EXPLORING CRITICAL GAPS AND SOLUTION STRATEGIES IN PUBLIC HEALTH PREPAREDNESS, RESPONSE, AND RECOVERY CAPACITY & CAPABILITIES

FINAL REPORT

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SGNL SOLUTIONS
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About SGNL Solutions

SGNL Solutions (SGNL), a service-disabled veteran-owned small business corporation, connects across research, policy, and practice communities to identify, understand, and solve complex health security challenges. We undertake collaborative projects involving stakeholder engagement, process facilitation, data collection, analysis, evaluation, scientific writing, and product development. Our team of experienced consultants provides cross disciplinary expertise and perspectives, which fosters better understanding and integrated solutions to address our nation's most pressing issues. We become issue experts and get excited about what matters to our clients. We sift through noisy data and distractions to get at the core of persistent problems to find the signal – the real information and approaches needed to finally address problems. We work across disciplines, think creatively, and break apart silos that oftentimes prevent progress. We then work with clients to make these important issues approachable and actionable.

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BACKGROUND

The United States Centers for Disease Control and Prevention (CDC), Center for Preparedness and Response (CPR) Science Agenda framework aims to strengthen and expand the public health emergency preparedness and response (PHEPR) evidence base by addressing short-term and long-term research priorities. The Science Agenda team, integrated under the Office of Applied Research, Office of Science and Public Health Practice, and CPR, is developing decision-making processes and stakeholder engagement plans to assist in the identification and prioritization of PHEPR knowledge gaps. This approach will steer future PHEPR research, evaluation, translation, and dissemination activities to strengthen public health infrastructure, systems, and science at the local level.

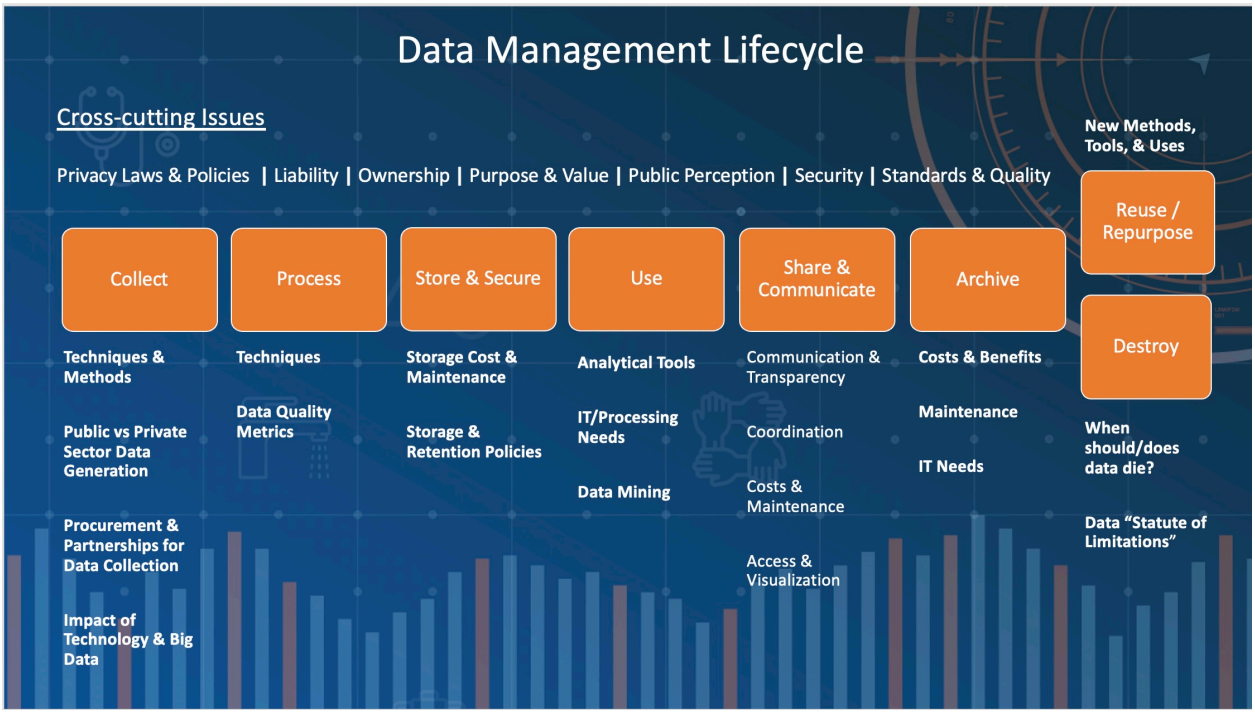
Through funding from CPR within CDC, the Association of Public Health Laboratories (APHL) has engaged SGNL Solutions (SGNL) to design and implement an information-gathering process to capture individual input from diverse stakeholders and subject matter experts (SMEs) to inform understanding of key public health practice gaps across domains within CDC CPR's science agenda framework. This phase of work focused specifically on the topics of public health information management, public health incident management, and community resilience. As part of this information gathering process, SGNL conducted three workshops dedicated to exploring these issues. For more detailed descriptions of the process, please see the methods section at the end of this report.

Topic 1: Public Health Information Management

Public health information management refers to the processes and practices that support the data lifecycle (see Figure 1) to include acquisition, collection, management, access, use of data and information from multiple sources and formats, and the exchange of that information to multiple audiences, stakeholders and/or other users.[1] Integral to this, is the ability to convert raw data into digestible information and subsequent knowledge. This is guided by public health informatics; the systematic application of information, computer science, and technology to bring data together in a format that aids analysis to public health practice, research, and learning.[2]

[1] Public Health Informatics Institute (2019). Building an Informatics-Savvy Health Department: A Self-Assessment Tool. Available from https://phii.org/wp-content/uploads/2021/07/InfoSavvy-Self-Assessment-tool-PHII.docx (accessed June 15, 2022).
[2] Centers for Disease Control and Prevention. Introduction to Public Health Informatics. Slide Template. Available from: https://www.cdc.gov/training/publichealth101/documents/introduction-to-public-health-informatics.pptx (accessed June 15, 2022).

Figure 1 – Data Management Lifecycle



Topic 2:: Public health incident management

Public health incident management is the ability to coordinate with emergency management and direct and support an incident or event with public health or health care implications by establishing a standardized, scalable system of oversight, organization, and supervision consistent with jurisdictional standards and practices and the National Incident Management System.

Topic 3: Community Resilience

Numerous definitions of community resilience exist within and outside the field of public health. For the purposes of this project, we borrowed from the National Institute of Standards and Technology: "Community resilience is the ability to prepare for anticipated hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions. Disaster preparedness activities—which includes prevention, protection, mitigation, response, and recovery—are key steps to building resilience.[3] Community resilience is both the foundation and the culmination of the PHEPR capabilities. A broad concept, informed by a variety of academic and applied disciplines, but lacking a unified, consensus theoretical approach, community resilience has been attributed with a variety of definitions and constitutive domains/components. This science agenda acknowledges that community resilience differs from individual resilience, which has been more well characterized within the psychology discourse.

[3] National Institute for Standards and Technology. Community Resilience. Available from https://www.nist.gov/community-resilience (accessed June 17, 2022).

FINDINGS

Across the three information gathering workshops, participants highlighted several themes that span the PHEPR enterprise. Each workshop also highlighted areas where relationships or established processes were working well. Key themes, successes, and challenges are summarized here, while full documentation and detailed findings of each workshop can be found in Appendix A.

Workshop 1: Exploring Public Health Data and Information Management in Public Health Emergency Preparedness and Response Practice

- Within data collection and acquisition, numerous practices were identified as working well, but areas of struggle remain.
    - Practices working well include establishing regular communication channels between lab partners, rapid, flexible scaling of surveillance and reporting mechanisms, developing public data dashboards for rapid and transparent information sharing, and standardizing data collection and analysis strategies across agencies.
    - Areas of struggle include outdated data systems or lacking enough capacity to handle volume during pandemic, challenges around data collection and reporting standards, such as the inclusion of "soft" qualitative and social data, and lack of communication strategies between agencies prior to emergencies.
- Within data exchange, there were similar successful practices and areas of struggle.
    - Successful practices include establishing partnerships and data coordination strategies, leveraging data use agreements with academic partners to surge analytic resources, and advancing technology for secure data sharing and reporting, such as through integrating cloud-based systems and using data visualization programs.
    - Areas of struggle focused mainly on not having data use agreements with clear standards outlined between partners prior to emergencies, and legal barriers to data exchange, such as misunderstandings of HIPAA.
- Obstacles to solid data collection, acquisition, and exchange include gaps in household level information, lack of data standards and messaging across partners, lack of community trust, outdated technology and interoperability limits, disconnect between government agencies, and lack of workforce capacity. Additionally, understanding ownership of the data and not having a centralized system, as well as threats to the data security also presented challenges to response staff when trying to obtain the most up to date information to inform decisions.
- To improve data and information management within public health, workshop participants suggested obtaining a better understanding of community values, learning the kind of operational data needed to inform emergencies (i.e., logistics and tracking personal protective equipment and testing use), improving accessibility and quality of data, improving data information systems, increasing data literacy among decision makers, and ensuring data use agreements are in place prior to the next emergency.

Workshop 2: Exploring Law, Regulations, Administration, and Ethics in Public Health Emergency/Incident Management Practice

- Legal and regulatory aspects within incident management can work well to support a response, or present additional challenges.

