

Advancing United States-Based Child and Family Reunification Disaster Science

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Introduction

Family reunification, the process of bringing members of a family, specifically children, back together after an event, is an essential component of disaster preparedness and management. Natural and mass casualty (no-notice) disasters can strike at any time, separate families and friends, create victims who may not be able to identify themselves, and have the potential to displace persons from their communities for long periods of time. In addition, needs for family reunification can be drastically altered by the specific nature of the disaster: the time of day, duration of the incident, environmental forces, and the availability of resources such as electricity and transportation. For example, if a disaster strikes during business hours when children are generally separated from their family at school or daycare, the need for reunification could be greater than if it were to happen at night. The process of family reunification can be challenging, especially for those who cannot self-identify. Victim identification requires ongoing improvement. Numerous groups are involved in family reunification from the individual to the federal level: Stakeholders range from individual families to workplaces, from child care sites to corporate entities, and from local law enforcement to state and federal governments (see *Figure 1*). This discussion paper will illustrate family reunification responses after real-world disasters, review the current state of family reunification, and consider future directions for family reunification disaster science.

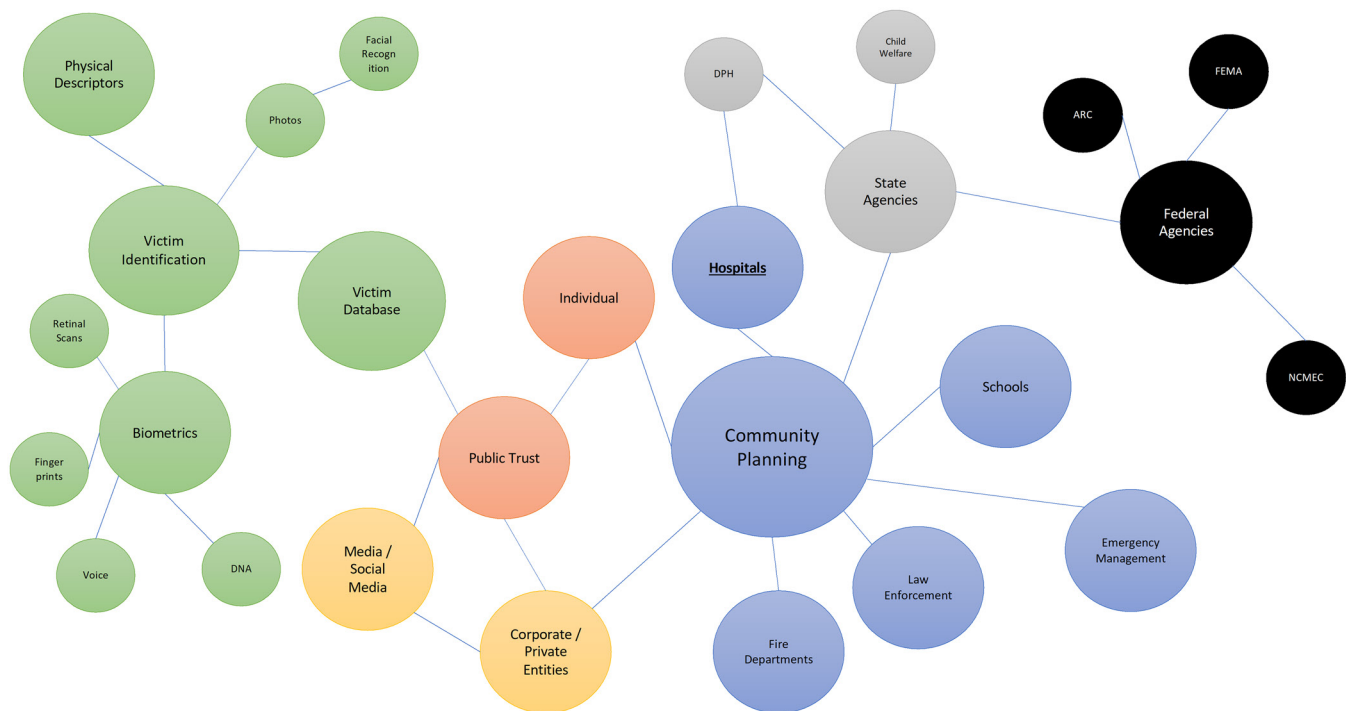
Current State of Family Reunification with Real-World Illustrations

In the United States, during the day, most adults work outside of the home and children are elsewhere for child care and schooling. In fact, on a given weekday, more than 69 million children are in schools and daycares (CDC, 2024). While they are away from their primary caregivers, children are particularly vulnerable to effects of disasters due to

their developmental level. Planning for children separated from their families requires specific considerations, such as attention to mental health, supervised pediatric-safe holding areas, as well as child-appropriate supplies including diapers, food, bedding, and toys.

