

CALIFORNIA BAPTIST UNIVERSITY

Riverside, California

Waterproofing Children in Selected California Regions: An Explanatory Sequential  
Mixed Methods Study Examining the Data Collection on Fatal and Nonfatal Drownings

A Dissertation Submitted in Partial Fulfillment of the  
Requirements for the Degree  
Doctor of Public Administration

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Division of Online and Professional Studies

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September 2018

Waterproofing Children in Selected California Regions: An Explanatory Sequential  
Mixed Methods Study Examining the Data Collection on Fatal and Nonfatal Drownings

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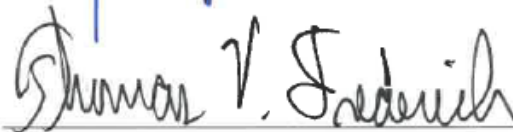
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## ABSTRACT

### Waterproofing Children in Selected California Regions: An Explanatory Sequential Mixed Methods Study Examining the Data Collection on Fatal and Nonfatal Drownings

by David A. Hernandez, DPA

Data elements collected from drowning submersion forms are not conclusive when attempting to build reliable drowning prevention initiatives based on the statistical data that have been captured in the field. Coinciding with this issue is the fact that data collection reporting systems are deficient in capturing comprehensive data that are being submitted by emergency service agencies at the local and state level. *Drowning is the leading cause of injury-related deaths for children less than 5 years of age and third leading cause for children aged 5 to 14 years worldwide. Nonfatal drownings occur at a rate of 5:1 against fatal drownings in the United States.* The purpose of this study was to examine the data elements collected from submersion forms and investigate how the data are collected, analyzed, and implemented into drowning prevention strategies within the five selected regions in California through participatory action research (PAR). Utilizing a mixed methods approach for data collection, the selected regions submitted their secondary statistical drowning data that were analyzed in order to guide the semistructured interviews with 8 public health administrators and emergency service agents. The findings identified that *acceptance* of the *Utstein*-style guidelines for reporting drownings did not match regional submersion forms and the data collection reporting systems utilized are not capturing all of the data. The findings suggested that public health and emergency service agencies seek to build comprehensive data collection and reporting systems collaboratively and seal the gaps that hinder accurate

reporting. Further research addresses developing a water safety plan at the state level that provides a foundation for public health agencies to develop effective drowning prevention initiatives in order to reduce the number of drownings.

*Keywords:* drowning, Utstein-style, public health, submersion forms, data collection

## ACKNOWLEDGMENTS

Starting this journey in 2015, I soon realized that *the only easy day was yesterday* as described by Navy SEALs because that day is over. The strength to stay the course was encouraged by my dissertation advisor, Dr. Pat Kircher, whose unwavering support and instruction motivated me to move on to the next day. Many thanks go to Dr. Frederick, a man who never refused our request for his expertise as we constantly tugged on him last minute to join our meetings. Thank you, Dr. Kling, for all of your infinite wisdom and encouragement that gave me the confidence to accept this challenge. Thanks also to the Director of the DPA Program, Dr. Elaine Ahumada, for your candor and belief in my ability to accomplish this rare feat. Thank you to each of the participants in the study who tirelessly work within their capacity to reduce the number of drownings in their region. My deepest thanks to my entire family; you understood the importance I had in reaching this milestone and always showed your support along the way.

## DEDICATION

This dissertation is lovingly dedicated to my wife, Syeda. The only reasons for reaching this pinnacle of higher learning are her support, caring, and understanding when I had those tumultuous writing days. My wife constantly endured family events and outings without me by her side while I worked on this degree. I also dedicate this dissertation to my mom, Theresa, who has always been there to support my ambitions. In closing, this research is also dedicated to those families who have endured the pain and suffering from losing their child to drowning.

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## CHAPTER 1: INTRODUCTION

### **Introduction to the Problem**

Statistical data can be a great indicator of success from previously implemented public health interventions. Statistical data can also be a punch in the gut when current statistics have not moved the needle on the galvanometer to indicate success from previously implemented public health intervention programs. Disturbingly, current statistical data indicate that from every region of the world there are 372,000 people who succumb to drowning annually, making it a public health threat that has been seriously neglected (World Health Organization [WHO], 2014). The research also indicates that drowning ranks in the top 10 leading causes of morbidity in children and adolescents; consequently, children less than 5 years of age are inexplicably exposed to a higher risk of drowning than their peers (WHO, 2014). The significance from these resulting data also identifies the numbers from community-based surveys as unreliable, signifying that global estimates are inaccurate and underreported by reporting authorities (WHO, 2018; WHO/United Nations International Children's Emergency Fund [UNICEF], 2008).

The complexities of drowning outcomes continue to muddle the exact number of deaths as many countries cannot provide accurate counts of their aquatic incidents (International Life Saving Federation [ILS], 2007). Advancing comprehensive drowning prevention strategies that are aimed at the specific age range of children and adolescents requires that data collection processes supply comprehensive, complete, and meaningful drowning data (ILS, 2015). The intent of this study was to investigate adolescent fatal and nonfatal drownings within the five designated counties of Simonsburg, Jamestown, Thomasville, Petersburg, and Andrew Town. This study utilized an explanatory

sequential mixed methods research design focused on semistructured interviews with emergency service coordinators employed by these public health agencies and supported with drowning statistics provided for each county. The aggregate data from this methodology were assessed for compliance with internationally accepted drowning prevention models in order to develop evidence-based recommendations for public health officials aimed at comprehensive drowning prevention strategies and policies.

### **Background of the Problem**

Water is an environment that provides the population an opportunity to engage in recreational water activities, boating, sport fishing, and professional sports; however, some individuals see water as an opportunity to have a good time with friends and family, failing to understand the harsh realities that it can deliver when water safety is shunned. Drowning is an international public health problem that does not stop at borders, does not target a specific economic class, and is not limited by the age of a person. The public health issue of drowning is recognized in low- and middle-income countries (LMIC) as well as high-income countries (HIC; ILS, 2014).

A threat to world health is death by drowning (ILS 2015). Worldwide, injury-related deaths equate to 7%, and drowning bears some of that burden as a staggering third leading cause of unintentional death globally (WHO, 2018). There are serious indicators that reveal global estimates from drowning are significantly underreported, which parallels the real public health threat that drowning is also underestimated (ILS, 2015; WHO, 2018). There are 372,000 people who succumb to drowning every year; therefore, it is recognized as a serious and neglected public health threat (ILS, 2015; WHO, 2014). The results from a 2007 ILS strategic planning session in Portugal revealed that best

estimates illustrate that nine of 10 people who drowned internationally did so in developing countries (ILS, 2015).

In the United States from 2005 thru 2014, there were 3,536 morbidity incidents as a result of unintentional drownings, which equates to 10 deaths per day (Centers for Disease Control and Prevention [CDC], 2016). The leading cause of morbidity in children aged 1-4 years is drowning (Gilchrist & Parker, 2014). During 2000 through 2016, drowning took the lives of 838 babies (4.4%) less than 1 year of age, ranking it number 3 in the five leading causes of unintentional injury deaths in the United States (all races, both sexes). In that same time frame, the drowning deaths of children and adolescents (aged 1-17) ranked number 2 behind motor vehicle accidents with 14,497 drowning deaths (14.3%; CDC, 2018a).

In 2016, California recorded 389 drowning deaths, of which 69 were for adolescents between the ages of 1-17 years (California Department of Public Health [CDPH], 2018). During 2000-2016, unintentional drowning ranked number 2 in the five leading causes of unintentional injury deaths in California for the age group 1-17 years (CDC, 2018b).

Simonsburg County was recognized by statewide surveillance based on death certificates in California for the years 1980 through 1989 as having the leading drowning rate of 21.9 drownings per 100,000. There were 317 unintentional drownings (85% occurring in irrigation canals) tabulated by the county sheriff-coroner's report from 1980 through 1990 (Agocs, Trent, & Russell, 1994). California averaged 669 drownings per year in that same time frame (Agocs et al., 1994). Simonsburg County saw 317 drowning deaths from 1980 through 1990 of which 94% were males, 85% were located in irrigation



canals, and just 22% were residents of the county. Within Simonsburg County, the annual drowning rate of residents was 6.0 per 100,000 and 2.6 per 100,000 for those less than 16 years of age (Agocs et al., 1994).

In Jamestown County, nonfatal drownings and drownings were the leading cause of morbidity and mortality among the population between 2011 and 2013<sup>1</sup>. The age group at highest risk for immersion-related emergency department (ED) visits was toddlers who are less than 5 years of age, with 21.6 per 100,000 population, which is 6.5 times above the countywide rate of 3.3 per 100,000 population. The report *Childhood Immersion Incidents & Deaths in Jamestown County* (based on emergency department and hospitalization data 2005-2007) listed 25 child deaths for those aged 0-17 years, which represented 12.3% of all immersion incidents resulting in an ED visit and/or subsequent hospitalization.

In Thomasville County, the leading cause of accidental or unintentional injury-related deaths for children aged 1-4 years is a result of drowning. Backyard pools and spas accounted for 86% of all drownings. In 2015, there were 36 nonfatal and four fatal incidents for children and adolescents aged 0-17 years.

In Petersburg County during 2015, the data collected by Safe Kids documented 42 nonfatal drownings for children and adolescents aged 1-17 years and one nonfatal incident for a child less than 1 year. The data also indicated there were two drowning incidents, but the age was not identified through the reporting system submersion

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<sup>1</sup>In order to protect participant confidentiality and their respective agencies, pseudonyms have been used in place of the agency names in order to add another layer of identity protection. Therefore, the sources for some of the research will not be listed throughout this dissertation.

incident report form (SIRF). As of March 18, 2018, Thomasville County has already tallied four fatal child drownings, 10 fatal adult drownings and two nonfatal near drownings for the year.

In Andrew Town County during 2015, there were 24 total unintentional deaths as a result of drowning. There were seven deaths for children aged 0-14 and five deaths for adolescents and adults aged 15-24 years. It was the second leading aggregate cause of death overall for 2015 only to asphyxia/choking. In California during 2000-2014, the data reveal 4,107 children (aged 1-14 years) and adolescents (aged 15-19 years) were treated and released from hospitals (per inpatient discharge data; California Office of Statewide Health Planning and Development, n.d.).

Research indicates a 2:1 ratio for *nonfatal* to *fatal* drownings (Christoffel & Gallagher, 2006). Statistics indicate that as a result of drowning deaths, *unintentional drowning* has accounted for 191,155 years of potential life lost (YPLL) before age 65, representing 1% of *all causes* (CDC, 2018d). Despite the lack of incomplete data, the price tag of coastal drowning in the United States is a profound \$273 million a year through direct and indirect costs (WHO, 2018).

### **Statement of the Problem**

In the United States, drowning is the fifth leading cause of unintentional injury death (CDC, 2016). Within this statistic, drowning is responsible for the highest mortality rate for children aged 1-4 (CDC, 2016). The second leading cause of mortality to adolescents aged 1-14 is drowning, which trails right behind motor vehicle accidents (CDC, 2016). The overall intent of data collection on drowning is to improve the quality

and content in order to develop comprehensive drowning prevention strategies that will target those who are most at risk—children and adolescents (ILS, 2007).

### **Purpose of the Study**

This study addressed the statistical data of children and adolescent drownings from the participating counties in Southern California and the data collection process used to gather this information. The researcher used an explanatory sequential mixed methods research design to collect quantitative data based on a spectrum of criteria aimed at adolescent drownings, and through face-to-face semistructured interviews the qualitative data were collected from public health and safety participants.