    - Those working well include emergency declarations to call attention to issues, enable rapid resource procurement, and increase options for emergency staffing; declaring enhanced surveillance advisories or changing reporting requirements; and the ability to waive certain compliance requirements or enact legal authority.
    - Legal and regulatory challenges include prematurely removing emergency declarations and impacting procurement, limitations of cross-jurisdictional staff sharing, lack of administrative flexibility in emergency staffing in public health, lack of consideration of staff wellness, navigating data use and protection laws, and maintaining compliance with other regulations when waiving at the state level.
- Ethically, numerous practices have been successful during emergencies, while others have presented additional, unforeseen challenges.
    - Successful ethical practices include increased awareness of equitable resources allocation, maintaining transparency in public notification, providing social supports during COVID to balance public health measures, and using ethical principles to guide emergency declarations or legal responsibility–as seen during the opioid crisis.
    - Ethical challenges in incident management include truly implementing equitable resource allocation and ethically managing the response workforce to address burnout, balancing restrictions with public health measures, balancing the "right to know" and protection of personal information in healthcare, and prioritization of vulnerable populations, such as the lack of data or prioritizing returning to normal and potentially compromising those at high risk.
- Knowledge needs in this area include more easily accessible legal information during emergencies, inclusion of legal and ethical challenges in exercises, increased understanding of how to navigate political responses to public health measures and community needs during public health emergencies, improved messaging around public health authorities, mandates, and restrictions, and ongoing use of transparent language around "evidence informed" vs. "evidence based" and what is guiding decisions.

Workshop 3: Decision-Making during Public Health Emergencies / Disasters and the Implications for Communities

- To protect the public's health, stakeholder groups agree on objectives to improve population health and prioritize health equity, ensure economic and social preservation, maintain critical infrastructure, manage healthcare capacity and develop long-term mitigation strategies.
- Actions available to protect the public's health include declaring states of emergency, using data and surveillance to drive response, managing risk communication, coordinating response activities, and increasing training for all-hazards events.
- Key challenges during response include prioritizing vulnerable populations and equity, managing healthcare capacity, addressing gaps in coordination, and balancing the ability the implement necessary response measures with public and political will.
- In addition to the identified challenges, many actions during a response can lead to unintended consequences that create additional difficulties or add to the response burden. For example, if school closures or shifts in mandates are not done thoughtfully, they can lead to adverse health outcomes or marginalization of vulnerable populations. Without careful considerations of consequences, there can also be impacts on public health credibility, exacerbation of mental health crises, erosion of public health authorities, and contribution to hospital surge and economic hardships.

DISCUSSION

Conflicts in Values, Priorities, and Conceptual Frameworks

Analysis of the workshop outputs revealed a number of conflicts in values, priorities, and conceptual frameworks across sectors. In order to achieve efficient and effective disaster preparedness and response, these conflicts must be better understood. The following areas emerged as key themes: decision-making, information sharing, representation and privacy, political will and public trust, individual rights vs. collective good, and workforce.

Decision Making

During a public health emergency or a disaster with public health implications, numerous sectors are involved, each with unique information needs, decisions to make, and stakeholders to whom they are accountable. Public health and emergency management purport to prioritize data-supported decision-making for hazard detection, resource activation, public notification, emergency activation, closeout, and deactivation. However, practitioners often state that they do not have the information they want. Further, even if there is sufficient information to make a "data-supported decision", the decision-making processes itself is subjective and exists within a dynamic, evolving context. Thus, all decisions likely need to be revisited and adjusted as new information emerges. Public health and emergency management practitioners might experience an unwillingness to adapt when presented with new information because of this continually evolving demand.

Additionally, other sectors may have conflicting priorities and be more heavily influenced by political will or public perceptions. Critical decision points for public health or emergency management sectors before or during an emergency may conflict with government, general public, or economic sector decision points. Additionally, public health practitioners often hesitate to release information that is not "100% vetted", while the media "runs wild" with emerging data. But this leads to confusion among the public and misinformation across different channels, impacting public health credibility if information is not disseminated in a consistent and timely manner. This highlights the significance of timely, accurate, and transparent dissemination of information. Public health needs to improve their comfort level with quickly releasing information that emerges, while still being clear about what is known, and what is still uncertain, in order to maintain trust and relevance. Otherwise, unintended consequences may include social media and other actors influencing public perceptions first.

Key questions for improving Decision-Making:

- How can public health increase trust in data and data literacy in decision makers and incentivize them to make decisions based on data during emergencies
- How can data be presented in a way that is understandable to decision makers?
- How does data presented to the public impact trust and decision making and what other factors are influencing public perception?
- How can public health ensure that data has a clear pathway to decision makers and can be easily interpreted?

Information Sharing

In order to make informed decisions during public health emergencies and disasters, stakeholders may often need access to the same information or obtain information from others. Instead of

having centralized information management systems that are coordinated vertically and horizontally within public health, information sharing is often a much more disjointed process, with numerous requests for the same information from different parties. When private businesses are involved, there are also concerns and hesitations around sharing information. Transparent and clear communication between partners may help navigate competing priorities between partners and vendors for data requests during emergencies.

Key questions for improving Information Sharing:

- What would incentivize federal partners to share data with state and local agencies?
- How can priorities be aligned and partnerships between practitioners and academic institutions be leveraged during emergency response to enhance data collection and exchange practices and workforce?
- How can values and priorities be aligned between analysts, vendors, and IT groups for sustainable partnerships?
- How can we bridge gaps between sectors to synergize data collection practices and reduce redundancies (e.g., healthcare, and public health)?

Representation and Privacy

During public health emergencies and disasters, the "easiest" logistical methods for data collection are preferred. However, information gathered that way, such as from existing channels or platforms, does not always accurately reflect communities. When aggregating data at too high of a level, important disparities in mortality or access to care can easily be missed. Additionally, data collection for at-risk or vulnerable populations is often not prioritized during emergencies, which speaks to inconsistency between stated values, such as equity, and actions across all sectors. This lack of data for more marginalized populations leads to a lack of representative information for decision-making in all disaster phases. Another unintended consequence is that it contributes to an inability for public health professionals to speak to social determinants of health with the granularity needed to inform infrastructure, resource allocation, and increase public trust.

While many challenges related to accurate and equitable data collection have emerged during the COVID-19 pandemic, stakeholders and researchers have also gained insight into better ways of doing things. For example, building relationships between public health and communities and increasing trust can be helpful in gathering neighborhood-based data as well as understanding the gaps and/or disparities. Similarly, establishing partnerships with tribal populations can help with addressing data decolonization and mislabeling of ethnicities. Overall, speakers across workshops highlighted the importance of understanding community values for a more equitable, useful, and representative approach to data collection.

Also important in data collection is the concern for privacy. Public perceptions and values around privacy can create challenges in navigating data protection for practitioners, health departments, and entities involved in data reporting, especially when there is a lack of knowledge around what data reporting is allowed. Again, because of the evolving nature of the COVID-19 pandemic, regulations and reporting requests were often changing and it could be difficult for members of the public to keep track of what pieces of their health information were getting reported or remaining private.

Key questions for improving Representation and Privacy:

- How can public health better integrate social determinants of health into data collection?
- What data would be most useful to communities to make decisions about their health?

- How can public health better involve communities in data collection and adapt their practices to learn more about what is important to the communities they are serving?
- How can public health be better equipped to prioritize and collect qualitative data?
- How can public health partner with communities to increase representation and involve community members when interpreting data?
- How can ethical principles be integrated into emergency response to prioritize or incentivize data collection for vulnerable populations?

Political Will and Public Trust

There is often a discrepancy between political will and public health and emergency management priorities, as previously discussed, which is partially influenced by public perceptions and reactions. At the outset of the pandemic there was minimal information with which to inform decisions, and different states and jurisdictions made different decisions based on their own needs, priorities, and context. As time went on, the cascading consequences of the more restrictive public health measures (e.g., full lockdown) became clear. Public health credibility impacts public willingness to accept or adhere to public health measures in the future, which ties to the erosion of public health authority that was seen during the pandemic. The public began to lose trust in decision-makers, especially public health leaders. While strict public health measures may accomplish goals that are important to public health and emergency management, other sectors, like business and education, can experience adverse outcomes. The consequences of this can be vast, especially if government leaders do not quickly step in to equitably address the gaps, such as unemployment benefits, insurance, housing assistance or eviction protection. Not all sectors are willing to take on the political or financial risks to uphold values critical to public health and emergency management, which can influence decisions being made (e.g., recommendations instead of mandates). Additionally, even public health and emergency management can diverge in their focus. For example, some emergency management priorities are tactical rather than value-based, such as efficient mass vaccine distribution rather than equitable vaccine distribution.

These differences in political will and varying priorities led to tension between sectors and decision-makers. All stakeholders and partners are accountable to government officials, therefore political agendas often still drive decisions. Additionally, even as more information emerged on vulnerable populations and communities that were at greater risk from contracting severe COVID or not accessing vaccines or necessary care, discrepancies again arose between priorities. Mitigating risk for these more vulnerable communities is not profitable, requires more investment, and may not be prioritized. However, the consequence of lack of mitigation strategies in at-risk communities results in a greater risk of adverse health outcomes during disasters, increasing the human and financial costs in the community over the long term. But these strategies must balance a mix of representative values, as restrictive measures in these communities often have more extensive impacts on physical, social, and economic wellbeing. For example, school closures in at-risk communities do not only disrupt education, but also access to food security and community relationships for children and creates additional challenges for parents if alternative childcare is unavailable during the work week. Additionally, many experienced mental health consequences, with increased caregiver stress increasing the risk of child abuse and domestic violence. These considerations should be outlined during planning phases to enable a more holistic response that minimizes disruptions.