Beyond the emotional and physical discomfort of families not being together, separation from family can cause long-term and profound impacts on children. Psychological stress compounds when children are without their support systems and biggest advocates. Physically, separated children do not cope as well as their non-separated counterparts in response to stressful situations (Eck, 2018). These effects can be long lasting; children under age 2 who were separated for more than 1 week from their parents showed increased negativity at age 3 and increased aggression at age 3 and 5 (Howard et al., 2011). Modeling has also shown that longer delays in reunification relate to worse health outcomes for children and increased health care costs (Barthel et al., 2013).

While disaster management in general is best approached from an all-hazards viewpoint, the type of disaster can affect family reunification. Natural disasters can have an increased risk of infrastructure collapse, including telecommunications and transportation, making even basic interventions more difficult. The magnitude of natural disasters can differ from man-made events, affecting larger populations and areas. This is well illustrated with the 2005 hurricanes, Katrina and Rita. Few events have been as impactful to family reunification science as these storms. With the magnitude of damage and the need to evacuate large groups of people very quickly, families were often intentionally or unintentionally separated across the South. In the days that followed landfall, as the public became aware of the catastrophic damage Katrina brought to the Gulf Region, officials noted that no clear system existed for the reunification of over 5,000 children separated from their family. At that time, the US Department of Justice asked

FIGURE 1 | Graphic Representation of Family Reunification Disaster Science

SOURCE: Spector sky K., A. Lin, R. Charney, and S. Chung. 2024. Advancing United States-based family reunification disaster science. *NAM Perspectives*. Discussion Paper, National Academy of Medicine, Washington, DC. <https://doi.org/10.31478/202412b>.

the National Center for Missing and Exploited Children (NCMEC) for formal assistance. Even with NCMEC’s hurricane-specific hotlines and searchable online databases for missing persons, it took over six months for the last child to be reunited with her family (Broughton et al., 2006; Gubbins and Kaziny, 2018). This large-scale natural disaster, affecting millions of families across an entire region and compounded by the loss of basic resources such as electricity, potable water, food, transportation, and normal communication methods, required the significant resources and pull of a federal-level organization.

Opposingly, human-driven, violence-initiated mass casualty events may have increased numbers of trauma victims requiring reunification and highlight the need for community-based reunification planning. These events create near instant panic, in which victims “scatter” in different directions, often without their belongings, and some scenes remain unsafe for hours, forcing victims to shelter in place. These areas then become crime scenes which further hamper retrieval of belongings such as cell phones and identification, which are crucial for communication and reunification. As an example, during the 2017 Las Vegas concert shooting, over 22,000 people fled the Las Vegas

Village lot in all directions, with over 500 injured. Immediately following the event, several community-based reunification centers were established but quickly overwhelmed by the volume. The following day, the Family Assistance Center at the nearby Las Vegas Convention Center was set up. While these responses ultimately reunited thousands of families in the aftermath of the shooting, challenges included communication with and transportation for the thousands of affected families (Lake, 2018; FEMA, 2018). While this event predominately injured adults, there were children affected as they were separated from their families in hotel rooms in the time following the shooting (Navis et al., 2024). The Las Vegas shooting demonstrates one of the largest community-based reunification efforts.

Violence-initiated mass casualties also cause large media and social media responses. Social media moves much faster than official communications, which can lead to an information vacuum that is filled with unverified, rumored, or even misinformation. However, social media can also be leveraged to quickly disseminate timely information and aid in reunification (Houston et al., 2015). As an example, Twitter postings provided localization and characterization of the Boston Marathon explosions in 2013 prior to official

communications from public health sources and pertinent national and local news sources (Cassa et al., 2013). During the 2022 July 4th parade shootings outside Chicago, a toddler was found alone and was cared for by well-intentioned strangers. While several reunification centers were set up, including at the local Highland Park Police Station, the good Samaritans were unaware of this, and used social media to spread the child's image, asking the public for help with identification (NBC 5 Chicago, 2022; Flores et al., 2022). Per his report, the maternal grandfather of the child was made aware of the circulating photo by a neighbor and eventually reunited after it was determined his parents had not survived the shooting (O'Donnell, 2022).