The first phase of this two-phase study required statistical data obtained from public health agencies on children and adolescent (1-17 years of age) drownings that occurred in participating agencies' counties in 2000 through 2016. These data were analyzed for accuracy and completeness in the categories of total unintentional drowning deaths, drowning deaths (per 100,000), nonfatal drownings, gender, data available, data not available, and SIRS submittals (ILS, 2007). The results from the quantitative data collected were analyzed against the *Utstein-style* recommended guidelines for uniform reporting of data from drowning for the purpose of consistencies in terminology and data reporting systems (Idris et al., 2017; Idris et al., 2014). Given the evidence, the data collected informed the researcher on the number of child and adolescent fatal/nonfatal drownings in each county in conjunction with the quality of data that were derived from the reporting systems in comparison to the recommended Utstein-style guidelines for submersion reporting.

The second phase of this two-phase study utilized the qualitative data that were obtained during face-to-face semistructured interviews with the participants in their environmental setting, thus allowing the researcher to observe their beliefs, experiences, body language, and emotions throughout the conversation. This phase of the study explained the significance of the quantitative data collected as a direct causal relationship to the development of drowning policies and preventative strategies. The qualitative data were analyzed for theme development and coded so that anonymity of the participant was maintained throughout the study.

The bottom line is that about 10 people die as a result of unintentional drowning every day in the United States, of which two out of 10 are 14 years old or younger (CDC, 2016). This explanatory sequential mixed methods research design supports the ongoing development of utilizing consistent terminology, comprehensive data collection, and effective drowning prevention strategies in order to reduce the 10 drowning deaths that have been occurring daily.

### **Primary Research Questions**

In the United States annually, there were an average of 3,536 fatal unintentional drownings (nonboating related) between 2005-2014 (CDC, 2016). The drowning ratio for adults to children 14 and younger was 5:1, and for every drowning mortality of a child, there are five that are treated in an emergency department for nonfatal submersion injuries (CDC, 2016). Drowning continues to be a major public health concern internationally, and the need for more comprehensive research is required to distinguish the drowning factors between a child and adolescent to an extent that consistent documentation in SIRFs is the critical first step (Committee on Injury, Violence, and

Poison Prevention, 2003; G. S. Smith, 1995). In order to gain a better perspective of drowning prevention and the data collection processes that surround this complex problem, the researcher explored the following research questions:

1. Do the data elements for fatal/nonfatal drownings of children collected by California regional public health and emergency service agencies meet the criteria of the Utstein-style recommended guidelines for uniform reporting of data from drowning?
2. How are the data on fatal/nonfatal drownings of children collected by California regional public health and emergency service agencies incorporated into the formulation, implementation, and enforcement of unintentional drowning policies and preventative strategies?

### **Research Design**

The research design adopted for this study is an explanatory sequential mixed methods design. This design was selected due to its two-phase approach in which the researcher identifies, collects, and analyzes quantitative data in the first phase, thus using the results to guide the researcher during the qualitative data collection in the second phase (Creswell & Clark, 2018). The quantitative data results supported the researcher in developing an interview instrument that provided an extensive analysis aimed at the qualitative phase and those questions needing to be addressed. The development of phase one is to consider all possibilities that could pose a threat to the validity of the research. The second phase requires the researcher to delve into alarming results that were identified through an iterative investigation of the quantitative data (Creswell & Clark, 2018).

The objective of this research design was to decisively select the qualitative sample that developed out of the quantitative results identifying the participants who could provide the most accurate qualitative data through semistructured interviews in order to close the loop between both phases (Creswell & Clark, 2018). This explanatory research design collected adolescent drowning statistics from the population, analyzed the data, and then followed up with semistructured qualitative interviews in order to understand the data collection variances.

### **Theoretical Framework**

The aim of the global network on drowning prevention is to eradicate drownings in their entirety. It is through drowning prevention strategies that interventions address the disparities among the population most at risk, children and adolescents (WHO, 2017). The collection of comprehensive drowning data remains a silo issue compared to that of other public health problems. In order to gain an accurate perspective on aquatic drownings, the methodology used to track the statistics should be iterative in nature and provide for extensive evaluation (ILS, 2007).

The theory and action related to adolescent drowning and the data collection process consisted of the Haddon Matrix and its influence on prevention of injuries and controls (Haddon, 1983). The intent of prevention is to remove or reduce the frequency and consequences of risk factors that are detrimental to the health and well-being of individuals and their populations (Haddon, 1983; Williams, 1999). The Haddon Matrix exhibits effective intervention strategies that modify or neutralize risk factors that lead to mortality or morbidity within a given population (Haddon, 1983). It is widely acknowledged that Dr. William Haddon is recognized as the patriarch of modern injury

epidemiology who in the early 1980s argued for a scientifically driven approach to injury control (Runyan, 2003).

In the discipline of injury control, it has become an accepted understanding that injury runs parallel to other diseases based on the features of the epidemiological triad: host, vector, and environment (Haddon, 1983; Lett, Kobusingye, & Sethi, 2002; Runyan, 2003; Williams, 1999). The complexities of injury prevention are dynamic, and to that end in order to develop an understanding of risk factors surrounding aquatic emergencies, surveillance, research, and identification will be part of the continuous outcome evaluation (L. W. Green & Kreuter, 2005; T. G. Smith, 2013).

The application of the Haddon Matrix was adopted by the Department of Homeland Security post-911 as the federal government embraced an all-hazards approach to manmade attacks, natural disasters, and intentional attacks (Barnett et al., 2005). In contrast to the socioecological framework that is built within the Haddon Matrix, it is argued that injuries and their solutions can be complex; moreover, there is often a requirement for effective methodologies and subsidizing as environmental modifications can be expensive (Peek-Asa & Zwerling, 2003; Runyan, 2003). It is understood that there cannot be a situation-specific preparedness model for all potential threats to human life; in essence, that is why the Haddon Matrix was implemented so that the readiness challenges of the future can be mitigated through efficient use of public health and safety resources addressing multiple issues with a single strategy (Barnett et al., 2005).

As the threat of adolescent drownings continues to loom as a public health problem, there is a need to facilitate collaborative approaches to develop effective drowning prevention strategies and improve the quality of comprehensive data collection

through the use of the Haddon Matrix. Action research projects designed to aggressively identify public health issues such as adolescent drowning can have an immediate effect on this preventable issue and potentially reduce the number of aquatic deaths annually (Franklin & Scarr, 2014).

### **Assumptions, Limitations, and Delimitations**

In many disciplines, including public health organizations, there is a lack of translation of research that is effectively disseminated and implemented (D & I) in a timely manner (C. A. Green et al., 2015). However, mixed methods research is gaining traction in this field in order to remove the silos that organizations work in when it comes to their research, their data, their programs, and their budgets all targeting the same public health issue like others in the network (C. A. Green et al., 2015).

#### **Assumptions**

It was assumed that the quantitative data collection from the five participating counties in Southern California were going to report dissimilar drowning statistics due to the varying instruments used to capture the data. The literature is replete with the need to create a standardized drowning registry that is supported with internationally accepted drowning definitions and terminology that track the circumstances surrounding a drowning event (Linnan & Bennett, 2014).

Another assumption was that the data elements for drowning incidents listed on each (electronic/paper) patient care report would list categorical headings based on the priority of basic incident information, victim information, water source information, adult supervision, barrier information along with specific categories needed for reporting to the state of California. Classification systems of drowning can offer detailed information on



drowning incidents; in contrast, information centered on the mechanism, swimming ability, or supervision is often reported inconsistently (Martyn, 2014; Szpilman, Simcock, & Graves, 2014).

It is also assumed that the collection of drowning data takes on different roles for the different agencies as they seek to compile data that benefit their target populations, risk factors, and drowning prevention programs coinciding with prevention strategies and policies. The creation of policies aimed at drowning prevention can be strengthened through legislation and standards while being measured through enforcement. An unexpected problem with policy is that policymakers are resistant to creating more legislation that impedes individual autonomy, program costs, or potential loss of profits to private organizations (Scarr, Beerman, Sharp, & Peden, 2014; Vincenten & Gerdmongkolgan, 2014).

### **Limitations**

The limitation for this study is that the quantitative drowning data were extracted from four regions within California (Ballotpedia, 2013). The population for this sample consisted of eight participants who work in the field of emergency services, injury prevention, epidemiology, and community relations from the selected regions. This information is based on a small sample size. The statistical model constraints stem from the ability to acquire consistent data from all five agencies from 2000 through 2016. The metadata categories built within each independent county are varied based on the specific counties' need to identify the risk specific to their target population.

There are limitations when using qualitative research. In this phase, the researcher through nonprobabilistic sampling engaged with a small population that may

not be the generalization for the entire state of California. As a means of establishing credibility, the triangulation findings were developed from a combination of the narrative analysis, hermeneutics, and phenomenology.

### **Delimitations**

The main focus of this dissertation was on the participants from the selected California regions who have direct access to drowning data for children and adolescents aged 1-17 years. This study has the following delimitations:

The sample regions that were selected are based in California. They were selected based on their ability to provide an accurate phenomenological inquiry.

The population was selected for their ability to access statistical drowning data and/or SIRFs from their agency. This dissertation is concerned with the data collection systems for each county. The representatives from the surrounding agencies were identified with in e-mail by the injury prevention specialist from Thomasville.

The years 2000-2016 were selected by the researcher as an attempt to generate a comprehensive database from the participating regions on child and adolescent drownings that would support the research questions.

### **Definitions of Terms**

The researcher used the following terms throughout this dissertation to explain specific words. The definitions are also annotated for clarification purposes.

**Drowning.** The process of experiencing respiratory impairment from submersion/immersion in liquid (van Beeck & Branche, 2014; World Congress on Drowning, 2002).

**Morbidity.** The existence or rate of disease or infirmity (L. W. Green & Kreuter, 2005).

**Mortality.** The event or rate of death (L. W. Green & Kreuter, 2005).

**Participatory action research.** Addresses the subjects participating in the research by creating a separation between subject and object and making them the agent of change. It changes the world by developing, implementing, and reflecting on actions determined by events arising from the qualitative research (Baum, MacDougall, & Smith, 2006; Loewenson, Laurell, Hogstedt, D’Ambruso, & Shroff, 2014; Whyte, 1991).

**Submersion incident report form (SIRF).** The SIRF project is a data collection project that utilizes first-response agencies (law enforcement, fire departments, paramedics, emergency medical technicians [EMTs]) to report key information from all fatal and nonfatal drowning incidents that occur in California regions. Data are collected on both adult and child victims.

**Unintentional drowning.** Accidental drowning and submersion (Xu, 2014).

**Utstein-style guidelines.** An established consensus process, endorsed by the international resuscitation community, to facilitate and structure resuscitation research and publication (Idris et al., 2017).

## **Summary**

This introductory chapter presented a summary of circumstances that surround child and adolescent drowning and the data collection process for the participating counties of Simonsburg, Jamestown, Thomasville, Petersburg, and Andrew Town through a descriptive overview of the background, statement of the problem, purpose, research questions, research design, theoretical framework, assumptions, limitations,

scope, and definitions of terms. In Chapter 2, the theoretical framework of the research study is reviewed through literature and linked to the research questions. In Chapter 3, the researcher describes the study design used to execute the quantitative and qualitative paradigms of mixed methods research. The researcher focused on the strengths and weaknesses in the methodologies used to capture and analyze quantitative and qualitative data. In Chapter 4, the researcher presents the data generated from the mixed methods design in union with the selected research questions. In Chapter 5, the researcher explains the study findings, implications of the findings, and conclusions correlated to the reviewed literature and linked to the research questions. The conclusion of this chapter addresses recommendations for future research.