Key questions for improving Political Will and Public Trust:

- How can the influence of social behaviors on political decisions or policies during emergencies be better understood?
- How can the ethical principle of proportionality (use of least restrictive means of achieving the reasonable public health goal) be considered to optimize public health while maintaining other priorities and aspects of society?
- How can community concerns be addressed equitably when restrictive measures are necessary (e.g., housing or food assistance, unemployment benefits)?
- How can public health involve at-risk communities in mitigation and preparedness?

Individual Rights vs Collective Good

Public health, emergency management, and healthcare sectors align in placing value on protecting and promoting health at population levels while business and education sectors, as well as the general public, often have additional factors they prioritize (e.g., profitability, accountability to stakeholders, autonomy). Government officials often fall somewhere in the middle, depending on the political will and public support in their jurisdiction.

Members of the public often value freedom and autonomy (e.g., healthcare options, mask wearing, hosting or attending large gatherings) over population level health protection, which can conflict with the public health need to implement interventions during emergencies. Individuals unrelated to the response also may want to avoid or limit the costs involved in mitigation practices. The degree to which this is true in communities can also influence how much the government invests in preparedness or mitigation strategies to various potential emergencies, instead waiting for a disaster to occur and then justify response funding.

Key questions for improving the tension between Individual Rights vs Collective Good:

- How can public health balance enforcement of public health measures with individual rights?
- How can public health communicate evidence supporting public health measures to the public in a way the public may accept?
- How can public health educate the public and media on political, legal, and public health systems that support population health over individualism?

Workforce

Public health emergencies and disasters highlight harmful impacts on workforce wellbeing, whether for frontline healthcare providers at the bedside, emergency managers at incident command, or public health case investigators. A cascading consequence is staffing conflicts showing up both between sectors (e.g., staff sharing / medical volunteers for public health during a surge) and within sectors (e.g., staff conflict of coming into work vs helping their families during an emergency). Healthcare also needs to balance patient values (e.g., refusing to vaccinate) with staff safety and duty to treat, potentially leading to conflicts in their own organizational values and increasing risk to staff health and safety.

Another example of this conflict is the implications of administrative or legal challenges that come with emergency response staffing, including a lack of flexibility to quickly reassign grant-funded

staff for response activities, or waiving labor law regulations to allow more flexibility for response, which have cascading consequences from both public and private sector standpoints (e.g., liability for injury or health insurance obligations). These cascading consequences continue with increased likelihood for staff injury, concerns for patient safety, physical and cognitive exhaustion, burnout, and decreased morale. Impacts on staff mental health and wellbeing are also not always prioritized by responding agencies, as their immediate concerns lie in securing the public's health at the population level, using all mechanisms available. Because previous disaster declarations were historically more short-term, some of these conflicting priorities did not emerge until several months into the pandemic when response staff had been working overtime for well beyond what had been done in the past.

Key questions for strengthening Workforce in emergencies:

- What are innovative ways public health can create a reserve workforce in the event of public health emergencies and surges?
- How can public health better balance adequate staffing in protracted emergencies with staff wellbeing?
- What do public health workers and frontline staff need during emergencies in order to better care for themselves?
- How can public health provide administrative and legal flexibility for staffing during an emergency response?

Sustaining Modifications to PHEPR Practice

During any public health emergency or disaster, various elements of PHEPR practice are adapted in order to address operational gaps in real-time. Studying these modifications could reveal options for sustaining these improvements beyond declarations of disasters and improve overall public health services and baseline levels of readiness. Information management, and laws, regulations, and ethics were the two key areas that would benefit from sustained modifications implemented during an emergency response.

Information Management

Several adaptations and innovations to information management emerged during the COVID-19 pandemic. For example, establishing regular communication channels between labs and partners by building a coalition of private, academic, and public labs to discuss what is working and provide capacity updates was hugely beneficial to those involved. While this was done in response to COVID-19, it should have already been in place, so how to maintain this setup across regions is an important question moving forward.

Regarding data collection, standardization of methods and analysis strategies across agencies eventually led to more informed pictures of needs and priorities within jurisdictions. For example, using neighborhood tabulation areas and agreeing on tracks of data as a denominator and standardized units for geography proved to be very useful in New York. Additionally, given the widespread nature of COVID-19, and the continual movement of populations across state lines, there was an immediate, clear need for flexible, rapid scaling of lab data collection and reporting mechanisms (e.g., cross-jurisdictional vaccine immunization reporting). Having the ability to scale up alternative surveillance reporting when existing systems were overwhelmed allowed for less breaks in reporting.

Once collected, coordinating the data among so many entities became a massive challenge as many more players were involved than would typically be for this type of health emergency response. Establishing partnerships and data coordinating strategies, including data use agreements, for bidirectional data exchange helped address some of these challenges. Also establishing stronger partnerships between health and public health helped to facilitate better attitudes between organizations (and less seeing the other as "being difficult") and allowed for more cross jurisdictional exchange of vaccine information. For those with more advanced technology, solutions included setting up secure data exchange, analyses, reporting, and sharing (e.g., through integrating cloud-based systems). All of this led to informing a better regional operating picture that could be seen in real time by numerous parties.

With the general public extremely interested in real-time information and a high demand for updated case counts, the public facing dashboards that were developed by multiple entities were very helpful from several angles in disseminating transparent data. Examples included COVID Act Now, Johns Hopkins dashboard (helpful in communicating with legislators), and the New York Times data visualization efforts (helpful in communicating data with political leaders). Dashboards also helped to relieve the burden on staff who were able to field less information requests.

While all of these emerged in response to COVID-19, with the help of political will and emergency declarations, there are now clear lessons that many of these efforts should be codified or sustained to enable more cohesive and streamlined preparedness and response efforts.

Important considerations that should be implemented before the next emergency include:

- Public health needs more support in collecting qualitative and social and behavioral data, especially for vulnerable populations and marginalized groups.
- Modernize outdated systems using paper and fax to improve data sharing.
- Prioritize the establishment of data use agreements with clear standards for data exchange prior to next emergency.
- Work with healthcare providers to outline minimum requirements public health will need during emergency so requests can be fulfilled more quickly.
- Establish routine standards for data sharing with public health within 42 CFR Part 2 (substance use disorder data) and FERPA, both during health emergencies or more generally.

Laws, Regulations, and Ethics

Legal, regulatory, and ethical practices were also explored, adapted, and leaned on to improve response efforts and protect response staff, whether medical, public health, or emergency management. Emergency declarations and compacts opened avenues for emergency staffing and provided more flexibility and bandwidth. They also allowed providers to work across state lines, but sometimes this augmented capacity is needed beyond the period of an emergency declaration. This was also a critical advancement in being able to deliver telemedicine or telehealth services across state lines and jurisdictions. But removing the emergency declaration impacts this ability and even rapid procurement of resources. Finding ways to maintain this cross-state capacity would be helpful across a range of fields. Additionally, U.S. companies that were based outside the country were not able to be reimbursed by the Centers for Medicare and Medicaid Services. Addressing this gap would open up access to needed resources for places that are experiencing surges or simply have workforce shortages.

It also became clear that the ability of state governors to waive compliance requirements and red tape during emergencies enhanced efficient and effective incident management. For instance, emergency declarations allow for enhanced surveillance advisories, modification of reportable disease requirements, use of venues for mass testing or vaccination sites, or canceling mass gatherings.

Ethical concerns emerged around several issues throughout the COVID-19 response. For example, there has been increasing awareness of equitable resource allocation practices, which became most recognizable when hospitals had more patients than ventilators available. There were also many resources provided for free to the public, such as COVID-19 testing and treatment options, and vaccines once they became available. Ethical principles have also been guiding emergency declarations or legal responsibilities, such as the emergency declarations made during the opioid crisis. These allowed for a change in legal focus that recognized substance use as a disorder rather than a crime and shifted the legal responsibility of opioid possession or use away from the user.

Important considerations that should be implemented before the next emergency include:

- Establish memorandums of understanding and emergency management assistance compacts between regions and jurisdictions that address staffing resources reciprocity, and liability can address emergency staffing issues.
- Build in language to job descriptions from start of employment to allow for staff reassignment during emergencies. Also allow this within federal grants to improve administrative flexibility for staffing so people in non-emergency roles (e.g., WIC program) can respond.
- Core ethical principles that guide decisions (e.g., resource allocation or crisis standards of care) "need to be laid out clearly and actually utilized"
- Inclusion of legal or ethical challenges in training and exercises
- Continue the National Association of County and City Health Officials (NACCHO)/CDC work on developing trainings around creating procedures for public health ethics in order to get accredited.

CONCLUSION

Despite the numerous challenges encountered during the COVID-19 pandemic and other public health emergencies, and the burden on response staff and health care providers, several sectors within public health have pivoted, adapted, and worked out creative ways to obtain the information they need and protect the public's health. In some instances, these adaptations and lessons can and should be sustained, to inform future systems and process changes to build better response systems in the future. Where there are still remaining gaps, workshop participants from diverse backgrounds have identified ways to improve future responses or suggestions for bolstering the current system to streamline efficiencies or avoid the same pitfalls in future public health emergencies. These suggestions and questions for future consideration are especially salient within the domains of information management and data collection, workforce capacity and retention, and legal and ethical aspects to public health emergency response.