School-based violent events pose additional challenges for family reunification, combining large numbers of children separated from their families and the need for establishing scene safety. In addition, school shootings have historically included higher percentage of deceased victims. School shootings have been increasing in frequency in the last 20 years. The FBI recently released a report stating that 2020-2021 represented the highest ever level of school gun violence events (da Silva, 2022). The nature of the separation at school and the developmental stage of many children can make establishing communication with family and tracking injured patients difficult. Often the scene may not be deemed safe for several hours, slowing identification of the deceased and the reunification of those sheltering in place. In addition, school shootings are particularly emotionally traumatic as they can involve younger children, such as the tragedies of Sandy Hook and Uvalde. Younger children are more likely to have difficulty self-identifying and communicating with strangers. Following the Uvalde shooting, it took more than 12 hours for all families to be reunified or notified of their child's status (Douglas and Beeferman, 2022).

Review of Hospital-Based Reunification

Health care facilities can play an essential role in family reunification, especially in events with large numbers of injured victims. However, a multi-institutional survey revealed the public expects hospitals to perform non-medical functions, including family reunification of both injured and non-injured victims (Charney et al., 2013). Yet not all US hospitals are prepared for family reunification, especially as it pertains to pediatric victims, injured or not. A national survey of hospitals indicated that less than half had a tracking system for children and about one-third had written reunification plans, protocols to identify and protect displaced children, or plans for acquiring supplies to shelter healthy, displaced children (Niska and Shimizu, 2011).

The National Pediatric Readiness Project assesses pediatric readiness in US emergency departments since 2013. While pediatric readiness has improved, less than half of all emergency departments had pediatric disaster plans (Gausche-Hill et al., 2015). In fact, for the half of the emergency departments in the US who report seeing an average of less than 10 pediatric patients daily, a large influx of pediatric patients requiring reunification, whether injured or not, would pose significant strain on resources (Gausche-Hill et al., 2015). In a more recent survey, hospital emergency managers all agreed on the importance of having reunification plans, but only two-thirds of those surveyed had written plans (Rebmann et al., 2021). Furthermore, of those with written reunification plans, the mean reunification preparedness score showed less than half of the components needed were addressed, indicating opportunities for improved planning. Over 90 percent of hospitals without a written plan were adult-based or served mixed age populations. This matters because most children initially present to community hospitals for care. Predictors of having a written reunification plan included having a disaster committee member with pediatric expertise and the conduction of a drill or exercise involving unaccompanied minors within the past year. Yet, a review of disaster exercise after action reports showed a paucity of child scenarios or child involvement (Ferrer et al., 2009). The combination of these data shows the gap between public and expert perception of reunification as a hospital function in disaster and the planning and capability required to effectively perform this function.

Accreditation and Regulation

One reason for varying capability in family reunification is there are no specific regulatory requirements for reunification planning. However, several regulatory elements align with reunification planning. The Center for Medicare and Medicaid Services (CMS) has outlined four core elements of emergency preparedness for hospitals in its conditions for participation: Risk Assessment and Emergency Planning, Communication Plan, Policies and Procedures, and Training and Testing (CMS, 2019). Within these elements, Policies and Procedures surrounding patient tracking and transport have direct application to reunification planning. Furthermore, CMS requires communication plans with external resources and establishing contact information for patients and their families, actions which support reunification. The Joint Commission, likewise, recommends a family reunification plan, but does not require it in their accreditation process (Kendig, 2021). However, it requires policies and plans

around communicating with patients and their families, including notification of relocation to alternative care sites (The Joint Commission, 2019). Best practices include involving internal and external stakeholders in the planning process, designating an area within the hospital for reunification, having standardized registration processes, and exercising the plan (Kendig, 2021).