## CHAPTER 2: LITERATURE REVIEW

In this chapter, the researcher presents a review of the literature on fatal/nonfatal child drownings as a result of unintentional injury and the data collection process used to track the drowning incidents in a quantitative format. This explanatory sequential mixed methods research design explored the iterative approach of drowning incidents through data collection and concluding with the development of drowning prevention measures that bring into focus the realities affecting the process. Drowning is at the forefront for injury deaths as it takes a continuous toll on children regardless of their geographic location or demographic composition (Martyn, 2014). The global burden of drowning is a serious public health issue illustrating throughout the reviewed literature that morbidity and mortality rates that stem from drowning are extremely underreported for several reasons, and data collection is one of them (Martyn, 2014).

The framework titled the Haddon Matrix supporting unintentional injury-drownings is derived from the understanding that breaking the injury chain through intervention while completely blocking one or more of the three phases was founded by Dr. William Haddon (1983). The framework in support of data collection was developed from the original Utstein-style consensus conference in 2002 where international experts in drowning established guidelines for reporting outcome data as a result of drowning now known as the *Utstein*-style Guidelines for Reporting Drowning (Idris et al., 2017).

Prevention is defined as the keeping of something (such as illness or injury) from happening (O'Toole, 2005). The groundwork for an effective drowning prevention program is constructed from two main issues consisting of collected data and the variance of populations (Franklin & Scarr, 2014). The value of accurate and reliable data can

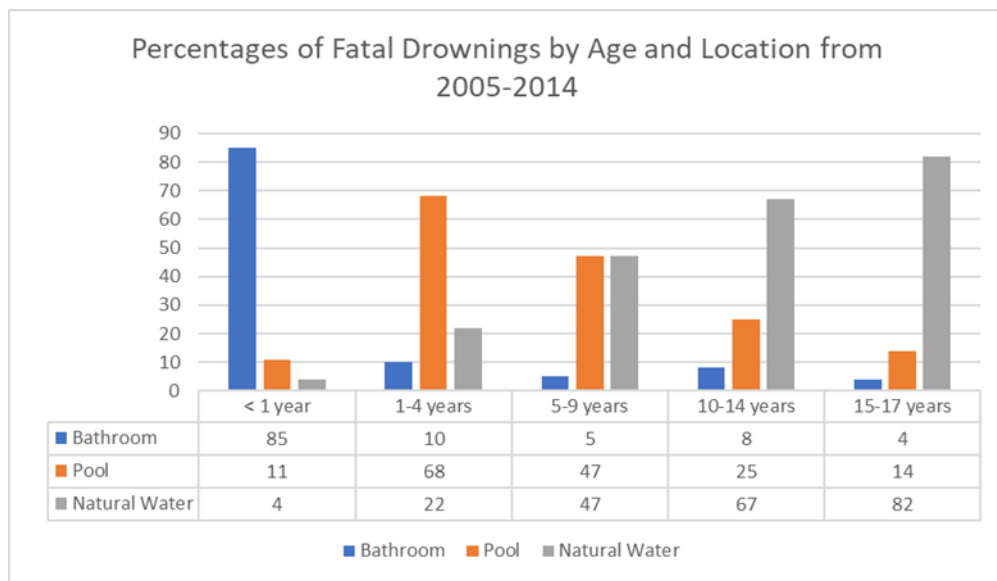
enhance drowning prevention programs through design, implementation, and program evaluation. For this reason, it is critical that the collection of data within a prevention program measures the impact and exposes the weaknesses of the program in order to improve efficiencies (Franklin & Scarr, 2014). The latter difference is based on cultural aspects of various populations in and around water. A comprehensive drowning prevention program can develop an equilibrium between focus and the dimensions of the targeted population (Franklin & Scarr, 2014). There has been little investigation into adolescents' taste for risk and taste for ambiguity as they encounter unfamiliar territory of risky behavior when engaging in aquatic environments dictated by their cultural factors (Quan, 2014a, 2014b; Tymula et al., 2012). The fact of the matter is that the risk factor complexities that underscore drowning require a comprehensive approach and an assortment of strategies in order to achieve effectiveness (Blitvich, 2014).

Partnerships and collaboration are the crux of success when two or more entities consolidate forces to reach a potential goal. The goal in this study is to gain a better perspective on how the unified command of drowning prevention resources can build a fortified consortium that can effectively reduce drownings globally. The partnership models that were discussed in the literature consist of international and regional partnerships, national partnerships, community- or program-based partnerships, and public-private partnerships (Scarr, 2014). The chapter concludes with a summary analysis of the major themes and findings within the reviewed literature.

## Definition of Drowning and Drowning Statistics

### Drowning Defined

A consensus of international drowning experts collaborated with the aim of creating a universally standardized accepted *new* definition for drowning focused on serving epidemiological purposes (van Beeck & Branche, 2014). The results of their work developed the following definition that was adopted during the World Congress on Drowning in 2002: “Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid” (van Beeck & Branche, 2014, p. 85; Witman, 2008, p. 384; WHO, 2018, p. 1). In the United States, Safe Kids Worldwide (2016) conducted a report titled *Dangerous Waters: Profiles of Fatal Childhood Drownings in the U.S. 2005-2014* (see Figure 1).



*Figure 1.* Percentages of fatal drownings by age and location from 2005-2014. From *Dangerous Waters: Profiles of Fatal Childhood Drownings in the U.S. 2005-2014*, by Safe Kids Worldwide, 2016, Washington, DC: Author.

The outset of the 21st century illustrated the challenges that researchers faced when attempting to interpret the various aspects of drowning as the maze of events was designed around submersion, asphyxia, and mortality (van Beeck & Branche, 2014). Drowning begins when the human body suffers respiratory impairment as the subject's airway is compromised by submersion in a liquid or immersion in which the liquid is splashed onto the face (Szpilman, Bierens, Handley, & Orłowski, 2012; WHO, 2018). Research in drowning has passed through a variety of stages in its development revealing that the criteria necessitated an overhaul of applicable cases and the exclusion of unrelated incidents. This analysis implies that a systematic reporting system for medical conditions and resuscitation data should adhere to the *Utstein*-style guidelines for the collection of drowning data (van Beeck & Branche, 2014).

The International Life Saving Federation (ILS) (2015) identified and reported new evidence at the global level revealing that death by drowning has become a public health epidemic. In 2006, the release of this new definition was in support of creating a standardized comprehensive approach that could be utilized at the global level for research by epidemiologist (van Beeck & Branche, 2014). The complexities involved in drowning research orbit around a person's age. The WHO, which leads the global consensus of child health and injury prevention societies, defined an infant as younger than 1 year of age, and children as 0 to 9 years of age while adolescents are aged 10 to 19 years inclusively. An adult is older than 19 years of age unless national law states differently (Queiroga & Peden, 2013; WHO, 2013).

The series of events inclusive to drowning highlight the optimistic attitude toward the incident when an intervention transpires. Evidence regarding drownings illustrates



that positive interventions shift the episode from fatal to nonfatal drownings and that every drowning occurrence equates to two nonfatal drownings that require emergency department treatment (Christoffel & Gallagher, 2006; Szpilman et al., 2012; Witman, 2008). A recent study by the WHO in 2014, *Global Report on Drowning* makes a convincing case that although drownings can be fatal, prevention is quintessential for survival (ILS, 2015). Research up to this point clarifies that critical distinguishing factors proximate to “death by drowning” shall be termed *fatal drowning* (Szpilman et al., 2012; van Beeck & Branche, 2014). Researchers have raised questions about their ability to correctly quantify drowning incidents based on current data systems because recorded figures are challenged by various policies, regulations, and other special interests from medical institutes (ILS, 2007; Witman, 2008). Although intentional drowning is a category that is not reflected in most research, this is one of the additives that hampers researchers from developing a clear understanding of drowning morbidity and mortality (Martyn, 2014).

A basic assumption thus far, pertinent to the study of drowning prevention, is that certified swimming skills have not directly attributed to an increased potential of survivability linked to drowning (Moran, Quan, Franklin, & Bennett, 2011). The leading component of adolescent drowning is that children are risk-takers in their curiosity to understand their environment and as the process continues through the various stages of their life, they continue to build a high tolerance for the mysterious (Tymula et al., 2012). Central to swimming skills is the notion that distinct traits of cultural attitudes and behaviors represented by a class of society influence their drowning risk (Quan, 2014a, 2014b). Australia, New Zealand, and southern United States continue to experience a

surge in the cultural phenomenon of residential swimming pools, thereby placing aquatics professionals in a prime position for heightened surveillance systems that target submersion-related injuries (Quan, 2014a, 2014b; Witman, 2008). Another aspect in the chain of events encompassing drowning is the diverse expert and their viewpoints on this phenomenon (van Beeck & Branche, 2014).

### **Drowning Statistics**

Evidence pertinent to drowning documented by the World Health Organization (WHO, 2018) lists it as the third leading cause of unintentional injury deaths globally and declared it responsible for 7% of all injury-related deaths. Among current trends in the study of unintentional drowning, the United States as of 2005 has quantified death from unintentional injury as the leading cause of death for males aged 1-4 years, and Canada in conjunction with the U.S. lists drowning as the second leading cause of death for children less than 14 years, surpassing that of motor vehicle accidents (ILS, 2007; Xu, 2014).

The theoretical analysis of drowning in high-income countries (HIC) is meaningful for the reason that aquatic recreation is the cause of unintentional injuries to children, males, and individuals who have easy access to recreational aquatic facilities and environments (Moran et al., 2011; WHO, 2018). A substantial body of research reveals that the *collection of victims* will not save lives or decrease drowning, thus justifying the research that the ILS directs at recognizing the problem and identifying risk factors in order to generate comprehensive drowning policies associated with high-risk populations, activities, and their locations (ILS, 2007). It should be noted that for every fatal drowning, there is a significant number of victims affected by catastrophic and neurological impairments who require lifelong medical care, which in Australia costs

\$1.22 billion annually for fatal drownings and \$4.2 million average costs annually from a fatal drowning incident (Australian Water Safety Council [AWSC], 2016; Royal Life Saving Society, Australia [RLSSA], 2017; WHO/UNICEF, 2008).

Most of the literature suggests that there is a relationship between *appropriate knowledge of* and *attitude toward* aquatic environments, yet there is a lack of evidence that affirms the fact that these two viewpoints influence positive behaviors, which ultimately could result in aquatic competency (Blitvich, 2014). An element of importance attached to the study of drowning is “risky behaviors.” These attitudes, actions, and knowledge are based on the populace of a community influencing the mortality and morbidity rates for adolescents who often exceed the drowning rate of their younger peers by 200% (Quan, 2014a, 2014b; Tymula et al., 2012).