METHODS

To facilitate the information gathering process, SGNL conducted three workshops in early 2022. The invited participants and objectives of each one is described below.

The first workshop was held on February 14, 2022 and included 12 active participants representing state and local public health agencies, national associations, academic institutions, and foundations exploring public health data and information management (see figure 1 for data management life cycle) in public health emergency preparedness and response (PHEPR) practice. The workshop focused on:

1. Describing state and local PHEPR practices (policies, processes, actions, and activities) related to the data lifecycle (acquisition, collection, and exchange) during an incident;
2. Exploring the factors that influence state and local PHEPR practices related to the data lifecycle during an incident (e.g., structural factors, root causes, extenuating circumstances); and
3. Understanding the short- and long-term knowledge needs of state and local PHEPR practitioners related to the data lifecycle during an incident.

SGNL facilitators asked participants to outline critical decision points throughout the disaster cycle and essential data elements. Participants also discussed what changes were needed related to data collection during an emergency, and what short- and long-term knowledge needs need to be understood before, during, or after a public health emergency.

The second workshop was held on March 14, 2022, with nine active participants exploring law, administration, and ethics in PHEPR practice and incident management. Observers from the CDC and APHL also attended the workshop. The workshop focused on:

1. Describing state and local PHEPR practices (policies, processes, actions, and activities) related to the laws, regulations, administration, and ethics of incident management;
2. Exploring the factors that influence state and local PHEPR practices related to the laws, regulations, administration, and ethics of incident management (e.g., structural factors, root causes, extenuating circumstances); and
3. Understanding the short- and long-term knowledge needs of state and local PHEPR practitioners related to the laws, regulations, administration, and ethics of incident management.

SGNL facilitators led participants through a series of activities, including describing how laws and regulations support effective and efficient incident management at the state and local levels before, during, and after events. Participants also explored the legal, regulatory, and ethical factors that influence PHEPR practices during incident management and sought to understand short- and long-term needs of practitioners using laws, regulations, and policies.

The third workshop was convened on April 19, 2022 and consisted of 15 invited participants from a variety of health and emergency management backgrounds, as well as business and education. The workshop focused on:

1. Understanding the motivations and objectives of varied stakeholders before, during, and after a public health emergency/disaster;

2. Exploring the challenges faced by and potential legal, regulatory, and policy solutions available to these stakeholders before, during, and after a public health emergency/disaster;
3. Understanding the social, economic, and ethical factors that influence deliberation and decision-making; and
4. Acknowledging the complex repercussions of public health actions (specifically legal, regulatory, and policy solutions) on community resilience.

SGNL facilitators organized this workshop around five hypothetical disaster scenarios and the actions available to protect the public's health, different stakeholder goals and priorities, and the potential unintended consequences of public health actions on community resilience.

APPENDIX A – DETAILED FINDINGS BY WORKSHOP

Workshop 1

Table 1 – Critical Decision Points

Critical Decision Points Before a Disaster/Public Health Emergency	
Decision point	*Essential Information Needed*
Hazard detection	• Data-supported evidence indicating an emerging hazard is a true threat to public health • Sufficient information from initial assessments and hazard detection, including for emerging pathogens, as well as data to guide timely decision making for activating emergency response • Threshold determinations for moving between disaster phases
Resource activation	• Sufficient information on event severity, type, predictions, and timing when "converting data into action" and requesting resources • Funds and budget allowed for hazard detection and data collection throughout the disaster cycle
Public notification	• Clarity around what information public health is allowed to release to the public and when • Information on event severity, type, predictions, and timing that can be released to the public • Identification of appropriate public messaging strategies
Critical Decision Points During a Disaster/Public Health Emergency	
Decision Point	*Essential Information Needed*
Emergency activation	• Threshold determinations for moving between disaster phases (based on data) • Identification of key partners, data, and communication channels for initiating response activities
Resource allocation	• Information on public health needs to guide resource allocation, including staffing, into emergency

	functions and when to place them back to steady state once the emergency is over ● Threshold determinations for shifting resources between disaster phases ● Determination of allocation for life-saving resources and supplies
Critical Decision Points After a Disaster/Public Health Emergency	
Decision Point	*Essential Information Needed*
Closeout	● Data supporting closeout decisions, not based on political pressure
Resource deactivation	● Threshold determination for shifting of resources, including staffing, from emergency to steady state

Table 2 – Current Practices Working Well

Current Practices Working Well: Data Collection and Acquisition	
Practices	*Context from Workshop*
Establishing regular communication channels between labs and partners	• Establishing weekly touch-base meetings between departments or agencies to discuss challenges and successes for data in labs. • Building a coalition of private, academic, and public labs for a weekly touch-base meeting to discuss practices that work or do not work and provide capacity updates
Flexible, rapid scaling of lab data collection and reporting mechanisms	• Ability to rapidly scale up alternative surveillance reporting mechanisms during COVID-19 when existing systems could not handle volume of surveillance data received • Cross-jurisdictional vaccine immunization reporting previously established • Ability to integrate lab information with case management during COVID-19
Developing public-facing dashboards for transparent data dissemination	• Transparency of data use, strategy, and sharing incentivizes participation in data acquisition • The COVID Act Now Dashboard provided simplified, neighborhood-based information, and was easy to explain to frontline staff • The John Hopkins Dashboard was easy to use and helpful in communicating data with legislators (COVID) • New York Times data visualization was helpful in communicating data with executive political leaders • Publicly available dashboards relieve burden on staff in terms of information requests
Standardizing data collection and analysis strategies across agencies	• Using neighborhood tabulation areas, and "agreeing on certain tracks of data as a denominator between agencies and units of analysis for geography" was useful for standardizing data collection and analysis in New York
Current Practices Working Well: Data Exchange	
Practices	*Context from Workshop*
Establishing regular communication channels between labs and partners	• Regional calls and regular touch-base meetings between organizations have helped to create movement in data sharing practices

Establishing partnerships and data coordination strategies, including DUAs, for bidirectional data exchange	• Establishing partnerships with the health care sector is important for good data exchange, as health care sees public health as an "irritation rather than a partner" • Allows for interjurisdictional exchange of vaccination information, including cross-jurisdictional exchange, which is useful for both public health and health care • Including regional approaches to data coordination across hospitals so that facilities understand the operational picture and information sharing can be done in real time • Leveraging standing data use agreements (DUAs) with academic partners for the ability to surge the usually limited public health analytic resources
Advancing technology for secure data exchange, analyses, reporting, and sharing	• Integrating cloud-based systems can be a "game changer" • Data visualization programs (e.g., Tableau) are useful for "joint analyses based on disparate data sets, providing a network of data sets that can be combined and aggregated"

Table 3 – Current Practices: Areas of Struggle

Current Practices: Areas of Struggle for Data Collection and Acquisition	
Area of Struggle	*Context from Workshop*
Data systems outdated or unable to handle volume during pandemic	• Systems themselves are huge barriers (e.g., bifurcated systems, using paper or fax for communication) and prohibits data sharing • Labs were underprepared for the volume of data during the COVID-19 pandemic and had to find strategies to be flexible and scalable. Prior to the pandemic, some labs only had two mechanisms for reporting (surveillance or electronic laboratory reporting), and had to quickly set up alternatives (e.g., Excel) to handle volume • The time to roll-out new systems for data collection and integration, especially novel systems (e.g., exposure notifications) is "not during an emergency"
Challenges around data collection, analysis, and reporting standards	• There is still a need for hyperlocal data to be fed back to state and local practitioners to "get a pulse of a community" • Public health needs support in the collection of "soft data," including qualitative and social and behavioral data, especially for vulnerable populations • Public health "focuses on numerators in data and treats denominators as a static number," when it should be adaptable for analysis of different geographical areas and integration of social determinants of health (SDOH) data. • Public health should be able to "better speak to SDOH analytics in depth," to "help infrastructure, resource allocation, increase public trust," and have a better picture of SDOH factors in modeling and forecasting
Lack of communication strategies between agencies prior to an emergency	• Establishing a coalition of labs and regular "touch base" meetings were "set up during the COVID-19 Delta response, but should have already been in place"
Current Practices: Areas of Struggle for Data Exchange	
Area of Struggle	*Context from Workshop*
Establishing DUAs	• DUAs with clear data standards for data exchange should be established between partners prior to an emergency
Legal barriers to data exchange	• During public health emergencies, healthcare providers are often a significant source of data, but are subject to HIPAA and push back against public health on minimum requirements