Resources for Hospital-Based Reunification

While opportunities to create and improve reunification plans seem daunting, many resources exist to support hospitals who wish to do so. The Administration for Strategic Preparedness and Response (ASPR) published a reunification tip sheet for health care facilities in 2018 (ASPR, 2018). This document defines common terms used in reunification and provides recommendations for activation, operationalization, and demobilization of a Hospital Family Information Center/Family Support Center. ASPR also supports the Technical Resources, Assistance Center, and Information Exchange (ASPR TRACIE) which is a website repository of emergency preparedness resources located at <https://asprtracie.hhs.gov> and has multiple resources, including community and hospital templates and plans for reunification and family assistance centers (US Department of Health & Human Services, n.d.). The American Academy of Pediatrics and Massachusetts General Hospital Center for Disaster Medicine published their *Family Reunification Following Disasters: A Planning Toolkit for Health Care Facilities (2018)* which provides guidance for family reunification planning to support hospitals (American Academy of Pediatrics and Massachusetts General Hospital Center for Disaster Medicine, 2018). This toolkit creates an overview of the planning process, including a needs assessment, identification of internal and external stakeholders, defining essential elements of a hospital family reunification plan, sample floor plans, site assessment tools, supply lists, checklists, and additional resources (American Academy of Pediatrics and Massachusetts General Hospital Center for Disaster Medicine, 2018). The Western Regional Alliance for Pediatric Emergency Management (WRAP-EM), an ASPR funded pediatric disaster center of excellence, recently updated work from the Coyote Collaborative and created a planning template for a Hospital Reception Site, outlining how hospitals fit into municipal/local plans, flowcharts for activation of the hospital reception site and family intake and reunification processes, supply lists, sample forms, and integration into the Hospital Incident Command Structure (WRAP-EM, 2023). To further gauge reunification preparedness, the Emergency Medical Services for Children's Innovation and Improvement Center

(EMSC EIIC) provided benchmarking for pediatric patient tracking and family reunification (Barrett et al., 2022).

Best Practices for Hospital-Based Reunification

The authors will highlight best practices for hospital reunification planning based on existing documents and toolkits. First and foremost, reunification planning requires an engaged team of both internal and external stakeholders. These include, but are not limited to, emergency management, social services, child life services, chaplaincy, medical providers, risk management, and security within the hospital. External stakeholders include emergency medical services, law enforcement, child welfare services, local schools and daycares, as well as local and regional health care coalitions. The American Red Cross can also support reunification services. Building relationships prior to an event can be crucial for timely information sharing and delineation of responsibilities. Prior events have shown that hospitals should plan for the arrival of 6-10 caregivers/family members per patient requiring reunification (Lake, 2018). To accommodate this, a Hospital Reception Site should be established which can allow for the gathering and dissemination of information away from onlookers and the media. Child care and supplies should be included at the Reception Site, as well as other support services such as interpreters, mental health providers, and chaplaincy. Medically cleared, unaccompanied children should be housed in a Pediatric Safe Area, away from those seeking information. In addition to having appropriate supplies, child life specialists have expertise in providing age-appropriate activities to help children cope with difficult situations and should be involved (American Academy of Pediatrics and Massachusetts General Hospital Center for Disaster Medicine, 2018). Finally, if the hospital intends to perform on-site reunification, there will need to be a separate, private space designated for family reunification once caregivers/family members have been identified and appropriately vetted. The ingress and egress to all three of these areas should be tightly controlled. During disasters requiring reunification, the Hospital Incident Command Structure decides and supports the activation, operationalization, and demobilization of these function and sites (Barrett et al., 2022; WRAP-EM, 2023). Furthermore, the Public Information Officer will coordinate and respond to regular and social media inquiries and reports, including the mitigation of inappropriate or inaccurate information. Regularly exercising reunification plans help solidify relationships, assesses sites for assigned roles, builds communication structures, and finds opportunities for optimizing the reunification processes (American Academy

of Pediatrics and Massachusetts General Hospital Center for Disaster Medicine, 2018; US Department of Health & Human Services, n.d.; US Department of Health & Human Services, 2022).

A gap has been found between the perception of family reunification as a hospital function during disaster and reunification preparedness. Specific resources and best practices to address this gap exist, although hospitals need time and internal resources to create, implement, and improve their reunification plans. As most large-scale events will involve more than one hospital, individual institutions will need the organization and resources of the larger community to coordinate efficient and timely family reunification.

Review of Community-Based Reunification

While much of family reunification research has historically focused on hospitals, large-scale disasters such as the Boston Marathon bombing and the Las Vegas concert shooting underscore the need for an integrated community-based reunification plan. In 2013, a collaborative publication involving FEMA, HHS, the American Red Cross, and the NCMEC, outlined a national framework for the reunification of children after disaster (FEMA, 2013). This framework sought to assist local and state governments in reunification planning and establish role clarity among multiple entities, both governmental and nongovernmental. Such family reunification plans must consider parental expectations, understand the unique pediatric needs of the community, and integrate resources at the national and state level into the community's plan.