The ILS has advanced the notion that death by drowning equates to more than half of all injuries sustained by children even though researchers believe traditional reporting methods underestimate the true number (ILS, 2015). It is important to note that the leading world authority in drowning prevention, lifesaving sport, and lifesaving is the ILS, and equally important is WHO for their leading role in organizing a comprehensive database on drowning statistics worldwide (ILS, 2007; Scarr et al., 2014). An important element in drowning incidents attached to the study of drowning prevention is data collection. An examination of the data by WHO signifies that drowning mortality is the third leading cause of unintentional injury deaths preceded only by motor vehicle accidents and falls in spite of being drastically underreported (ILS, 2007). In September of 2007, the ILS convened in Porto, Portugal for a Strategic Planning Session and

revealed that data from drowning mortalities are consistently unrecorded by health information systems (ILS, 2015).

### **Theory Models: Haddon Matrix and Utstein-Style Guidelines**

#### **Haddon Matrix Injury Prevention Model**

Living in sunny California provides an opportunity to come in contact with an open water source (e.g., ocean, river, or swimming pool). Opportunities like this provide children the ability to have fun, play, and create adventures in the water. These momentous occasions can also bring pain, anguish, and morbidity to children and their families. Drowning is a complex event that stems from various risk behaviors based on the age of child and body of water involved (Quan, 2014a, 2014b).

The discipline of injury prevention has delivered several evidence-based models that shed light on the risk to public health (Barnett et al., 2005). The main principle of prevention is to ultimately reduce injuries by removing the event while ancillary prevention measures aim to reduce the consequences of injury or prevent the injury altogether (Mace et al., 2001). In order to construct proactive drowning prevention strategies, it is quintessential that drowning risk factors are pinpointed in order to target the number of drownings (Quan, 2014a, 2014b). As early as the 1930s, researchers fundamentally shifted their understanding of injuries and redirected it toward the progression of disease as opposed to a sequence of unrelated injury events (G. S. Smith, 1995). It is through an extensive methodical analysis of data, programs, and methods that the discipline of injury prevention is viewed by researchers (Mace et al., 2001). It is also through injury prevention that surveillance, research, and methodologies are sought after to discover the properties surrounding injuries (G. S. Smith, 1995).

As humans, we have the ability to prevent and control injuries (WHO/UNICEF, 2008). It is through active injury prevention that individuals within society see a reduction in the severity of injuries reported (Haddon, 1983). The traditional purpose of epidemiology identifies the alliance in the development of disease as consisting of the host, the agent, and the environment (Songer, 2009). In 1949, it was Gordon's findings that advanced the theory of injuries in alignment to that of medical ecology (Haddon, 1983). The contributions to injury prevention controls are attributed to Ralph Nader and William Haddon in the 1950s and 1960s (Songer, 2009). The evolution of systematic injury control continued in 1963 when it was documented that injury agents contact the human body similarly to that of infectious disease (Haddon, 1983). Haddon (1983) suggested that between injury and disease, there are no real scientific distinctions correlating the fact that injury control systems are equivalent to that of disease. It is based on the components of epidemiology, biomechanical sciences, and medical care that injury prevention strategies have progressed into a branch of learning (G. S. Smith, 1995).

The injury process is a sequence of events and factors stemming from an activity that require the field of injury prevention to utilize multiple interventions that target the various injury components (Runyan, 1998; Songer, 2009). The theoretical basis of injury is paralleled to that of the model of disease, which concludes that a wide range of interventions can be implemented to combat and reduce injury outcomes due to their association (Haddon, 1983, WHO/UNICEF, 2008). Through conceptual models, researchers can classify underlying causes that are part of the injury sequence of events (Songer, 2009). The Haddon Matrix employs a methodical process that categorizes the

epidemiological components for injuries into potential multidisciplinary interventions (see Figure 2; Christoffel & Gallagher, 1999). The host, the agent-vector, and environment form the components of the epidemiological triad that addresses the various phases of injury (G. S. Smith, 1995). It is through categorizing the gears of the epidemiological triad within the matrix that public health officials can create effective injury prevention strategies (Runyan, 1998). It has become evident through these processes that the Haddon Matrix has become the prevailing injury prevention model used for this field of science (Williams, 1999).

		Factors			
		Host	Agent	Physical Environment	Social Environment
Phases	Pre-event				
	Event				
	Post-event				

Figure 2. The Haddon Matrix. From “The Haddon Matrix: Its Contribution to Injury Prevention and Control,” by A. F. Williams, in R. McClure (Ed.), *Third National Conference on Injury Prevention and Control*, 1999, May 9-12, Brisbane, Queensland, Australia (<https://eprints.qut.edu.au/10081/>).

### Theorists for Injury Prevention

In years past, injuries from accidents were perceived as indiscriminate and that unintended acts were a result of the victim’s behavior (Mace et al., 2001). The discipline of modern injury prevention was first studied in 1940 by a physiologist at Cornell Medical College who studied kinetic forces attributed to falls. Hugh De Haven examined

the fact that in social settings, people are not in a position to distinguish or control the risks linked to injuries (Christoffel & Gallagher, 1999; G. S. Smith, 1995). The principle concept of this biomechanics scientist concluded that a crash or injury that transpires (with or without injury) is merely the first-step in comprehending the science of injury prevention (Christoffel & Gallagher, 1999; G. S. Smith, 1995).

Another epidemiologist who transformed injury prevention mid-century from Harvard University was John Gordon who examined injury causes in the same way as infectious diseases, thus creating the terms of host (victim), agent (energy), and vector (environment; Christoffel & Gallagher, 1999; G. S. Smith, 1995). Epidemiology is a scientific discipline that is based on frequency and patterns within a given population and is grounded in quantitative statistics and uses causal reasoning from various scientific fields (e.g., behavioral science) to study the control of health problems (Centers for Disease Control and Prevention [CDC], 2012). Gordon explained that tunneling in on one aspect for injuries was deficient since there were three forces that generated them: the host, the agent, and the environment (Christoffel & Gallagher, 1999). Succeeding Gordon's injury rationale in 1961 was James Gibson whose theory recommended that "energy interchange" assumed the role of agent within the epidemiological triad (Christoffel & Gallagher, 1999).

The most significant advancements were developed by an engineer, public health physician, and director of New York State Department of Health, William Haddon who some consider to be the progenitor of modern injury epidemiology (Sleet et al., 2011; G. S. Smith, 1995). In the early 1960s, Gibson and Haddon were in agreement that injury "agents" were produced by "energy" interchange as they inflicted injury (Haddon, 1983).

The epidemiological theory Gordon devised for the epidemiologic elements—the host, the agent, and the environment—was advanced by Haddon to include: pre-event, event, and post-event, as perpetual and repeatable phases of injury (G. S. Smith, 1995). The development of the Haddon Matrix has been instrumental in addressing the public health concern of drowning by creating multiple prevention strategies that target the sequence of events leading up to drowning/near-drowning (Quan, 2014a, 2014b).

The Haddon Matrix is a proven injury prevention tool, yet researchers Peek-Asa and Zwerling argued that resolving such complex issues necessitate the need to secure funding, suitable methodologies that educate the public, and operationalize solutions (Runyan, 2003). Furthermore, the Haddon Matrix debate revealed that other researchers construed his concept of increasing countermeasure choices meant bypassing human behavior as it related to motor vehicle accidents. Remaining firm with his concept, Haddon claimed that aborting unproductive behavioral strategies was necessary in order to segue from the predominant strategies (Williams, 1999).

The prologue for conceptual models based on injury and violence prevention are as follows:

- Epidemiologic model
- Public health model
- Haddon Matrix model
- Social-ecologic model
- Safety promotion model

The aim of the Haddon Matrix model for injury prevention control prevailed over the other conceptual models based on its foundation of classifying risk factors and creating



solutions that limited or reduced injuries (Mace et al., 2001; Songer, 2009). It was through this conceptual model that Haddon's theory unlocked opportunities to expand the countermeasures beyond what the theory was originally intended for and is now used to create concepts for injury prevention (WHO/UNICEF, 2008; Williams, 1999). The argument in support of the epidemiologic framework created by Haddon suggested that it could discover risk factors stemming from injuries (Songer, 2009).

A highly contested examination on countermeasure choice, specifically passive as opposed to active strategies was waged in 1970 and 1980, advocating that passive methods in place essentially affected everyone while active methods required people to put into service their device, thus resulting in less than 100% compliance (Williams, 1999). Injury control has evolved based on the Haddon Matrix and its ability to integrate a rational methodology utilizing traditional public health doctrines (Williams, 1999). The practical use for Haddon's framework addressing injury prevention stems from a meticulous exploration on injuries that amasses several strategies aimed at the problem similar to that of infectious disease prevention (G. S. Smith, 1995; Christoffel & Gallagher, 1999). The most significant fact about the Haddon Matrix is that it put into place the versatility to utilize a mixture of effective countermeasures directed at injury prevention strategies (ILS, 2014; Sleet et al., 2011). The analysis and research into injury is provided by the framework from Haddon's matrix as it illustrates its potential to see the *big picture* for events yet provide a critical analysis for specific components (Barnett et al., 2005; G. S. Smith, 1995).

The most traditional method in injury prevention is to understand injury causation from the standpoint of human behavior, and although this methodical approach is often

exercised, however, Susan Baker and William Haddon both agree that the overarching purpose of injury prevention is effectiveness (Christoffel & Gallagher, 1999; Williams, 1999). Educating the public on changing their behavior and attitude toward injury prevention will require capital to be infused into injury prevention programs ensuring significantly improved outcomes (Bradstreet, 2014; G. S. Smith, 1995). The injury prevention countermeasures that comprise the Haddon Matrix and Haddon's 10 injury prevention tenets inform society that intervening will reduce injury no matter at which point they intercede (Christoffel & Gallagher, 1999).

### **Haddon Matrix**

The dynamics of a public health crisis requires a multiprong approach from various health agencies that will test their state of readiness and response activities, which highlights the fact that Haddon's matrix generates a mixed approach to prevention through this data-driven model (Barnett et al., 2005; Christoffel & Gallagher, 1999). Generating a collaborative effort with first responders and health agencies will craft effective injury prevention policies through brainstorming and design (Barnett et al., 2005). In the field of prevention and disease, the understanding is that preventative actions produce successful outcomes, thus requiring fewer people to be protected as the complexity of data sources validate these results (Haddon, 1983; Runyan, 1998). Simply put, maximizing injury prevention requires an array of preventative methodologies in order to reduce injuries to which no *magic potion* can create (Haddon, 1983).

The conceptual model that is the Haddon Matrix offers these distinct advantages for injury prevention control:

- Recognize that injury is a process

- Employ multi-disciplinary thinking
- Help to develop creative solutions
- Identify range of strategies for prevention planning and resource allocation

(Songer, 2009, Slide 22).

There is a growing body of evidence that suggests the Haddon Matrix is an essential tool that, when used by Health department leaders, can aid them in formulating a comprehensive injury prevention plan geared toward public health emergencies while utilizing proactive measures to break apart the whole of the problem (Barnett et al., 2005).

It is important to consider that in order to change human behavior, laws alone will not be successful; therefore, it is essential that public education programs based on the Haddon Matrix work in conjunction with policymakers (Williams, 1999). The major implications of the Haddon Matrix illustrate its ability to connect public health preparedness and injury prevention science toward injury reduction (Barnett et al., 2005).

The findings of earlier studies appear to be in general agreement with the Haddon Matrix except that William Haddon (considered the founding father of modern-day injury prevention) advanced Gibson's theory to *include* drowning and hypothermia as injuries that did not fit his criteria for the transfer of physical energy (Christoffel & Gallagher, 1999). Previous research has investigated the impact of Gibson's theory upon the Haddon Matrix. Crucial to the development of the Haddon Matrix was Gordon's epidemiological discernments that addressed injury host, agent, and environment, thus expanding the Haddon Matrix to include preinjury phase, injury phase, and postinjury phase (Christoffel & Gallagher, 1999). Another aspect of the crash sequence depicts the

events prior to the crash, those during the crash, and sequelae of the event (Barnett et al., 2005; Songer, 2009).