Table 4 – Obstacles

Obstacles to Good Public Health Data Collection and Acquisition Practices		
Theme	*Obstacle*	*Context from Workshop*
Data sources, types, and collection	Public health has no way to collect information directly from households	• Data is often collected out of ease rather than prioritizing what is useful due to inability to gather household-level information • "Different areas have very different baseline data specificity and we often bias toward collection where it's easiest" • Difficulties in navigating compatibility with non-health care systems that are out of the health information exchange loop
	"Soft" data sources and types are not prioritized	• Definitions for what counts as "good data" to collect is often limited to "hard" data sources only, and is often determined by federal standards • SDOH data is not always considered critical for other non public health organizations
	Lack of data standards, messaging, and terminology across partners	• "Lack of agreed-upon messaging, terminology, and general standards," including for accessing baseline data for public health to provide background information and context • Lack of an information ecosystem (e.g., lab consortiums) that is in place before an emergency • There is "no clear evidence by emergency phase for what data is needed beyond the basics"
	Need for transparent and strategic data request processes	• Becoming more strategic and concise in data collection needs may help with unburdening partners with data requests and would enable more rapid acquisition and analysis • Communicating intentions and use of data, analysis, and results with partners with requesting data or establishing DUAs may incentivize partners to share data with public health • Competing priorities between partners and vendors are especially problematic during emergencies, and more concise requests may help
	Lack of community trust and relationships with public health	• Building stronger relationships between community organizers and public health may help increase trust and the ability to gather neighborhood-based data • Establishing partnerships with tribal population could help with addressing data decolonization and provide education about data and data use

Data Systems	Outdated technology and data systems does not support good data collection practices	• Failure to adopt emerging technology for more rapid data collection, "Data are only as good as the system you have designed to collect them" • Even with sufficient staffing, data processes can't be completed effectively with antiquated systems and facilities
	Interoperability challenges limits public health data infrastructure capabilities	• Systems across partners are not set up for bidirectional data acquisition • When local partners want to share data with public health for emergency preparedness or response purposes (e.g., school absenteeism during pandemic or flu season), they do not always have a system in place to do so, or the existing data systems are incompatible
Data Governance	Disconnect between agencies in accessing data and using it to guide decision making	• Changes are needed for public health Incident Command and emergency operations center structures to include guidance on how that group looks at data and ensure data have a clear pathway to decision making, especially when political leaders are making decisions not based on data • Disparate testing and health infrastructure means there's no one entity collecting or making decisions • Federal partners don't always share data with state and local agencies
	Legal or policy challenges inhibit ability to collect data	• "Perceived implications of HIPAA," meaning "HIPAA itself is not a challenge, except for those who don't understand it" speaks to educational opportunities for individuals and organizations around liability • 42 CFR Part 2 (substance use disorder data) and FERPA have no routine standards for data sharing with public health, especially 42 CFR which does not have a provision for sharing during health emergencies like FERPA does • In Stafford Act declarations, the "information management mechanism is set up through FEMA and public health cannot access data," even though it includes "useful SDOH information for climate-related disasters" • There are likely additional legal difficulties and unanticipated challenges that are not yet known in all-hazards responses
Workforce	Lack of workforce capacity during	• There is a lack of capacity ("bandwidth"), budget, staff, and time to process all data received even with updated systems

	emergencies or surge	
	Skilled workforce recruitment and retention challenges	• Staff may not have the skills and tools needed to do the work, including familiarity with technical systems or knowledge of social and behavioral data acquisition tools • Implicit knowledge is disappearing with turnover, "if someone who has worked with a particular data set over time leaves, their institutional knowledge goes with them" • Salaries in public sector do not rival private sector, and staff is being "brought into potentially antiquated facilities" which does not incentivize skilled workforce recruitment • Informatics staff being outsourced is not a sustainable solution for health departments who are unable to recruit and retain talent
Obstacles to Good Public Health Data Exchange Practices		
Theme	*Obstacles*	*Context from Workshop*
Data sources, types, and collection	"Soft" data sources and types are not prioritized	• There is a bias toward "hard" data over "soft" social (qualitative) data that can be more useful in speaking to community values and experiences • There is a lack of understanding about types of data needed for different purposes in public health and its usefulness (qualitative)
	Lack of data standards and terminology across partners	• There are no standards for how jurisdictions define data points for different populations and clients served, or an understanding of type of data that are specific to different sectors • Lack of common terminology and data standards across entities and jurisdictions, which can lead to incompatible metrics
	Need for transparent and strategic data request processes	• Becoming more strategic and concise in data collection may help with unburdening partners with data requests and would enable rapid acquisition and analysis • Public health perception of data "needs vs wants" can lead to large data requests from partners, who want to understand how the data is to be used • Exchanging data is not a priority if the purpose of data requests is not clear

	Data collection prioritization does not always reflect community needs	• Investments are not made in capabilities to gather data that reflect community priorities (e.g., "community feedback loops") • If public health data sharing "begins with the objective of getting the public what they need, instead of what public health wants," data sharing could become more valuable and help build public trust
Data systems	Interoperability challenges limits public health data infrastructure capabilities	• Limited public health information infrastructure allowing for bidirectional communication with local communities or the public, leading to the creation of siloed data collection mechanisms • Lack of interoperable systems across entities
Data governance	Ownership and access issues creating silos	• Understanding who owns data, and who is authorized to access and view ("need to know" basis) • Data ownership issues can lead to "turf wars" and is impacted by politics and lack of trust between agencies, as those who "control the data also control the narrative" • Organizations are reluctant to share useful information with public health especially if they don't understand the purpose, and often "only share when they are forced" • Health systems in some areas (e.g., New York) do not want to share information with one another because they are in competition with each other • Determining if public health really needs to own all the data, or if there are better ways of sharing useful data with the public so they can make decisions • Public health needs a high-level, central entity that consumes and shares data, rather than a "data vacuum" that does not support bidirectional data exchange (e.g., National Oceanic and Atmospheric Administration's centralized data sharing systems allows for weather forecasting and predictions for public consumption)
	Threats to data security and infrastructure damage	• Loss of access to data if systems are physically damaged during an emergency (e.g., flooding), embargoed by hackers, or are compromised during other cybersecurity attacks • Different types of attacks or damage have different security implications on data access, privacy, and trust

	Challenges created by outdated laws or regulations	• Restrictive state laws around data sharing can preclude public health from sharing data with others, even when the information is useful for establishing baseline or guiding decision making (e.g., Disease Prevention and Control Act in Pennsylvania)
Workforce	Staff turnover creates challenges in workforce capacity and retaining institutional knowledge	• Lessons learned across events are not documented and shared or integrated internally or externally to build up a competent workforce • High turnover results in loss of knowledge, a system is needed to carry information across staffing transitions

Table 5 – Knowledge Needs

Knowledge Needs to Improve Public Health Data and Information Management		
Theme	*Action*	*Context from Workshop*
Data Collection, Sources, and Types	Establish sustainable partnerships between public and private entities, including academic institutions for general data collection and expanding surge capacity during emergencies	• The partnerships and collaborative groups formed during COVID-19 established important data practices. Discussions should be held to determine what kind of data collection and sharing can be continued into the future • Leverage relationships between practitioners and academic institutions to support emergency response or surge capacity staffing with specialized skills (e.g., modeling teams in schools of public health when state department capacity is lacking, or other expertise during emergencies)
	Understand community values for a more equitable, useful, and representative approach to data collection	• Adapt data collection practices to learn more about what communities want to know • Partner with communities to increase representation, and involve community members when interpreting data to improve quality of information produced by public health
	Understand what kind of operational data need to be collected during emergencies	• In emergency settings, novel operational information is requested that isn't routinely expected, and public health needs to know how to improvise and incorporate those needs without compromising existing systems • Public health is used to conducting surveillance and collecting operational data for real-time policy and response information, but also needs logistics response information (e.g., tracking testing and personal protective equipment use)

	Develop ways to measure progress and change of public health programs and determine if the solutions generated are filling identified gaps	• Consider shorter-term grants and/or more iterative approaches that define goals and success criteria so that retrospective learning can influence next iterations • Larger grants are easier to manage than small, interactive grants. Partnerships with institutions would help in funding sustainability and security • Use collaborative exercises to learn more about the needs of real-time data application and how it can be applied to an outcomes-based, agile development cycle
	Improve accessibility, quality, and quantity of data, and understand what data are "needed" vs "wanted"	• Public health should be transparent in what data it needs and how the data will be used in an effort to be more data generous and less data scarce • Establish a list of essential data needs through a collaborative approach, including identifying desired data elements, mapping out ways to obtain them, and develop essential data needed for different audiences. • "We can't think about data collection without thinking about use and communication." Public health should consider this entire process when thinking through what data are being collected as a best practice to help address some of the issues around requesting too much data
Data Systems & Information Sharing Practices	Increase knowledge across entities by establishing partnerships and collaborative, secure data sharing practices and solutions	• Create standardized systems to "leverage communities of practice to share information and learn from each other" • Update infrastructure and software systems (e.g., cloud based) and ensure staff is sufficiently trained • Establish partnerships between analysts, vendors, and IT groups to address challenges in data sharing • Develop or incentivize grant support for academic partnerships to enable data sharing during surges and for long-term sustainability
	Improve data information systems	• Invest in cloud-based solutions and flexible data structures that support interoperability • Support unified data systems for easier exchange of information

