per day.

Officers trained to deal with mental health crises also remain in the minority, though this number is increasing as training becomes more prevalent. While we found little research done specifically on the identification of mental health calls, we were able to infer some information/data from the numerous articles found on general 911 call processes. The analysis of the initial call placement and basic/routine questions asked showed that no mental health analysis is done at the time of the call in general. This is a place for future research into algorithms and processes that can better sense and suggest categories of mental health crisis.

Currently, unless a caller explicitly mentions anything about mental health, PSAPs are unlikely to mark a call as having a mental health aspect, and officers have no reason to approach it as a mental health crisis or breakdown. Instead, they are likely to arrive on the scene and be surprised. This is a second place where systems researchers can help. The 10-codes and signal codes used at this point in the process also lack mental health focus, but there may be data patterns that can help detect likelihoods of different types of mental health situations. Such systems could potentially integrate with computers already present in first-responder vehicles and provide an alert to the possibility as well as quick refresher guidance about what to do if that mental health issue is present. Such a system could also potentially loop in further professional mental health resources proactively as conditions are confirmed. This would cut current long wait times prior to mental health professionals being brought into crisis situations.

While there are specific programs available after individuals have been brought to a jail or ER, there is no specific screening at the time of the call or on the way to the crises. While officers at the scene might be able to identify mental health crises through experience, this is no guaranteed solution. Systems can help in both places.

Although there is limited time in any emergency, one or two mental health related inquiries could be developed to add to basic protocols. Developing basic questions could help the dispatch keep records of past mental health crises from specific callers. In this way, PSAP and dispatch

systems could provide analytics to see patterns of mental health suspicion in repeat callers. Such analytics seem to be missing in the systems we analyzed for this article.

The development of the national 988 number for mental health crises shows potential for collaboration between 911 and 988. If a non-emergency call is received by dispatch, a method can be developed for the call to be transferred to the 988 hotline so a mental health professional could properly deal with the situation. While dispatchers receive training in how to deal with emergency situations, mental health hotlines specialized in dealing with these situations could be far more effective. With the dearth of knowledge about 988 among the public, 911 will likely continue to receive most mental health crisis calls.

988 presents an opportunity for change that could be utilized by county and state law enforcement agencies to aid individuals going through mental health crisis. One of the largest problems for these individuals is the fragmented state of services today. Most people do not know who answers when they call 911. Even within several counties we analyzed, there are many PSAPs and first-response organizations. They do not share data. One town may have their own EMS PSAP, while people just across the town line get routed to the county's PSAP. Others may get routed somewhere else because they are on mobile phones. With data scattered across so many locations, seeing patterns and doing early detections for prevention becomes harder. This too is a situation ripe for information systems researchers to propose and test solutions.

14. Implications & Conclusion

The aforementioned illustrations of community-based strategies to accurately identify and respond to 911 calls that could have explicit or implicit undercurrents of behavioral health challenges also have implications for how information systems are designed for first responders. These systems can be used to train the responders to code the nature of the calls more accurately and to expand the types of referrals they make.

As a by-product, information in systems including better coding would depict overall trends in a given community, which would help judge efficacy of interventions as impacts of mental health outcomes for residents would gain some metrics. Finally, the legal implications for sharing information across different types of first responders and systems would need to be addressed. Specific state law changes may be needed to enable 'safe-harbor' for different jurisdictions to share information to improve our current systems. Conversely, perhaps laws are already adequate, but leaders within the 911 stages need to learn how to navigate them. Case studies and similar research could aid in solving this problem.

Based on the review of the literature and illustrations in this article, it is apparent that owing to the legal implications of sharing information, first responders often do not share or log their codes and notes in the same fashion. Also, differences in how different types of institutions of first responders (e.g., police, fire, EMT) invest and train in using a system, there is great variability complicating the development of a "seamless information management system" for first responders.

We are suggesting that with a well-designed integrated system, all responders can view and share information in order to improve the quality of the response, the referral, and the final disposition of a 911 mental health crisis call. Such a system can be used for training new recruits more consistently. For example, they could learn categories for them to log their responses to depict the situation and their response more accurately. At present we cannot find any article

identifying the major types of mental health calls that exist in 911 systems nor their prevalence. Different groups point to suicide, substance abuse, and psychosis as three major types, but are they distinct? How frequent are they? Do they all need the same resources? There are many topics of research just within this domain of creating a typology to describe mental health crisis calls. An integrated system could make this easier by getting all the data into fewer places, but research should begin now using whatever data researchers can find to help address this problem. Otherwise, it is hard to justify resource investments without clear magnitude measures for sub-types within the problem.

Finally, an integrated system tracking dispositions can also be used for identifying the types of community resources most referred to by all first responders and resourcing those more. In one county we analyzed, we found a long list of private and public resources available to help in mental health crisis situations. Few police or fire officers interviewed knew about more than one or two of these. Crisis responses happen quickly. Systems could help recommend appropriate resources to first responders and perhaps even help connect them to those resources in real-time.

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