### **Adolescent Drowning in Open Waterways**

An examination of the three phases constructing the Haddon Matrix describes the pre-event phase as an effort to reduce harmful events, while the event phase as an analysis of the injury to energy exchange ratio as it occurs, and the post-event phase as that which takes aim at reducing injury outcomes (Haddon, 1983, Williams, 1999). The redundancy of injury problems reveals through the Haddon Matrix that post-event phase methods can shed light on pre-event methods as an effective means to mitigate ensuing events (Runyan, 1998). It is important to note that through Haddon's matrix approach based on energy exchange management regarding vehicle safety, an estimated 328,551 lives were saved between 1960 and 2002 (Sleet et al., 2011). Ultimately, the purpose of the Haddon Matrix is to remedy the most important injury components that precede injurious events while maximizing the work from public health officials and external disciplines for a safer environment (Barnett et al., 2005; Songer, 2009).

An important theoretical assumption on injury prevention was that Haddon claimed resources were being used erroneously because they attempted to change human behavior as opposed to focusing on injuries and the consequences that followed (Williams, 1999). Another aspect on the background of injury prevention is that it offers convincing evidence addressing injury problems by supplying various routes for countermeasures (Runyan, 1998). A closer inspection of these assumptions suggests that the epidemiological triangle (host, agent-vector, and environment) could diminish injuries by separating the agent from the host through human behavior, motor vehicle

equipment, or socio-economic environment (G. S. Smith, 1995; Williams, 1999). This analysis implies that injury prevention specialists take the opportunity to address the information from multiple cells within the Haddon Matrix and not become fixated on just one cell (Songer, 2009).

A major implication that underscores the Haddon Matrix occurred in 1961 when William Haddon coined the term “passive” (referencing automatic) to mean that human action is not required to be protected as opposed to active, meaning human action is a prerequisite (Haddon, 1983). There is other evidence that indicates the merger of passive and active strategies can strengthen prevention, mitigation, and intervention methods while reducing injuries (Williams, 1999). It is evident that Haddon has influenced the world of injury prevention by utilizing theory and conceptual models in support of injury prevention epidemiologic analysis (Runyan, 2003).

In view of the close connection between intentional and unintentional injuries, the Haddon Matrix when used as an injury prevention tool can assist public health departments in addressing dynamic injury problems through epidemiologic research and evidence-based interventions (Barnett et al., 2005; Runyan, 2003). In conjunction with injury prevention, William Haddon also established 10 basic injury prevention countermeasures that supported injury control outcomes derived from quantitative or qualitative information (Christoffel & Gallagher, 1999; G. S. Smith, 1995). It is these 10 injury prevention strategies that provide health officials the opportunity to seek out effective intervention strategies employing risk factors from drowning events while using methodological procedures (G. S. Smith, 1995; WHO/UNICEF, 2008).

### **Haddon Matrix: Third Dimension**

The third dimension of the Haddon Matrix was created as a means to support health officials' rational decision making for alternative interventions based on key values (e.g., effectiveness, equity, freedom, cost, stigmatization; Runyan, 2003). Central to the drowning chain of events, the prevention aspect pinpoints public education as a major intervention (Bradstreet, 2014). It has been noted that developing the third dimension requires multiagencies to be creative in developing effective injury prevention measures as a collective entity (Runyan, 2003). The argument that the Haddon Matrix is an effective technique is well documented as it advocates for a range of prevention strategies that can be addressed through several solutions (Barnett et al., 2005).

The leading exponent of this theoretical framework stems from different disciplines (e.g., first responder, nonmedical) interacting as one while utilizing quantitative and qualitative data to bring about numerous ideas through a collaborative effort (Runyan, 1998; G. S. Smith, 1995). In order to extend the scope of the Haddon Matrix over time, the model's utility ought to be available to public health agencies and distributed in professional literature so that the model is easily recognized and applied appropriately (Runyan, 1998).

### **Utstein-Style Reporting Guidelines**

**Background.** A recurrent theme in the reviewed literature is the adoption of Utstein-style guidelines and terminology by the emergency services community, injury prevention specialist, and the drowning prevention community in order to create a consistent model for reporting drowning incidents regardless of location and to allow emergency departments to share reliable data in an attempt to reduce drowning incidents

(Chamberlain & Cummins, 1992; Szpilman et al., 2012). The improved changes to Utstein-style reporting guidelines were recommended by a field of recognized international resuscitation experts in an attempt to unify the reporting elements from data obtained through resuscitation outcomes from drowning (Idris et al., 2014).

It was through a consensus conference at Utstein Abbey in Stavanger, Norway in 1990 that investigators realized there was no consistent use of nomenclature and that multiple drowning definitions hindered further drowning research (Idris et al., 2014). The gravity of this conference is weighted against the 1968 Minnowbrook I Conference that brought together top scholars in public administration and management under Dwight Waldo, emphasizing a normative approach and highlighting social equity values (Newland, 2015). The members of the Utstein Task Force had an interest in resuscitation and epidemiology and were affiliated with the following coalitions: Maatschappij tot Redding van Drenkenlingen, International Liaison Committee on Resuscitation, American Heart Association, Australian Resuscitation Council, Comité Latino-America de Ressuscitacao, European Resuscitation Council, Heart and Stroke Foundation of Canada, Resuscitation Councils of Southern Africa, and the CDC (Idris et al., 2014).

**Methods.** The primary objective of the Utstein-style reporting guideline template is to achieve consistency regarding guidelines and increase accuracy for those reporting data criteria as a result of a drowning incident (Idris et al., 2003; Idris et al., 2014). As a preferred designation for reporting, the Utstein-style is widely viewed by drowning prevention advocates as an effective method. The intended use for the new recommendations is aimed at enhancing improved international audits through efficiencies at the levels of exchange for consistent drowning information (Chamberlain

& Cummins, 1992; Idris et al., 1996). These guidelines paralleled scientific communication and comparability of scientific investigations as a means of enhancing efficiencies related to drowning (Idris et al., 2017). Utstein-style guidelines were reviewed in 2013 by the international resuscitation community as a means of developing definitions and consistent data reporting as it relates to cardiac arrest (Idris et al., 2017).

Up to now, the data that have been presented on adolescent drownings indicate that more is known yet less is understood about the preventative effects necessary to save lives, implying that further research is required (Moran et al., 2011; Queiroga & Peden, 2013). In reviewing the research literature, more attention by researchers and stakeholders is required in order to abandon *all* non-Utstein-style drowning terms (NUSDT) such as wet, dry, near, silent, passive, and active drowning for research going forward (van Beeck & Branche, 2014). According to most of the literature produced on this subject, it is evident that drowning morbidity and mortality rates are clearly underestimated based on a host of reasons, and the defined and accepted definition of drowning seems to be the root cause (Martyn, 2014; van Beeck & Branche, 2014).

Reporting systems worldwide can benefit from the Core data recommended by Utstein-style reporting guidelines. These supplementary data are recognized as vital, but often capturing them or the time intervals is difficult at best. It is expected that any reporting agency can follow up and investigate drowning incidents and obtain, at best, minimal core and supplemental data elements to improve prehospital care (Chamberlain & Cummins, 1992; Idris et al., 2017). The best practice for developing a complete understanding of drowning is based on the data that are collected in the field. This data collection will help paint a clear picture for health advocates on the full spectrum of



drowning (Idris et al., 2014). The Utstein style for drowning (USFD) template listed 22 core components (Table 1) that are advocated by the consensus of experts as needed for documentation purposes and added 19 supplementary data components that are essential for data collection when the time is available (Venema, Absalom, Idris, & Bierens, 2018).

The Utstein-style reporting guideline template coincides with the core and supplemental elements with time tracking elements relating to cardiac care occurring in the field (Chamberlain & Cummins, 1992). As a result, any data that can be collected that are following agreed-upon nomenclature and follow the patterns of a drowning incident can be beneficial. It is foreseeable that there will be incidents that do not fit the criteria, but there should also be an attempt to obtain all relevant data at these tragic events (Chamberlain & Cummins, 1992).

The revisions consisted of exchanging core and supplemental components between each category and removing other components based on their significance in reporting, reliability, or difficulty in obtaining information. The internationally accepted definition on drowning was also reviewed to interpret the meaning of the keywords immersion and submersion (Idris et al., 2017). The revised guidelines are designed to enhance shared core and supplemental data that can be communicated between investigators. Matter experts do not recommend the use of other procedures or protocols when developing experiments using Utstein guidelines. Additionally, conducting extensive experiments without Utstein-style reporting guidelines in effect must be disclosed within the report by the author (Idris et al., 1996).

Table 1

*Core Utstein-Style Guidelines for Reporting Drowning*

Data element	Priority	Description
Victim identifier	Core	A number, code, or other information for unique identification of each victim
Sex	Core	Sex
Age	Core	Record birthdate if known.
Incident date and time	Core	Date/time
Precipitating event	Core	Is there evidence to suggest a precipitating event or factor is causally related to the drowning?
Was the face submerged (underwater) at any time before or during rescue?	Core	A drowning occurs when a liquid covered the mouth and nose and prevented air from entering the lungs.
Preexisting illness	Core	Preexisting illness causing impairment
Level of medical knowledge of lifeguard delivering patient care	Core	Level of training and certification
Interventions used by lifeguard or first responder during resuscitation	Core	Type of equipment used
Time face/airway seen underwater	Core	Hour/Minute/Second or unknown
Time victim was removed from water	Core	H/M/S or unknown
Time of first trained responder/EMS treatment	Core	H/M/S or unknown
Time CPR first began	Core	H/M/S or unknown
Time ROSC was achieved	Core	H/M/S or unknown
Time first conscious/awake	Core	H/M/S or unknown
Submersion duration (face underwater)	Core	Derived from time underwater to time of removal/commencing resuscitation
Underwater to first treatment or CPR interval	Core	Derived from time underwater to time of removal/commencing resuscitation
Date of hospital discharge	Core	Document the date of discharge from the hospital
Vital status at discharge	Core	Did the patient survive to hospital discharge?
Cause of death, if patient did not survive	Core	What were the causes of death?
Neurological outcome at hospital discharge, if patient survived	Core	Use an age-appropriate validated scoring system
Method of administering ventilation	Core	Type of equipment used

Some investigators have expressed concerns that the Utstein-style reporting guideline template can have unintended effects on future experiments or control innovation. It is without judgment that this field of resuscitation experts knowingly expected this type of response from researchers and reinforced their message that the guidelines are there to promote creativity as opposed to stifling it (Idris et al., 1996). Advocates in support of drowning prevention endorse a single form with core data that follow the Utstein-style template to collect data that can be tracked accurately in emergency reporting systems. As a result, this form would eliminate unaccepted drowning definitions, reorganize classifications, and help build a formal comprehensive national drowning database to draw from (Chamberlain & Cummins, 1992; WHO/UNICEF, 2008).