	Increase data literacy and trust, especially in decision makers	• Decision makers do not always have time to look at the data during emergencies, or do not always trust the data collected, therefore decisions are often not based on data • Lack of data literacy during response can also be problematic. "Data may be available, but when presented to leadership they don't understand and can't make decisions based on the data"
	Ensure DUAs are in place prior to an emergency for data sharing and exchange	• Relationship building is needed between owners and users prior to an emergency, not during a response • DUAs can be helpful in establishing an understanding of restrictions and opportunities in sharing information, and clarify intended use and purpose with owners
Public Health Data Science Workforce	Identify sustainable immediate and long-term staffing gaps and solutions for local and state health departments	• Using contractors for informatics, data science, and IT is not a viable long-term strategy, and health departments need permanent staff now • When more specific functions are contracted out to vendors, institutional knowledge within the permanent workforce is lost or never built • Identify the crucial data skill sets and position descriptions needed for both routine and response capabilities at state and local levels, then identify gaps in the workforce base on those needs • Support data science and IT staffing in health departments through grant requirements and language, as well as developing IT infrastructure
	Increase education, training and development opportunities for workforce recruitment and retention	• Strengthen partnerships between public health and academic institutions to ensure the next generation is being trained on specific tools and skills they need to enter the workforce (e.g., software and analytics training) • Expand or create new fellowships for placement into data programs as a long-term strategy • Offer professional development opportunities for existing staff, as well as supportive and collaborative environments to increase retention and skill development in data science workforce

Data Governance	Increase workforce knowledge around liability	• Organizations and individuals need to be educated and have a clear understanding around liability for sharing data, what can and cannot be shared, and how to be compliant with regulations (e.g., many automatically assume information is protected by HIPPA when it does not actually apply)
	Increase knowledge and preparedness for data security concerns, especially cyberattacks and ransomware	• Cyberattacks and ransomware are becoming an issue for government agencies and private companies, and have only increased during COVID-19 • There is a need for "figuring out how to avoid cyberattacks, as well as for backup and contingency plans" to protect data systems, availability, and privacy

Workshop 2:

Table 1 – Legal and Regulatory

Current Legal and Regulatory Practices Working Well in Incident Management	
Practice	Workshop Context
Emergency declarations bring attention to public health issues	• States issuing emergency orders restricting the sales of vaping products "brought attention to the issue and ignited a political response"
Emergency declarations allow for rapid procurement of resources	• Early on in the pandemic, states and territories simultaneously declared emergencies, which "triggered expedited procurement processes for needed materials that would not have been possible otherwise." Effective incident management at the state and local levels would not have been possible without simultaneous declarations and associated public health powers at the federal, state, and local levels • The federal government "did well in moving along emergency use authority processes during the pandemic and making products available to states and territories"
Emergency declarations and compacts opening avenues for emergency staffing	• Establishing memorandums of understanding and emergency management assistance compacts between regions, states, or municipalities that address sharing healthcare staffing resources, including reciprocity and liability protection made possible by emergency declarations • Legal processes allowing for cross-state licensure agreements enabled doctors to practice in other states if needed, which has been shown to be highly effective and advantageous during emergencies even beyond COVID-19 • When emergency declarations are issued, medical providers in the private sector have the ability to work across state lines if the organization has licensure in those states, but the organization needs to have agreements in place across sectors (e.g., emergency medical services (EMS) and pharmaceuticals) • Telehealth, including for mental health, was legally made possible at a much broader scale during COVID-19 and has been very beneficial for allowing medical services to be delivered across jurisdictions
Having the ability to order or change reporting requirements during emergencies	• The capacity to declare enhanced surveillance advisories, facilitated by public health emergency declarations, is effective in informing state providers of emergency reporting requirements and information in real time (e.g., opioid declarations required overdose reporting that was not otherwise being reported)

	• The ability to modify the list of reportable diseases quickly and easily without legal triggers provides the power to order reporting of additional conditions from other facilities (e.g., funeral homes) during COVID response (Michigan)
Efficient coordination and providing clarity of roles during emergencies	• "Executive orders can be helpful in outlining roles and responsibilities during emergencies" for agencies and practitioners
Allowing flexibility in compliance with other regulations during emergencies	• "State governors have waiver authority, or the ability to waive certain compliance requirements and 'red tape' during emergencies that might otherwise get in the way of effective incident management"
Enacting legal authority and countermeasures	• "The number one tool for saving lives in the first 90-120 days of the pandemic" was using legal strategies and declarations (e.g., use of the Model State Emergency Health Powers Act and emergency declarations) • Despite communication barriers early in the pandemic, most people took the crisis seriously and complied with public health orders (e.g., stay at home orders)
Legal and Regulatory Challenges in Incident Management	
Challenge	Workshop Context / Influencing Factors
Removing emergency declarations impacts rapid procurement	• "Rapid procurement mechanisms end when an emergency declaration ends." If this is removed prematurely, states can have a difficult time responding to emerging issues (e.g., emergence of Delta or Omicron) • "It would be beneficial to have the ability to make emergency purchases without bids"
Limitations in cross-jurisdictional sharing of emergency staff	• Relying on cross jurisdictional sharing of emergency staff "only makes sense if only one place is surging, but not if there is a surge with staffing shortages everywhere" • Telehealth services helped provide healthcare support across jurisdictions during the pandemic, however there is a challenge with U.S. companies based outside the country not being reimbursed by Centers for Medicare and Medicaid Services
Restrictions in ability to waive labor regulations during emergencies	• Contract and grant language can be limiting, and while emergency declarations can waive some labor regulations, more flexibility is needed. • During emergency declarations, there is not a waiver for labor law regulations that would allow flexibility for requirements around maximum number of hours allowable work, breaks, and paid time off which would be

	helpful, especially from a private sector standpoint. However, there are other cascading consequences to be considered in this, including liability for injury due to exhaustion or health insurance obligations
Administrative challenges in pivoting to emergency staffing	• There is a current lack of administrative flexibility for staffing during emergencies, particularly in the way grant language is framed that doesn't allow for staff to pivot in their roles to respond. Utilizing staff from grant funded programs (e.g., WIC) is difficult when those staff are required to work within specific parameters. • Language needs to be built in to job descriptions from the start of employment to allow for staff reassignment during emergencies • Language built into emergency declarations can be limiting in public health response staffing. Considering shifting language to "maintaining critical infrastructure" or "essential services" rather than "response" to allow more flexibility for staffing during emergencies • Public health staff are not designated for emergency response in HR and payroll systems the same way EMS or fire staff are, which results in having to manually enter hours, obtain authorization for overtime, and manage compensation issues for the number of hours worked during the pandemic • There are concerns around liabilities that exist in reassigning staff to areas where they may not be properly trained, which speaks to the need for greater cross-training within departments • "There is a general lack of underlying supports (e.g., employee pay) for effectiveness of legal mechanisms"
Emergency staffing personnel wellbeing	• Impacts on staff wellbeing are not always considered when implementing emergency staffing, such as the types of hours they are required to work under stressful circumstances without adequate compensation. This not only has consequences on physical and cognitive capabilities to perform duties, but also hurts morale
Emergency reporting requirements and processes	• Manual reporting can be problematic • There has been talk about "the lack of a true national surveillance network for years, but not a lot of political will to create this infrastructure", which resulted in many data and reporting challenges during the pandemic. • Inconsistent reporting requirements needed "through different mechanisms to different entities is challenging from an operations standpoint to maintain routinely," especially from private sector perspectives • From a "local perspective in emergency preparedness, the only reporting requirement is around grant deliverables, but there should be more"

	• Data reporting to state health departments through third party vendors is challenging for locals
Navigating data use and protection laws	• Navigating "state and federal data protection laws and use of data" can be a challenge for practitioners • Privacy of patient information creates obstacles, even during emergencies and when there are many legal opportunities to solve these issues in real time (e.g., waiving critical privacy agreements) • Entities involved in data reporting often push back on reporting patient information during emergencies, and the time-consuming back-and-forth communication causes delays in obtaining needed data, which is problematic in emergencies
Managing the dynamic nature of emergencies	• Sometimes public health "does not do well in pivoting response actions due to ability and willingness to adapt once decisions are made and are already down a path," even as novel information becomes available • "The 'temporariness' of an emergency" influences how practitioners carry out duties and responsibilities
Maintaining compliance with other regulations	• States may be able to waive compliance with other regulations during emergencies, but federal support and regulation is still needed to back those decisions • Fundamental misunderstandings existing around HIPAA, and the workforce needs to be educated in what HIPAA compliance really means
Enacting and enforcing legal authority and countermeasures	• There are cascading consequences to consider when restrictive measures are put into place that require the government to step in and fill gaps for communities (e.g., unemployment benefits or insurance when shutting down places of business and income sources) • "Attempted regression of police powers" and "exercise of existing legal authorities" are challenging for practitioners • "Inconsistency of legal response based on devolution of public health authority to local or county level"
Lack of funding	• "Underfunding of public health over the course of thirty years is an inhibitor to effective public health emergency response"

Table 2 – Ethics

Current Ethical Practices Working Well in Incident Management	
Practice	Workshop Context
Increasing awareness of equitable resource allocation practices	• Facilitating meaningful discussions around equitable allocation of resources during the pandemic and heightening an awareness around this challenge • Maintaining the ability to pivot when decision-makers realized that decisions are not being made ethically and equitably • Making efforts to educate local public health partners on ethics and equity during COVID-19, which heightened awareness (e.g., NACCHO/CDC working on developing trainings around creating procedures for public health ethics in order to get accredited)
Providing resources to the public with ethics in mind	• The federal government did well in providing free COVID-19 testing and treatment options to the public
Applying professional ethics in the field	• "Volunteer responders (Red Cross) who come from different professional backgrounds bring strong ethical principles with them into the field, in addition to adhering to ethical principles in being good stewards of donations from the American public"
Transparent communication with staff around Duty to Treat, personal risk and moral distress	• "Staff were committed to showing up for work in the early days of the pandemic after working to prepare them for challenges around the principle of Duty to Treat patients in the face of personal risk (Colorado)" • Maintaining transparency with workforce about what kind of risks they face • Moral distress conversations have taken place in the medical field for some time but are now starting to occur in the public health workforce. Conversations around PTSD and first responders have also been receiving more attention
Maintaining transparency in public notification and engagement	• Transparency and science-based communications with the public is an essential ethical practice • During Ebola response in 2014 and pandemic flu in 2009, public health did well in" ramping up in preparation for full response while making transparent decisions based on science, not politics"
Ethically enacting public health prevention measures and authorities	• Social supports (e.g., stimulus checks and eviction moratoriums) were provided during COVID-19 while putting restricting public health prevention measures in place