Parental Expectations

Disaster planning can be overwhelming and emotionally difficult to undertake. Unsurprisingly, individual family disaster planning remains low nationally and is dependent on many socioeconomic factors (Ronan et al., 2015; Rao et al., 2023). In a disaster, families will try to prioritize the well-being of their children and try to reunite with their loved ones as soon as possible. In one study, 63 percent of parents noted that during a disaster, they would disregard any evacuation orders and go directly to retrieve their children from school or child care. However, the same survey showed that nearly 50 percent of parents would not know where to pick up their child if their child were evacuated as part of the school's disaster plan (Redlener et al., 2008). In addition, fewer than one-third of schools have drilled their reunification plans (Graham et al., 2006). To facilitate reunification, most families (95 percent) were willing to share at least some information but were concerned about protection (55.4 percent) or abuse (52.3 percent)

of their child's information in citing reasons not to share. Families surveyed also indicated trusting local hospitals to reunite their families rather than local or state governments (Charney et al., 2019).

Community-Based Resources for Community-Based Reunification

While disasters happen locally, there are national resources that communities can utilize for family reunification planning and response. In collaboration with federal partners, the NCMEC and the American Red Cross created a framework for community reunification, providing an overview of logistics and coordination necessary in a mass casualty event (FEMA, 2013). This was followed by creation of the Multi-Agency Reunification Services Plan Template in 2015, which provided a plan outline and examples in each section (National Mass Care Strategy, 2015). National organizations such as the NCMEC and the American Red Cross also can provide support to local community reunification efforts. The NCMEC hosts the Unaccompanied Minors Registry which is operational 24/7 and uses text-based fields to input information, can collect photographs, and has strike teams that can be called upon to assist with identification and reunification in an affected community (National Center for Missing and Exploited Children 2023). The American Red Cross serves as a co-lead for the Mass Care component of the Emergency Support Function 6 in the National Response Framework which includes reunification services. The American Red Cross can assist with reunification of already identified individuals with their families. Social media sites have also created family reunification websites to allow individuals to post their whereabouts in a disaster or post information about their missing families. The use of such sites for children is limited especially if the child cannot self-identify and privacy concerns regarding children are not addressed. In addition, the American Academy of Pediatrics has resources available for individual families, school, and communities online (American Academy of Pediatrics, 2023).

While evidence-based practices for community reunification are not readily identified in the literature, many communities have made their plans available online. Various states and counties have published their family reunifications online on ASPR TRACIE. Most plans center around the creation of operational protocols for a Family Assistance Center (US Department of Health & Human Services, 2022). Through the collaboration of partners in fire, police, and emergency management, the city of Tempe, Arizona has created a scalable interoperable platform for victim identification and reunification involving photographs

that can be easily accessed by first responders (Thornton, 2023). Recent experience with the humanitarian crisis of unaccompanied children crossing the southern border has created collaborative integration of academic institutions with federal, state, and local planning. This partnership has provided trauma-informed medical care, culturally and developmentally appropriate psychological and social support, as well as experts to help design child-friendly and safe spaces (Sherin et al., 2022).

Best Practices for Community-Based Reunification

With more variation in community settings, evidence-based best practices for community-based reunification are relatively unknown. This is acknowledged in one study of emergency responders where in a large-scale disaster, if a reunification system could reunify 10 percent of families, over half would adopt it as a primary system (Chung et al., 2012). Community reunification must consider the unique pediatric needs of each community. However, there are core principles for reunification that can be applied to community-based plans. This includes knowing the specific pediatric population of the locale, as well as making sure the specific needs of children are considered in planning. Planners will need to understand the percentage of children in a community, particularly those children with access or functional needs. Communication strategies must include the languages spoken in that community. In addition, creation of protocols for child identification, verification of guardians, and processes for family reunification must be considered. Physical spaces such as the Family Assistance Center need to be child friendly with dedicated, vetted staffing who have knowledge of trauma-informed care. In addition, tools such as Psychological First Aid and PsySTART can be used to address emotional trauma (Gupta et al., 2021; Jacobs et al., 2006). Schools may be an important partner, as most events happen during the day when children are away from their families and can help play a role in identification of a child as well as verification of the guardians. Schools will also need to ensure that their family reunification plans are integrated and align with local planning. Tracking intake forms for pediatric victims should include sections for descriptive characteristics (age, gender, and unique characteristics such as birthmarks, piercings, etc.) for those who cannot self-identify and denote if the pediatric victim is unaccompanied or accompanied by caretakers. The ability to incorporate photographs can aid in identification, but there will need to be policies in place for protection of the pediatric victims. Finally, reunification processes and procedures need to consider the privacy of the child and their families (Chung and Blake, 2014).