**Results.** The implementation of USFD guidelines provides a retrospect on data obtained from child drowning outcomes and illustrates an increase in fatal and nonfatal drownings as a result of this comprehensive data tracking for all incidents within a single year (Vähätalo, Lunetta, Olkkola, & Suominen, 2014). This index of accepted definitions and USFD guidelines provides specific data as it results from resuscitation procedures that occur in the field as a result of cardiac arrest (Chamberlain & Cummins, 1992). The application and use of these guidelines also benefit the field of Cardio Pulmonary Resuscitation (CPR) through communication and collaborative efforts. A drawback is that the guidelines do not disclose a methodological approach to obtaining data elements, thus impeding the goal of the template (Idris et al., 1996).

The 2018 report “Review of 14 Drowning Publications Based on the Utstein Style for Drowning” unveiled the usage of these reporting guidelines since its inception more

than 10 years before (Venema et al., 2018). It was designed to capture the peer-reviewed journals that reference USFD while comparing and contrasting the findings that provide essential details for drowning resuscitation based on USFD data elements (Venema et al., 2018). It is noteworthy that no one single publication used all USFD elements, and there were several inconsistencies as to how USFD elements were implemented among the studies. These circumstances have had a negative impact on the structured evaluation within the study as well (Venema et al., 2018).

The group of international resuscitation experts advocate for the implementation and use of Utstein-style reporting guidelines to capture essential data elements that occur in the field for heart attack victims (Chamberlain & Cummins, 1992). An emergency medical condition or injury a priori to a drowning should be part of the reporting information to assist emergency medical staff in providing the best care possible (Idris et al., 2003). It is with clarity from future reports that clear guidelines and best practice will move the clinical and epidemiological fields forward and enhance a more robust exchange of drowning information (Chamberlain & Cummins, 1992; Idris et al., 2003).

The balance of successful drowning prevention techniques and comprehensive data collection coinciding with Utstein-style reporting guidelines is the most effective strategy that can be implemented by drowning prevention advocates in any country, state, or community (Idris et al., 2017). The ultimate goal of drowning prevention is to save lives. That goal is achieved through studies that identify effective drowning prevention strategies as well as addressing emergency medical care for victims (Idris et al., 2003). We might not be able to control their behavior, but we can reduce the consequences.

## **Collaboration: A Global and Regional Approach**

Preventative strategies and collaboration are needed because the sequence of drowning events varies across international regions and the environment in which it occurs (World Congress on Drowning [WCOD], 2002). Drowning incidents are preventable, and the focus of drowning coalitions should be on the preventative measures that can ultimately reduce the number of drownings that occur globally. Culturally, there are significant challenges to preventing drowning incidents that occur in all bodies of water (WCOD, 2002). In the sphere of drowning prevention, actively recognizing the value of such programs is far different than actually implementing them (Scarr, 2014). Drowning coalitions, local and state governments, consumer groups, research institutions, research and developers, donors, manufacturers, and retail stores across the globe who advocate for progressive drowning prevention programming should build on collaborative efforts aimed at policies and other public health agendas for local and national levels of government (WCOD, 2002; WHO, 2014).

The first circulated *Global Report on Drowning* was released by WHO in 2014 in order to draw attention to the need for national water safety plans aimed at drowning prevention. The feature from this report was establishing goals and improving drowning prevention programs that were evidenced based through a multisectoral approach of cooperation (AWSC, 2016; ILS, 2014). The formulation and quality of cohesive relationships that share the same vision and communicate effectively build upon their social capital. The advantage to this cohesive relationship promotes interest from those organizations outside of the group (Damschroder et al., 2009).

The tentacles of drowning stretch across the globe creating significant problems for economically challenged countries and developed nations, thus hampering their ability to collect reliable data surrounding fatal and nonfatal drownings (ILS, 2007). The greatest research effort on this issue has been to improve the quality and quantity of data collection (ILS, 2007). The WHO does take the lead in crafting the most extensive drowning mortality reports based on their global databases, and this has influenced the progression of The Alliance for Safe Children (TASC) created in 2002 to promote child injury awareness in Asia and the RLSSA, which was created in 1896 with an interest in international development and collaboration (ILS, 2007; Scarr et al., 2014).

Drowning is a dynamic public health issue that has an impact on multiple organizations when an incident occurs. The fact that there are many commonalities among drowning prevention strategies similar to those in the public health arena reaffirms that a multisectoral approach is warranted to reduce the number of drownings (WHO, 2014). Contrary to public health programs, there have been several interventions based on health services studies that failed to enhance patient-care outcomes through a litany of public health issues (Damschroder et al., 2009). Critical to the act of reducing drownings, a global campaign to raise awareness and create active relationships among the international community rests with support from state and local governments, private and nonprofit organizations, research institutions, manufacturers, and corporations (ILS, 2014). As an accessory to international organizational goals, capacity building is viewed as a critical component that requires a high level of performance and training of personnel to effectively implement specific programs that communities and/organizations utilize to succeed (Hyder et al., 2014).

The risk management process should be founded on transparency that allows those affected by the policies to have input into the decision making (AWSC, 2008). Prioritizing risk reduction as the basis of drowning prevention programs by local, national, and regional leaders can aid in the reduction of drownings based on program implementation and evaluation (ILS, 2014). Program development is based on reliable intelligence and intuitive research that is supported by environmental design initially and then followed up by education, training, and policy development that target specific at-risk groups, such as children. These programs should be evaluated with the results made available to *all* (WCOD, 2002). Vital to the success of drowning prevention programs is constant monitoring and evaluation of the assessment process as part of the undertaking for risk management (AWSC, 2008).

The reviewed literature on this topic comes directly from public administration and management disciplines. The underlying theme in the evaluation of drowning prevention research literature is partnerships (Scarr, 2014). The baseline for improving and refining drowning prevention measures is composed of policy and legislation, intuitive research, community infrastructure, public education, and active preventative strategies (WHO, 2014). Guldbrandsson and Bremberg (2004) advanced the notion that the two major areas of concern for safety activities in a community are that safety promotion is organized and relative to the affluence of the town. There is ample justification for a global initiative from national, state, local, and community drowning prevention coalitions to promote lifesaving skills, effective drowning prevention, and risk reduction programs that comprise a comprehensive *all hazard* approach in support of community needs (ILS, 2014).

It is important to distinguish the fact that drowning prevention programs and instruments are multisectoral, and because of this, there is a need for organization across boundaries that address low- and middle-income countries (LMIC; WHO, 2014). The influence from a wide range of sectors including health and rural development has entered into the discussion on drowning prevention as a way of developing models and a diversity of relationships outside the circle of drowning prevention coalitions (Scarr, 2014; WHO, 2014). In that external group are the pediatricians who have direct influence on policy, regulations, and legislation that is created at the state and local levels in support of public and private recreational swimming areas (e.g., mandated life jackets for children less than 5 years of age; Committee on Injury, Violence, and Poison Prevention, 2010). A recent study titled *A Decade of Drowning in Ireland* (occurred between 2002 and 2011) addressed collected data relating to pediatric drowning events that applied the Utstein-style template that required researchers to access multiple generic data sources (Nabialek & Breatnach, 2016). It is for this reason that pediatricians should use their influence with emergency services personnel at the local and state level to support a consistent and reliable data reporting system for drowning events that will enable epidemiologists and other health care officials to extract reliable data efficiently in support of drowning prevention strategies (Committee on Injury, Violence, and Poison Prevention, 2010).

The AWSC (2016) established a convincing case that best practice is adopted and performed by those internal and external advocates from the drowning prevention coalition as a result of working and collaborating across local jurisdictions, state boundaries, and international borders. Creating an effective drowning prevention



strategy in order to achieve common goals is developed through active relationships that seek to understand the drowning problem in nations with either relatively low incident rates or addressing challenges for reducing those incidents in LMIC (Scarr, 2014). Several studies point out that drowning is a multisectoral issue to the extent that it requires a global partnership as a force multiplier for policy development and implementation in the drowning prevention community (WHO, 2014).

A framework for the successful implementation of drowning interventions through a collaborative effort can be seen in a recent drowning prevention program that occurred in Bangladesh known as the Saving of Lives from Drowning (SoLiD) Project that was developed based on the response to the high burden of child drownings in that country (Hyder et al., 2014). Based on the authors' knowledge, this is considered to be one of the largest drowning prevention programs aimed at children in LMIC ever developed. This multisectoral collaboration was sponsored by Bloomberg Philanthropies and included the Center for Injury Prevention and Research, Bangladesh, International Centre for Diarrhoeal Disease Research, Bangladesh, and Johns Hopkins International Injury Research Unit, Johns Hopkins Bloomberg School of Public Health, USA as all participants maintained a strong formal relationship with each other (Damschroder et al., 2009; Hyder et al., 2014; ILS, 2014). The program consisted of two specific drowning prevention programs (playpen and crèche) addressing children less than 5 years old for the given population of 1.3 million in rural Bangladesh. The global funding of this program by Bloomberg Philanthropy also involved coordination from inside and outside Bangladesh in a multisectoral collaborative approach to thwart the impact of some of the highest childhood drowning risks within this country (Hyder et al., 2014).

The drowning prevention program SoLiD used an implementation model of planning, engaging, executing, and evaluation that was strategically supported through the technical capacity to implement the interventions with a multisectoral approach (Hyder et al., 2014; Scarr, 2014). The effective implementation of SoLiD also revealed that there is still more work that needs to be done in the arena of multisectoral collaboration (Hyder et al., 2014). The many successes from drowning prevention are due in fact to effective partnerships, collaborative efforts, and weighing the negatives against the positives that each brings to the table because no single sector can go it alone (Hyder et al., 2014; ILS, 2014; Scarr, 2014).

The development and implementation of health interventions aimed at childhood injuries are founded on the success of community-based campaigns that specify the use of constant surveillance, dedication to interagency cooperation, and training for developing professional networks aimed at program implementation (Guldbrandsson & Bremberg, 2004). The backbone for drowning prevention goals is partnerships and collaborations and the need to develop agendas based on drowning issues at the community, national, and international levels (ILS, 2014; Scarr, 2014). The collaboration of global multisectoral drowning prevention coalitions can move on increasing and mobilizing funds, reduction in duplicate efforts, and consistency in campaigning on the same message (AWSC, 2016; ILS, 2014; Scarr, 2014). The ultimate goal in drowning prevention is the reduction of death by drowning. This goal can be obtained with the collaboration of multiple stakeholders who have an interest to see a reduction in drowning through the use of proactive drowning prevention measures (AWSC, 2016). Unfortunately, when it comes to creating effective collaborations within the drowning

prevention world, it is found to be underdeveloped and underresourced when compared to other global public health issues (Scarr, 2014). Lifesaving programs that bear the weight of ultimate success should consider whether the interventions are scalable to allow researchers the ability to evaluate them for long-term sustainability (Hyder et al., 2014).

Developing an agreement on drowning prevention solutions that effectively interact with multisectors and the people within a specific organization for community-based approach has lacked empirical studies (Guldbrandsson & Bremberg, 2004; WHO, 2014). Oftentimes, it is the legal obligation of local government to ensure that duty of care principles affect the control they have over hazards and risks within their communities (AWSC, 2008). The potential to advance drowning prevention programs is through the use of increased collaboration and coordination across the multisectors that drowning incidents occur and the development of a modern system that provides access to researchers who provide efficiency for future resources (WHO, 2014).