Ethical principles guiding emergency declarations or legal responsibility	• Emergency declarations for the opioid crisis allowed for a change in legal focus that recognized substance use as a disorder rather than a crime, and shifted the legal responsibility of opioid possession or use away from the user
Ethical Challenges in Incident Management	
Challenge	Workshop Context / Influencing Factors
Ethical and equitable resource allocation	• Allocating scarce resources ethically and equitably can be challenging in emergencies • It can be difficult to assess real impacts of actions during emergencies to guide ethical decision making and equitable resource allocation
Ethically managing the emergency response workforce	• During COVID-19, first responder staffing was only sustained by sacrificing wellbeing in order to keep services going (e.g., EMS working long hours and at high risk). They were thought of as "bodies but not people" • There has historically been a lack of attention to moral distress in the public health workforce, which contributes to burnout
Navigating public notification and data disclosures	• "Contending with the obligation to disclose data about emerging public health concerns after COVID-19, as the public will likely expect the same level of data disclosure and dissemination in future emergencies"
Balancing restrictions with public health prevention measures and authorities	• Decision makers should be "considering the ethical principle of proportionality, the use of least restrictive means of achieving the reasonable public health goal, when enacting public health prevention measures" (e.g., stay at home orders, closing of businesses) • There are cascading consequences to consider when restrictive measures are put into place that require the government to step in and fill gaps for communities, and do so ethically and equitably (e.g., unemployment benefits or insurance when shutting down places of business and income sources)
Balancing "right to know" and protection of personal information	• "Right to know" claims in the healthcare field, particularly around mandating COVID-19 vaccinations and if healthcare workers have the right to know the vaccination status of their patients and coworkers (e.g., wearing designators of vaccine status on ID badges). In the past, this was not an issue with flu vaccines, but during COVID-19 many were not allowed to enforce the same requirements.
Prioritization of vulnerable populations	• Data on "at risk" populations is often limited due to a variety of issues, from informed consent to deprioritizing data collection for this population, which is especially problematic during emergencies

	• "Failure to adequately account for the wellbeing of persons who are disabled or otherwise especially vulnerable" • "Prioritization of returning to 'normal' and focus on the preferences of those who are not at high risk from the emergency" • "Inconsistency between stated objectives (e.g., equity) and emergency response actions
Systemic issues in public health emergency preparedness	• Those involved in a response often "come into these situations with the right mindset to be ethical, but this face-value approach is a limitation." Core ethical principles that guide decisions (e.g., resource allocation or crisis standards of care) "need to be laid out clearly and actually utilized" • There is often a "refusal to grapple with the need for significant changes in infrastructure to prevent further harm (e.g., the need to overhaul ventilation in public spaces) • There are challenges around how to "balance preparedness efforts in light of the likelihood and impact of various emergencies"

Table 3 – Knowledge Needs in Incident Management

Knowledge Needs	
Need	Workshop Context
Easily accessible legal information or advice during emergencies	• Information should be available in contemporary ways, and in a way that practitioners can navigate easily during an emergency or receive expert legal advice in real-time • Legal strategy playbooks or guides to provide information to public health practitioners about possible legal maneuvers to solve noncompliance issues
Inclusion of legal or ethical challenges in training and exercises	• It would be beneficial to have "training in how to think through ethical problems, which may help in thinking through contentious policy problems"
Understanding how to navigate political aspects of public health emergencies	• Political decisions can influence poor health outcomes • How the public behaves and reacts impacts political decisions and policies • Ethically implement strategic legal responses to "defeat COVID-19 denialism and politically motivated decisions" through a greater federal presence in declared emergencies
Understand community needs during public health emergencies	• Local jurisdictions have a significant role in the efficacy or impact of public health approaches and responses within their communities • Public health should be asking questions around "how communities want to be protected" • Consider finding creative ways to encourage compliance beyond public health powers and enforcing mandates
Understand how to balance the right to refuse care with public health prevention during emergencies	• "All patients have the right to refuse care and practitioners must respect that right to choose, assuming the patient has the ability to make informed decisions" • Discuss how to balance enforcement of public health prevention measures and individual rights
Better information, education, and messaging around public health authority	• This should include accurate information about enacting and enforcing mandates and restrictions • There is a need to better educate the public and the media on "how the basic political and legal systems work," to combat "hyper-individualism" and emphasize the public good

Maintain transparency around what is guiding decisions	• Consider a "shift in language towards 'evidence-informed information' instead of 'evidence-based interventions' while maintaining transparency about the scientific factors that contribute to decisions" and evolving research

Workshop 3:

Table 1 – Stakeholder Values

Public Health		
What drives their work	Who are they accountable to	What do they have to lose
• Commitment to the public health mission of community health and wellbeing • Collaboration and collective action • Providing the greatest good to the greatest number of people • Desire to equitably improve health outcomes and prevent adverse health outcomes in communities • Reducing disease incidence and impact • Protecting vulnerable populations	• Government agencies and elected officials • Public health peers within teams and agencies • Healthcare, board of health, healthcare providers • The public, residents and communities served (including at-risk communities)	• Employment and careers • Public trust and credibility • Population health and loss of life • Support (resources or funding) • Social and political will or capital for public health work and implementing core interventions • Public health power and authority
Emergency Management		
What drives their work	Who are they accountable to	What do they have to lose
• Understanding and preparing for hazards by anticipating needs, developing plans, and creating and reinforcing infrastructure • Operations, structure, logistics, and interagency collaboration • Continuation of essential services	• Government agencies and elected officials • The public and residents of communities served • Emergency and first responders as well as other partners and local, state, and federal levels	• Employment and careers • Public trust, perception, and credibility • Population health, loss of life, and damage to communities served • Support (resources and funding) • Authority

• The authority, expertise, and credibility to advise society on requirements necessary to maintain the public's health and safety, and mitigate and prevent risk to communities • Ensuring elected officials, partners, the public, and the media are aware of, prepared for, can respond to, and be resilient to disasters		
Healthcare		
What drives their work	Who are they accountable to	What do they have to lose
• Patient needs, outcomes, and quality of patient care • Health equity • Cost savings and profit • The Hippocratic Oath	• Centers for Medicare and Medicaid Services • Patients, families, and communities • Providers • Licensing • Insurers • Shareholders	• Revenue and funding • Trust and reputation • Demand and market share • Patient lives • License to practice and accreditation • Insurance reimbursement
Education		
What drives their work	Who are they accountable to	What do they have to lose
• Improving future outcomes by enriching and expanding the minds of students • School boards and politics • Parents and caregivers	• State and local boards of education and government • Students, their parents, and parent/teacher association committees • General society, as it depends on schools to educate the next generation	• Funding • Credibility • Jobs • Loss of history and knowledge • Students • Accreditation • Autonomy

Business		
What drives their work	Who are they accountable to	What do they have to lose
• Business models and value propositions • Consumers and market demand • Brand, profit, and community optics • Shareholders	• Shareholders • Market • Regulators • Competitors	• Customers • Funding and profits • Stability and going out of business • Freedom if found criminally liable
General Public		
What drives their work	Who are they accountable to	What do they have to lose
• Autonomy and freedom to make their own decisions • Personal and family safety and wellbeing • Providing for their families and households • Values, religion, and beliefs systems, including group identities and political affiliation • Impacts of public health actions • Opinions on social media	• Family, peers, religious leaders, and community as well as associated values, beliefs, and social pressures • Themselves • Legal authorities • Employers	• Health, wellbeing, and life of themselves, loved ones, and community members • Jobs and livelihood • Reputation and future prospects • Self-respect • Safety and security • Freedom in found criminally liable

Table 2 – Aligned Objectives of Various Stakeholders and Actions Available to Protect the Public's Health

Aligned Objectives	Context
Improve population health and prevent morbidity and mortality	• All stakeholder groups place value on improving health and wellbeing outcomes for individuals, families, and communities • Ensuring access to resources and systems that can help prevent illness, injury, and death (e.g., cooling systems in homes or setting up accessible cooling centers during high heat events) • Utilizing environmental inspectors and epidemiological outbreak investigations for foodborne illness outbreaks • Providing more mitigation strategies in mass shelters (e.g., handwashing and hygiene stations) to prevent illness • All stakeholders share similar concerns about potential evacuation zones, especially in terms of "reducing damage as well as protecting property and people"
Economic and social preservation	• Ensuring the least restrictive measures are taken first, then escalated as appropriate so disrupting economic and social "normalcy" is minimized • All stakeholders are interested in "serving the common good, especially when doing so is aligned with profitability" • All stakeholders want to protect property and businesses to minimize long-lasting social and economic impacts to communities
Support health equity and prioritize vulnerable populations	• Providing protections for marginalized communities, communities of color, and those without access to information, transportation, housing, or shelter • Ensuring availability of services and access for vulnerable populations • "Advocating for health equity in all policies"
Maintain critical infrastructure	• Ensuring contingency plans are in place to minimize disruptions to communities during an emergency • All sectors want to prevent infrastructure damage, maintain access and operations of critical structures
Manage healthcare capacity	• Managing capacity may require "alternative or crisis standards of care, or allowing for the ability to treat patients on site at mass shelters to improve healthcare access and decrease emergency department visits during an event"
Develop long-term mitigation strategies	• "There is a need to mitigate existing risk, but also to think about preventing risks or reducing disease burden in the future"