Biometrics in Reunification

When initiating planning for child identification, disaster responders naturally collect numerous physical descriptors. Initial intake forms tend to focus on physical characteristics such as hair color/texture/length, eye color, birthmarks, scars, and clothing. When comparing the similarity of physical descriptors from the viewpoint of parents and research associates, Rebmann et al. found discrepancies despite using multiple methods to examine the mismatches (Rebmann et al., 2022). In fact, only gender, race, and eye color, if limited to brown and non-brown, showed high concordance between parents and researchers. There was low concordance for skin color or any type of hair descriptor. Furthermore, they found that verbal descriptors, such as the names of pets or beloved objects, were the most specific and concordant. Limitations of verbal descriptors include that they can only be assessed in a verbal, cooperative child, are less easily categorized, and are thus slower and more error prone in regard to data entry (Rebmann et al., 2022). Use of photo recognition software can enhance physical descriptors matching and reduce the amount of potential trauma induced by photo review. Chung et al. found that pairing photos with physical characteristic matching was ideal compared to random searching of photos and reduced the number of potentially traumatizing photos reviewed; however, in 10 percent of the searches, parents did not identify their child on the screen (Chung et al., 2012). Facial injuries may further complicate facial recognition. Moulaging volunteers to simulate facial trauma resulted in an only 40 percent match accuracy in one study from 2017 (Broach et al., 2017).

If physical characteristics are only able to help identification broadly, even when using photo recognition, biometric technology is the logical next step for specificity. Fingerprinting, DNA, retinal scans, and other biometrics have all been suggested as mechanisms to improve family reunification. There are advantages and drawbacks to each of these technologies, particularly relating to community member trust.

Using Fingerprint Identification

Fingerprinting of children has been used for decades as a preemptive way of identifying children that might become lost. Technology has advanced to capture fingerprints in infants (Kalisky et al., 2022). Parents can choose to enroll children in fingerprinting databases at schools, fairs, and other locations. Intermittent opportunities to sign up and concerns for abuse of information result in uneven implementation. In addition, the public may perceive preemptive programs like fingerprinting as a surrender to the

idea that children cannot be kept safe from school shootings or other violence-initiated disasters. This perception could undermine the otherwise good intentions of these programs (Charney et al., 2019).

Using DNA Identification

There are similar issues in using DNA identification. In 2021, the Texas state legislature passed Senate Bill No. 2158, which required the Texas Education Agency to provide identification kits to parents. While not mandated, the provision of these kits, which included both fingerprinting and DNA sample collection, resulted in backlash as a result of the Uvalde school shooting which occurred shortly before the distribution plan. Parents felt the kits sent the message that officials were accepting shootings as inevitable and that the kits themselves might prompt traumatizing conversations with school-aged children (Campoamor, 2022). In addition, there were concerns that DNA samples collected could be subject to abuse of privacy, even though kits were not being collected and were meant for families to hold on to in case of emergency (Shackford, 2022). Charney et al. found that while most families were willing to share physical characteristics and identifying information, they were less willing to share DNA information, with up to one quarter unwilling to do so (Charney et al., 2019). Trust also varied based on the entity collecting the information, with high trust for hospitals and NGOs and significantly lower trust for universities and outside state government agencies, the latter of which could be of particular concern in states that have large border populations (Charney et al., 2013; 2019).

While there are concerns from families, the use of DNA technology continues to improve for emergency identification. Traditional DNA technology has been too slow and cumbersome for the rapid identification of a significant number of unidentified children. Currently used by law enforcement for crime scenes, newer rapid DNA technologies are portable and can produce results in less than two hours. Rapid DNA was used in the 2018 California wildfires for victim identification (Bowman et al., 2022). This type of DNA-based reunification is also advocated for separated migrant families (Barnert et al., 2021). DNA Bridge is a consortium of scientists and human rights experts who focus on enabling and promoting ethical and secure usage of DNA for reunification. The strategy embraced by this consortium is collecting DNA from unidentified children, as well as from family members seeking them (Katsanis et al., 2022). When combined with identifying features, collection of DNA can improve reunification speed; however, it is not currently viable as a widespread intervention without improved trust and buy-in from families.