A perfect example of a unified drowning prevention collaboration is seen in the AWSC and the support that is provided by the Australian Government as a commitment to working with a legitimate organization and its water strategies to reduce drowning and promote the safe use of waterways in Australia (AWSC, 2016). Promoting a multisectoral collaboration with a range of stakeholders from government, private sectors, manufacturers, donors, and research institutions proves a formidable force to be reckoned with that can aggressively tackle the drowning issue globally with a national water safety plan (ILS, 2014; RLSSA, 2017; WHO, 2014). Effective use of social strategies can help transform the knowledge base in drowning prevention into policies and proactive water safety programs that require political support (Avramidis, 2011).

The RLSSA (2017) elaborated further and revealed that there is a need to work with industry, government, private sector, and academic institutions in collaboration with the AWSC to adhere to the recommendations established in a symposium regarding research, policy, advocacy, support and collaboration, recognizing that a world free from drowning is attainable through the development of healthy partnerships and strengthened alliances in support of the global platform to reduce drowning that has been created by the international community (ILS, 2014; Scarr, 2014). Drowning prevention programs such as this can also employ other partnership models that have been developed in support of other major global public health issues and policies that are derived from them (RLSSA, 2017; Scarr, 2014; WHO, 2014).

Drowning prevention coalitions and advocates must work in a collaborative atmosphere at the global and regional levels in order to raise awareness and generate funding for research while communication among governments, nonprofit organizations, research institutions, and private donors is ongoing regardless of organizational structure (Damschroder et al., 2009; Scarr, 2014). Research and other scholarly work indicate that maximizing the synergies of regional, national, and international partnerships can help foster long-term sustainability for implemented drowning prevention programs for those people who are marginalized (Hyder et al., 2014; ILS, 2014; WHO, 2014). In order to focus on providing the essential safety needs of the community, local governments must ensure they are in compliance by meeting their full legal obligations based on occupational health and safety policies in order to steer clear of negligence litigation (AWSC, 2008).

Overall, the health of any global drowning prevention program is reliant on the collaboration and partnerships from government, industry, nonprofit organizations, research institutions, and private donors that can help tailor individual water safety plans and improve the data collection processes as a result of fatal and nonfatal drownings for individual countries (WHO, 2014).

### **Data Collection**

Australia, Canada, United Kingdom, and United States have seen a steady decline in their mortality rate for children under 5 as they continue to pursue aggressive prevention strategies targeting this class of individuals (ILS, 2007). An example as to why there needs to be an unremitting progression on children under 5 is that although Australia indicated a decline in mortality, the contrast to this statistic is that they had the highest incidence of drownings stemming from backyard pools (ILS, 2007). In November 2014, the WHO created their first independent report on drowning noting that governments and policymakers have disregarded the high number of drownings for too long and that current policy implementation should coincide with current public health programs (WHO, 2018).

The purpose of the *World Drowning Report* in 2007 conducted by the ILS was globally to reduce the number of drowning incidents by building up the quality and quantity of drowning data that is collected (ILS, 2007). The *World Drowning Report* was more detailed and explicit in defining drowning trends, causal factors, and high-risk groups that were recognized from the data gathered by the ILS member organizations (Brazil, Finland, New Zealand, Czech Republic, Bulgaria, Australia, Canada, Sweden,

Ireland, United States, Singapore, Germany, St. Lucia, United Kingdom, Malaysia, and Iran) that paralleled the *Factsheet on Drowning* created by the WHO (ILS, 2007).

It is important to note that contributing nations who utilize ICD-10 codes in reporting injury mortality, specifically, drowning codes between W65-W74 classifying the mechanism of drowning, promote the reliability of drowning data collected by the WHO (Martyn, 2014). Impetus for statistical accuracy requires *all* countries to utilize ICD-10 codes for submersion incidents in order to build a comprehensive database and cut down on inaccuracies (ILS, 2007; Martyn, 2014). Evidence regarding circumstances centered on drowning (e.g., age) are inadequate stemming from the one-dimensional death certificate record that lacks the qualifying elements of how and why a drowning occurred (Christoffel & Gallagher, 2006; Quan & Cummings, 2003). The review of the literature is instructive in revealing that various agencies define age independent of the terminology standardized by the WHO's guiding principles as it relates to infants, children, adolescents, and adults (WHO, 2013).

There are similar implications in the findings obtained from data in HIC that identify risk factors, demographics, and drowning mechanisms that pale in comparison to low-income countries where the drowning risk is much higher, yet the statistics are not supported or documented correctly in the data (Blitvich, 2014; ILS, 2007). The question arises that if drowning rates are on the decline in HIC, then drowning prevention messages must be effective. Research up to this point has exposed the dearth of literature on the causal factors for drowning, suggesting the drowning prevention message is missing an important link albeit the many drowning prevention resources available: that missing link is *evidence* (Blitvich, 2014; Moran et al., 2011; WHO/UNICEF, 2008).

Central to the advancement of an effective water safety strategy, the ILS has established its organization as the leading international water safety expert in order to build a collaborative effort engaging water safety communities on the importance of developing water safety messages, implementing lifesaving policies, and evaluating the processes through enforcement in hopes of reducing the number of drownings globally (ILS, 2007; Scarr et al., 2014; WHO, 2018).

The largest proportion of the studies support the premise that although the collection of drowning data is important, the primary reason for continued drowning prevention research is to protect adolescents from the naïve behavioral patterns they reflect around open water sources by reducing their consequences based on lessons learned from HIC such as Australia and the United States (ILS, 2007; Tymula et al., 2012; WHO/UNICEF, 2008). In conclusion, it is evident that the leadership role taken by the ILS has a significant impact on water safety communities and the capacity to build an international collaborative approach for creating effective drowning prevention strategies globally. It is through active communication that the ILS can influence Member organizations and governments on the benefit from utilizing the Utstein-style guidelines for reporting drowning data so that international audits can be conducted in order to supply scientifically credible data (Chamberlain & Cummins, 1992; ILS, 2007; Moran et al., 2011).

Evidence regarding the existence of large data gaps is founded on the complexities of fatal and nonfatal drownings and the challenges that come with data collection (ILS, 2007; Martyn, 2014). A significantly high proportion of the studies in this discipline are concerned with inconsistent terminology that yields no specific

drowning behavior patterns as different reporting systems have hampered the ability to output reliable data (Idris et al., 1996). Research investigating data collection suggests that with no lead drowning prevention organization responsible for a single operating data system collecting fatal and nonfatal drowning reports, the unexpected consequences now lead to the following situations where data are unreliable in various countries or regions, the drowning death toll is underrepresented by up to 50% in some HIC, or events are excluded and/or irrelevant in the case of U.S. government statistics (ILS, 2007; Witman, 2008; WHO, 2018).

Given the evidence for a variety of water safety controls that aim to reduce drowning, the findings of earlier studies appear to be in general agreement that reliable data from water safety controls is inadequate (Blitvich, 2014). The significance of reliable data has some bearing on the broader issues of progressive epidemiology that requires transparency of methodologies in order for future researchers to replicate and understand previous studies (Christoffel & Gallagher, 2006). Research up to this point has identified the shortcomings that stem from inadequate data collection at drowning incidents (e.g., swimming ability, supervision, drowning mechanisms) that could support epidemiologists in identifying the risk factors involved, furthermore expressing the importance of obtaining accurate quantitative and qualitative data (ILS, 2007; Martyn, 2014; Witman, 2008).

An important ingredient requires comprehensive drowning data to be standardized and recognizable in a consistent format so that epidemiologists can interpret the data in order to recommend pragmatic drowning strategies aimed at the various stages of life (AWSC, 2016; Christoffel & Gallagher, 2006). Data provided by preceding studies tend



to support the uniformity of classifying fatal and nonfatal (drowning) injuries that are recorded in emergency reporting systems be based on the internationally accepted definition on drowning (Witman, 2008). In view of the close connection between drowning prevention and strategy implementation aimed at children and adolescents aged 5 to 19 years, the exigency for effective water safety policies is in the lap of government officials, stakeholders, and water safety organizations worldwide (Queiroga & Peden, 2013).

### **Summary of Themes Within Reviewed Literature**

Drowning is 100% preventable. Drowning prevention strategies provide the framework for a collaborative discussion among policymakers, drowning prevention coalitions, government officials, industry, community leaders, research institutions, donors, public safety, hospital administrators, emergency services transport companies, and those affected directly as a result of a drowning incident. In the course of time, there have been many injury prevention theorists who have developed successful injury prevention models in support of injury prevention programs. The injury prevention model that has been established as a benchmark for development of injury prevention programs is the Haddon Matrix. Supporting this proactive injury prevention model is the compendium of outcome data as a result of drowning. The Utstein-style reporting guidelines were developed through a collaborative group of internationally recognized drowning experts in order to develop a universally adopted definition for drowning and common terminology in support of drowning incidents and outcomes.

Drowning is a global public health issue, and reduced down to regions, it becomes a multisectoral problem. The reviewed literature strongly supports the growth of

partnerships and collaborative efforts in an attempt to bring the unified forces together if there is to be a reduction in drowning incidents annually around the globe. The data collection complexities have been diagnosed by researchers as one of the main causes for obtaining accurate statistics referencing drownings. The development of a consistent and comprehensive reporting system that provides accurate and reliable data and can be accessed by those investigators seeking to understand drowning is quintessential for the progression of drowning prevention strategies for all.

In conclusion, drowning continues to be a serious health threat globally. The complexities, cultural aspects, economics, environment, and education all have a meaningful role in order to combat this tragedy. The financial burden from drowning can also have an impact on families and local government. The strength to overcome drowning is grounded in the collaborative efforts by *all*.

### **Forecast for Chapter 3**

Chapter 3 details the sequential mixed methods research design utilized for this study by focusing on the theoretical perspectives. The research design includes the purpose and approach, specifics on the research strategy, data collection process, data analysis discussion, the chronological timeline of the study, and the role of the researcher.

## CHAPTER 3: METHODOLOGY

The purpose of this study was to examine the data elements collected from submersion forms and investigate how the data are collected, analyzed, and implemented into drowning prevention strategies within the five selected regions in California through participatory action research (PAR). The qualitative design of this research was to build a collaborative approach by integrating the three qualities of PAR commencing with the formulation of knowledge with participants and the researcher: campaigning for self-awareness that reflects a common approach to individual, collective, and/or social change and an active approach through collaboration between participants and researcher to plan, implement, and disseminate the research methodology (McIntyre, 2008). The complexities of PAR lie within the defined roles and responsibilities of the researcher as the varying degrees of participation run counter to the inclusiveness of information held by the researcher (Karlsen, 1991). PAR is founded on the tenet that it delivers opportunities for a collaborative approach with people rather than for people (McIntyre, 2008).

Utilizing PAR in this study, the researcher took advantage of the cyclical process that initiates exploration, knowledge constructs, and *action* itself throughout the various phases of research (McIntyre, 2008). The iterative circular cycle of PAR involves questioning, reflecting, investigating, developing plan, implementing, and refining (McIntyre, 2008). Adolescent drowning is a dynamic public health matter that demands the full attention of program planners in an attempt to lower the number of daily drownings that occur in Southern California. Consequently, Pace and Argona (1985) presented a strong argument for the success of PAR with the evolution of quality of work

life (QWL) activities at Xerox by illustrating a common theme that it allows for quick adjustments to the process while it endures, grows, and develops within the organization. PAR's having the ability to make adjustments *midstream* is fitting for this type of research. The tentacles of drowning are always in motion and PAR is a multifunctional approach that allows for adjustments to be made by researchers and participants as they attempt to understand why the gaps in data collection exist.