Actions	Context to Support Actions
Declaring states of emergency for procurement of space, funds, mutual aid, and resources	• Public health can recommend elected officials use emergency authority to open venues to support the public during a crisis • Legal mechanisms can cancel mass gatherings and events, or close schools and businesses if needed • Can provide energy assistance to communities when applicable • Implement mask mandates or encouragements during communicable disease outbreaks • Ensure emergency management assistance compacts are in place before emergencies
Utilizing data and surveillance to drive an effective response	• Data collection on vulnerable populations can drive equitable resource allocation • Investments in data modernization and improving ways to share data across stakeholders are needed • Ensure surveillance, hospital, and public health reporting systems are able to "talk" to each other • The ability to collect and analyze sufficient data is important in coordinating with elected officials and justifying decisions
Managing risk communications prior to and during an emergency	• Public messaging needs to include information on what to do during the emergency (what resources are available, where to go, and how to stay safe and healthy) and include information that "reduces the number of people showing up at hospitals" • Risk communications should include informing communities about the response, risks, and what agencies are doing to respond and protect communities • Information sharing with the public needs to ensure business owners, individuals, and communities are able to make informed decisions in preparation for and during emergencies • Have risk communications plans in place to quickly address public health emergencies, including plans for events which may disproportionately impact children, and partner with sources communities trust to disseminate (e.g., Head Start channels) • Support regulatory requirements to provide communications in alternate languages appropriate for impacted communities, and ensure communications plans are equity-focused • During emergencies, social media "can run wild while public health is hesitant to release information that is not 100% vetted." Public health needs to improve ability to and comfort with quickly releasing information about what is and what is not known
Engaging in effective disaster planning, mitigation, and preparedness efforts for all hazards	• Ensure appropriate evacuation and transportation plans are in place prior to an event • Integrate public health preparedness into zoning planning and building codes (including planning, which accounts for and ensures provisions for persons with disabilities and elderly persons) • "Declaring healthcare as critical infrastructure for power restoration should be done prior to an event"

	• Include water management in planning, zoning, and building codes, and supporting nuisance abatement laws to mitigate vector-borne illness • Coordinate efforts between private vector control districts to consistently apply vector control practices • Engage in public information campaigns as part of risk mitigation strategies appropriate for areas prone to particular health risks (e.g., removing standing water that attracts mosquitos), and tailor campaigns for vulnerable populations (e.g., education on vector-borne illness risks for pregnant women)
Coordinating response activities	• "Standing up ICS and staffing EOC" • Implement emergency protocols in different settings (e.g., crisis standards of care, EMS triage protocols) • Response activities across sectors should "start with the least restrictive measures and escalate as needed"
Coordinating mass shelter	• Ensure authority and logistic ability to open appropriate shelters and centers for the event type (e.g., cooling centers for high heat events) • Support robust food safety law enforcement and program training and education in shelter settings to avoid foodborne illness
Increasing training and exercise for all event types	• Public health is still not ready for all-hazards events, and more emphasis is needed on "training and exercises over plans to increase knowledge and find gaps"

Table 3 – Challenges and Consequences

Challenges	Context
Prioritizing vulnerable populations and equity during response	• Mitigating risk at individual levels can be prioritized over mitigating risk at community levels, especially when involving profit and politics (e.g., serving at-risk communities is not profitable) • Some emergency management priorities are more tactical and less value-based, which is not always equitable (e.g., mass vaccine distribution plans do not always reach at-risk communities) • Populations who rely on electronically serviced medical equipment are at higher risk during power outages • Different events can exacerbate pre-existing medical conditions in vulnerable populations • Communicating messages to at-risk populations for shelter, evacuation, health information, or resources may not always be sufficient • Ensure resources (e.g., shelters) are accessible to all populations • Marginalized communities (e.g., communities of color) have less stability in housing, access to transportation, and shelter options which can exacerbate the impacts of disaster • Childcare can be challenging with school closures while parents still need to work • School closures can impact food accessibility for children • Safety considerations for children in high-risk communities or households may depend on how parent and caregivers are responding to stress (i.e., stress may contribute to abuse and neglect) • Ensure availability and equitable access to food, water, and shelter for displaced populations during all hazard types
Managing consequences of damage to critical infrastructure during response	• Damage to traffic lights increase likelihood of traffic accidents and fatalities, and impacts hospital capacity • Loss of power to businesses and homes can have environmental and occupational health concerns, including impacts to cold chains and food safety • A contingency plan is needed in anticipation of 911 or 311 service disruption
Managing healthcare capacity and staff during response	• Increased number of patients in emergency departments can be expected, adding stress to healthcare systems • Reliance on telemedicine may be disrupted with power outages, increasing the number of in-person visits to healthcare facilities during a surge • Public health may request medical reserve corps volunteers, or healthcare workers for staffing a response, which can create a conflict with overburdened healthcare facilities

	• Personal conflicts for healthcare workers exist when deciding between helping their families or showing up to work during an emergency, which can impact the number of available staff to respond • Healthcare has to balance patient values (e.g., refusing to mask during the pandemic) with staff safety and duty to treat
Addressing gaps in coordinated response and capabilities for responding to specific hazards	• HAZMAT and first responders often have very little decontamination capabilities at hand • Public health, emergency management, and healthcare often differ in their understanding of who should be screened during chemical exposure events, and healthcare often has little understanding of public health antidote resources or how they are distributed, including the strategic national stockpile • Emergency planning falls on local entities, but confusion can exist around who is in charge of different event types • There is often a lack of knowledge and gaps in planning within public health departments around radiation/nuclear and HAZMAT responses
Supporting mitigation and preparedness activities	• There is often "a conflict of investing time and money in mitigation and prevention instead of just responding when or if something happens" • Prevention measures are more of a priority for public health and emergency management than for the political and executive level government officials, which often prioritizes "response to negative consequences of disasters instead of prevention" • "Property owners may want to avoid or limit costs to mitigate flooding or storm water management practices, while the government may want to improve storm water management practices despite costs to property owners"
Unintended or Cascading Consequences	**Context**
Adverse health outcomes or continued marginalization of vulnerable populations	• Lack of investment in mitigation strategies in at-risk communities result in greater risk of adverse health outcomes during disasters, as well as disruptions in critical infrastructure, economy, housing, shelter, and healthcare access • School closures in at-risk communities disrupt education, access to food security, and community relationships for children • "People often do not have options for where they are placed in public housing programs, which speaks to exacerbating intergenerational trauma and has long-term impacts on mental health, access to education, and physical health."

	• "One of the challenges with lifting of mask mandates and returning to normal during the pandemic includes immunocompromised populations (those unable to get vaccinated) feeling at-risk and left out of the conversation for returning to their normal lives," which resulted in tension and marginalization • "Responding to existing problems without future planning reinforces existing power structures and inequities"
Impacts on public health credibility and public trust	• Public communications are delicate, and "if there are any mistakes or conflicting information, there is a loss of trust in the ability for organizations to response to future emergencies" • If any element of a response is mismanaged or goes wrong (e.g., foodborne illness in shelters), it can result in hesitancy for individuals to trust in those actions and systems in the future
A precedent for public health response without individual responsibility	• A certain level of personal responsibility needs to exist during disasters. If individuals and communities are under the impression that public health and emergency management will "always come to the rescue, they will rely on that instead of taking on personal responsibility, while still blaming public health for anything that goes wrong" • There is "increased apathy from the general public which leads to inaction and a false sense of security," which is dependent on historical visibility and impacts of other disasters
Creating or exacerbating mental health crises	• Decisions are sometimes made without considering the mental health implications for the population (e.g., school closures and shutdowns) • Not addressing health inequities in disaster planning and response can contribute to intergenerational trauma and associated adverse mental health outcomes
Public health authority	• Since COVID-19, public health authority "has eroded with political powers influencing" decision-making, which has resulted in public health having less options to enforce mandates • Public health no longer has a clear idea of what authority looks like since COVID-19, or what options are available to enforce public health orders during emergencies, given the pushback from many states throughout the pandemic. • When public health "takes strong actions, the people want to take away more public health authority"
Contributing to hospital surge during disasters	• Foodborne illness in mass shelters could lead to individuals seeking medical care at already burdened hospitals during an emergency
Contributing to economic hardship for businesses and individuals	• Some public health actions (e.g., shutdowns and quarantine) can lead to businesses and individuals losing income, which is especially problematic without essential worker protections or federal programs to alleviate those concerns

Increasing risk aversion in healthcare	• "People have learned how to manipulate the legal system to get what they want during the pandemic (e.g., masking or not), which will likely lead to more defensive decisions being made in the medical community to avoid medical malpractice lawsuits, which reinforces the bottom line over healthcare values (patient care)"