Using Other Biometric Identification

Other technologies have been suggested with a variety of associated challenges. Additional biometric methods, such as retinal scans or voice recognition, can have high accuracy in ideal situations. However, these cannot be matched to family members like DNA and will also prove tricky to obtain in children who may have injuries or are developmentally or psychologically unable or unwilling to comply with assessment (Nager, 2009). Similarly, implantable radio frequency identification chips, which have made significant strides in reunification in the pet population, require the expense and planning to place ahead of a disaster, and face significant public distrust (Tanne, 2004).

While the use of biometric data may aid significantly in reunification of families, particularly as technology continues to develop, specific concerns, such as data breaches and uneven access to technology in disaster and pre-disaster scenarios, may limit its overall utility. Compared to other identifiable data, biometric data is permanently affiliated with an individual and thus breaches may constitute lasting harm.

Proposed Strategy for Future Work

Family reunification as a disaster science continues to evolve. Current reunification research has been based on after action reports from individual disaster events, simulations of family reunification, and surveys of parents and responders. All have identified numerous opportunities for growth in creating pediatric-focused family reunification plans and responses. In addition, best practices driven by expert consensus for family reunification have been disseminated via the publication of toolkits and guidelines distributed by large federal and national organizations (American Academy of Pediatrics and Massachusetts General Hospital Center for Disaster Medicine, 2018; Barrett et al., 2022; FEMA, 2013). The paucity of family reunification planning at both the hospital and community level has precluded rigorous study of these best practices, and opportunities exist for further socialization and use. Given this landscape, the following priorities should be considered for future work: leveraging technology to improve identification and simultaneously working to develop the security the public needs to engage with this technology, improving family reunification planning in all settings where children are present, and using and improving developed standardized metrics (benchmarks) to exercise/drill reunification response in simulated settings or during an actual event to identify and address gaps in response (see Box 1).

BOX 1 | Priorities in Future Work in Family Reunification Disaster Science**Identification:**

- Leveraging social media for child identification
- Exploring image-based family reunification systems using voice and video recognition
- Testing other biometric systems
- Developing security for biometric systems for improved public engagement

Planning:

- Evidenced-based practices: Reunification plans for families, schools, hospitals, and all communities where children are present
- Standardization of metrics for successful family reunification
- Understanding the community's values and trust

Response:

- Drilling and exercising family reunification plans with predefined metrics at the hospital and community level
- Identifying and addressing gaps in performance

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Identification

A clear challenge to family reunification is when victims cannot self-identify due to injuries or level of development. The use of photographs has been incorporated in some reunification systems (such as the UMR) or hospital electronic medical records, but the ability to search by photographs remains limited. Leveraging technology such as facial recognition and video or voice recognition may further improve efficiency of identification for already stressed caregivers and overwhelmed response systems but would need to be validated in a disaster setting. With the number of images uploaded in social media settings, a potential partnership between social media organizations and federal/regional emergency planners may allow for faster identification but would require significant privacy measures to protect victims and their families and garner support from consumers. Other biometric systems such as DNA, retinal scans, or fingerprinting may be the most accurate, but incorporation of these into policies should be tested and would require a registry and protective measures as well as need community approval for its use. Community approval for any technology is necessary to ensure effective engagement.

Planning

Reunification planning in families, school, hospitals, and communities remains uneven. Identifying and understanding both facilitating factors and barriers to family reunification planning at all levels could improve engagement and progress in current family reunification processes. Ideally, 100 percent of families, hospitals, schools, and communities would have reunification plans. To achieve this, refining specific outcome metrics to benchmark reunification planning is critical for better information sharing, interoperability, and scalability. This requires the definition and standardization of reunification processes and structures.

Standardization is required to compare and adapt existing reunification best practices as identified in previously described organizational resources. This allows for stakeholders of all sizes, locations, and backgrounds to use the same language and create more organized and complete databases of resources. It can also improve scalability, lowering hurdles smaller or rural communities and health care organizations may face when engaging in reunification work and addressing inequities in dedicated resources for disaster planning and response.

Even with the benefits of standardization, reunification planning cannot exist outside of its community context. More studies are needed to understand the political, socioeconomic, and cultural motivations within a community to better engage and tailor reunification efforts. Continued dedication to community-based reunification must also focus on building trust within a population. For example, certain communities may prefer working with local hospitals rather than with local law enforcement, or vice versa. Understanding the drivers of trust enables better community buy-in, customization of standard processes into the local environment, and socialization of reunification best practices.

Response

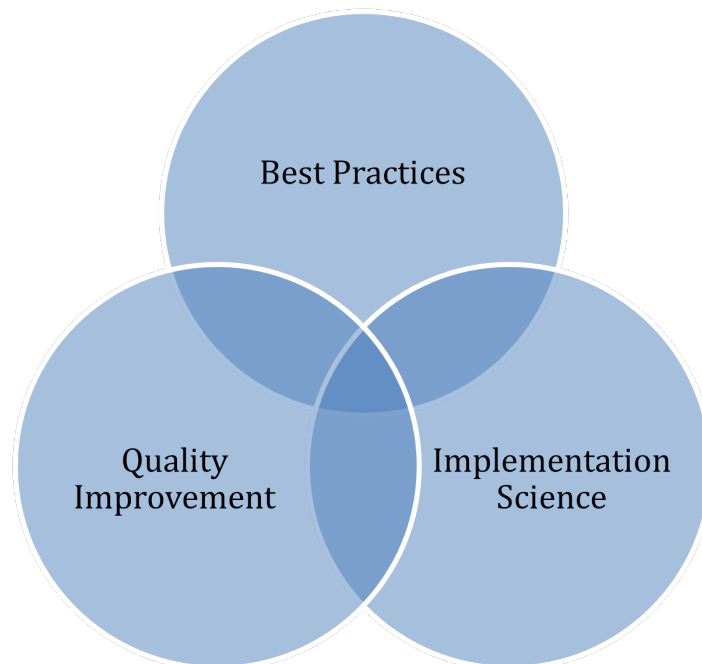
The ultimate success of a family reunification plan is prompt, efficient reunification of families separated after a disaster. By using predefined outcome metrics, disaster events requiring reunification can be evaluated as a whole, rather than individually. In lieu of real-world events, standardized drills and tabletops could allow for evaluation and practice of existing plans and responses. Specifically, school shooting drills offer an opportunity for schools and law enforcement to practice their reunification protocols within their community (Schonfeld et al., 2020). Regular inclusion

of pediatric victims and scenario details that require the need for reunification in disaster drills and exercises can highlight the need for novel plan creation or existing plan improvements. Use of in situ debriefing structures can identify any gaps in planning and response. After action reports to address these gaps can then be used to advance family reunification planning in both hospital and community settings. Furthermore, these drills and exercises should encompass the complex nature of interoperability between hospitals, schools, local, state, and federal/national reunification responses.

Using Reunification Future Work to Define a Scientific Framework for Disaster Medicine

Describing future work in family reunification exemplifies the complex nature of disaster medicine and may have implications in defining the science of disaster medicine (see Figure 2). Several medical research frameworks exist. With limited ability to control external factors, basic clinical research based on efficacy, effectiveness, and safety are not feasible with disaster medicine. The focus on standardization with planning and the iterative process of exercises and drills align well with quality improvement methodology. Lack of existing plans and processes provide challenges to quality improvement methodology. With

FIGURE 2 | Defining a Scientific Framework for Disaster Medicine



SOURCE: Spectorosky K., A. Lin, R. Charney, and S. Chung. 2024. Advancing United States-based family reunification disaster science. *NAM Perspectives*. Discussion Paper, National Academy of Medicine, Washington, DC. <https://doi.org/10.31478/202412b>.

a focus on contextual factors that facilitate or impede family reunification planning, implementation science can provide a framework for engagement, creation, and operationalization of reunification plans. This will likely involve tenets from behavioral change and transition theories. The scientific approach to disaster medicine can be outlined using a combination of known methods. Examples include consensus building beyond subject matter expertise using a modified Delphi method, benchmarking methodology to validate expert opinion, standardization and iterative change through quality improvement, and engagement and operationalization through implementation science.

Conclusion

Existing data on reunification shows a number of siloed plans unevenly dispersed across the nation. The development of a scientific framework for disaster medicine is necessary to form the basis of standardized reunification planning. Improvements in family reunification disaster science will require a multi-disciplinary integrated approach to address gaps in individual/family, hospital, community planning, community trust, and victim identification. Plans must be aligned and implemented at the same magnitude as the disaster. Ideally, a uniform standard of reunification metrics will be developed as a result of robust reunification science. Ultimately, results from family reunification disaster science will hopefully drive faster and more efficient reunifications of children and their families after disasters.

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