Scientists have developed an understanding that scientific standards are not based on individual silos separate from the world we know; it is through engaging the world that theoretical and methodological trials are overcome (Whyte, 1991). Similarly, Nyemba and Mayer (2017) identified and reported on the roots of PAR in their interview with Dr Marja-Liisa Swantz, identifying that the problem with PAR in academia is that learning is based heavily on theory as it distances itself from realities in the world. It is important to note that PAR is a multifaceted approach that allows practitioners and participants to build on their knowledge as they combine theory and practice in order to better understand the community issue (McIntyre, 2008). The success of PAR in this research study is based on the *awareness* raised in the minds of participants and researcher. It is this awareness that will expand beyond this group and into the participants' respective communities that will benefit the citizens who did not believe that adolescent drowning could be remedied (McIntyre, 2008). Ultimately, the goal of PAR is that this research tool promotes knowledge transference (Nyemba & Mayer, 2017).

The objective of PAR is to develop an iterative investigative process that will *bring to light* the deficiencies that revolve around the data collection methodologies based on adolescent drownings in Southern California. This public health problem was

framed within the context of “*participation*,” and data obtained were filtered through the recursive process of PAR. It was necessary to gather the qualitative and quantitative data and analyze it for patterns that will influence program planners to develop comprehensive drowning prevention strategies in order to reduce the number of drownings yearly in Southern California. This researcher took advantage of PAR methodologies in that allowing the participants to describe their data collection procedures is the core philosophy of PAR. The contributions from the participants in this social science research gave them some freedom to explore how they are gathering data and to become engaged in the process of advancing their procedures (McIntyre, 2008; Nyemba & Mayer, 2017).

### **Research Design**

This research design utilized the framework of a two-phase sequential mixed methods design in order to capture the strengths that each approach produces as opposed to using either one as a standalone research tool (Creswell, 2014; Creswell & Clark, 2018; C. A. Green et al., 2015; Johnson & Onwuegbuzie, 2004). The core concept of sequential research design begins with the quantitative collection and analysis of adolescent drowning statistics that are examined for common themes in order to assist the researcher with developing an interview instrument that furthers the research. This phase is followed by the collection of qualitative (semistructured interview) data that is analyzed in order to explain and explore the results from the quantitative findings.

The overall intent of this sequential mixed methods style aimed to have the qualitative data explain the analysis of the quantitative data in-depth so that common themes are understood (Creswell, 2014). A challenge when collecting data for this

research design is that the quantitative and qualitative data can be collected simultaneously, thus making the quantitative results difficult to determine for follow-up and selecting the correct participants to interview for the qualitative phase. This is why Creswell and Clark recommend that in order to give a comprehensive overview of how the variables interact, researchers should adhere to the explanatory model by following up on the quantitative results with the qualitative course of action (Creswell, 2014; Creswell & Clark, 2018; C. A. Green et al., 2015). The value for strict adherence to the sequential model is that the quantitative results guided the questioning for the qualitative phase in creating such general questions that allow the researcher to build on the foundation developed in the preceding quantitative phase (Creswell, 2014).

The quantitative phase is the first step in the sequential mixed methods research design and is linked to what quantitative purists articulate this theory to be, *objective*. The positivist paradigm is that controlled settings are used, biases are removed, and no emotional attachment to the study and/or the objects occurs while validating their hypothesis through testing (Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 1998). In opposition to the positivist paradigm, qualitative purists (constructivists and interpretivists) assert that through inductive logic, information moves from specific to general and the knower and known are bound together as the knower is the source of realism (Creswell, 2014; Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 1998).

The hierarchal tier of mixed methods design is qualitative research that subscribes to *natural settings* as highlighted by constructivists (Tashakkori & Teddlie, 1998). It is at this juncture that constructivists work from another set of assumptions; they work up from the bottom to understand the phenomenon and translate the meanings others have

on the world (Creswell, 2014; Creswell & Clark, 2018; Tashakkori & Teddlie, 1998). The end goal for the constructivist worldview is to gather as much information as possible on the participants' view on data collection instruments within their county in order to bring about a new awareness of their strengths and vulnerabilities (Creswell, 2014; Creswell & Clark, 2018).

This study takes as its interpretive framework a mixed method approach to understand the aggregate of vulnerabilities in the data collection processes of participating health and emergency service agencies in Southern California. Rather than to continue investigating the differences of quantitative and qualitative research through the lens of a positivist and constructionist, it is time to focus on the similarities that, when combined, can offer a workable solution to from the insights that both have to offer (Johnson & Onwuegbuzie, 2004). Mixed methods designs are gaining traction with health service researchers because the stalemate of implementing what was considered "evidence-based" has since become a breakdown in design implementation of strategies (C. A. Green et al., 2015). Mixed methods research employs a methodically unified approach for quantitative and qualitative data that assists researchers in answering research questions through multiple methods (C. A. Green et al., 2015; Johnson & Onwuegbuzie, 2004).

The strength of the mixed methods research design is that at the onset, the quantitative approach is initiated, the structure of the design allows the researcher to address each phase independently, there is a clear delineation between the writings for both phases, and the initial phase lends itself to developing the emerging themes that are followed up on in the second phase (Creswell & Clark, 2018). The vulnerabilities that

researchers can succumb to in this research design are the extensive amount of time needed for completion, the qualitative is dependent on a comprehensive phase one approach, the quantitative results must be completed in their entirety in order to develop emerging themes and identifying the participants to support the qualitative phase (Creswell & Clark, 2018). The justification for mixed methods design is founded on the fundamental principle of mixed research that provides the researcher the capacity to exercise the strengths and weaknesses of both phases through the collection of data using multiple approaches lending itself to the superiority over monomethod investigations (Johnson & Onwuegbuzie, 2004).

In closing, sequential research design relies on comprehensive data that have been analyzed for commonalities and then explained in detail through the use of interviewing participants as a means to understanding their viewpoints centered on the problem. The role of the researcher involves the adherence to a strict diet of ethical moralities. The demand for a high level of ethical behavior could not be more fitting in the social climate we live in today (Creswell, 2014). The researcher of today needs to demonstrate a sincere effort in reflecting the highest level with retrospect to the *code of ethics* for his or her particular professional organization (Creswell, 2014). An informed researcher anticipates issues that surround his or her participants, sensitive data that is revealed, and the disclosure of all aspects of the research as a means of transparency (Creswell, 2014; Creswell & Clark, 2018).

### **Research Questions**

This two-phase mixed methods research design was to utilized in order to gain insight into the data collection procedures used by public health and emergency service



agencies from the participating regions of California specific to adolescent drownings for children aged 1-17 years. The quantitative data studied spanned the years from 2000 through 2016 for Simonsburg, Jamesville, Thomasville, Petersburg, and Andrew Town.

This phase of the study was concerned with the following questions:

1. Do the data elements for fatal/nonfatal drownings of children collected by California regional public health and emergency service agencies meet the criteria of the Utstein-style recommended guidelines for uniform reporting of data from drowning?
2. How are the data on fatal/nonfatal drownings of children collected by California regional public health and emergency service agencies incorporated into the formulation, implementation, and enforcement of unintentional drowning policies and preventative strategies?

### **Population and Sample**

The population for this study focused on areas throughout California. The regions were selected based on population. The sample includes full-time public health administrators, emergency service personnel, public health epidemiologists, and Injury Prevention Coordinators I and II who were employed by public agencies within selected regions of California. There were eight total participants serving in the selected regions in California for this study.

The involvement by the participants was voluntary and included an approved Institutional Review Board (IRB) informed consent letter that was signed by each. The participants in this recruitment were considered eligible after meeting the following criteria: (a) full-time employee with public health agencies for participating agencies,

(b) having access to submersion incident report form (SIRF) data, (c) controller for statistical data on drowning, (d) analyst of statistical data on drowning.

The researcher accomplished recruitment using an approved California Baptist University (CBU) student e-mail. The selection of participants started with an e-mail distributed by a participant from one of the regions who brought awareness to those potential other regional public health agency representatives. The participants from Jamestown were identified by an agency employee via a phone call by the researcher. The participant from Andrew Town was revealed to the researcher after attending the National Drowning Prevention Alliance (NDPA) Educational Conference held in Tampa Bay, Florida in April of 2018 by members of the NDPA. The second participant from Andrew Town was later identified by primary participants of the same town.

In this PAR study, the researcher obtained secondary data on adolescent drownings within all five contributing California regions. The data obtained were analyzed for the following identifiers: (a) adolescent children aged 1-17 years of age; (b) data from years 2000 thru 2016; (c) metadata identifying the Utstein-style guideline reporting recommendations for at-scene drowning incidents; (d) commonalities across all five counties for drowning data collection processes; (e) SIRF format (e.g., electronic, paper); (f) how the data are analyzed; (g) who the analyzed data are reported to (e.g., department head, policymaker, stakeholder). By analyzing and aggregating the dichotomy of quantitative and qualitative data from the participating public health agencies, the researcher intended to develop a comprehensive drowning prevention strategy to address adolescent drownings in selected regions of California that continue to be besieged by this preventable incident.

## **Instrumentation**

The purpose of this sequential mixed methods research design was used to collect qualitative data after analyzing the quantitative data in order to explain the underpinnings of the quantitative analysis with valid and reliable proofs (Creswell & Clark, 2018). The initial phase of this study consisted of a survey instrument of inquiry (see Appendix) that detailed the specific statistical data for drowning incidents to those agency representatives who have custody or access to relevant data. The intent was to develop a comprehensive database with statistical information regarding the drowning issues for the participating regions of California.

The second phase of the study utilized a semistructured interview as the collection instrument to gain a better understanding of impressions and the phenomenological experiences in greater detail in order to expand and clarify the participant responses. A combination of convenience and snowball sampling located participants who could describe the data collection process for drowning incidents during the qualitative phase of this study. As part of the validation process for the qualitative phase, the participants were provided a copy of their transcribed interview for the purpose of clarifying, adding, or redacting comments made during the interview.

## **Data Collection**

The initial phase of the sequential mixed methods design is focused on acquiring and analyzing quantitative data. In this phase of the study, an electronic request letter for drowning statistics was dispatched to those agency representatives who had direct access to the drowning data for their respected public health and safety agency. This lead up was effective in galvanizing the questions for the semistructured interview and

identifying the participants who would reinforce the findings based on their training, experience, and knowledge of drowning related emergencies. The second phase of this research design is to use the qualitative data to explain the quantitative results (Creswell, 2014). The qualitative data were collected from each participant at his or her place of employment for security reasons and his or her ability to access electronic reporting systems should any immediate questions need further inquiry. This model provides a two-prong approach to developing a complete and comprehensive illustration of the underpinnings for a reliable and valid reporting system in support of *all* aquatic emergencies. The application for addressing a complex world health issue cannot be fully researched with a single strand of data. This convoluted public health issue is better suited for a “mixing” of data that can utilize the strengths and address the weaknesses that each of the quantitative and qualitative phases carry (Creswell, 2014).

### **Data Analysis**

The principal intent of a sequential mixed methods design is to analyze the quantitative and qualitative databases independently (Creswell, 2014). The objective of this model is to utilize the qualitative data to explain the primary quantitative data results (Creswell & Clark, 2018). The results from the analysis of the quantitative data then paints a picture for the development of the qualitative configuration for face-to-face semistructured interviews (Creswell, 2014; Creswell & Clark, 2018). The secondary quantitative data collected from the participating agencies was placed in a Microsoft Excel spreadsheet and then analyzed against each independent database.

The secondary stage of the mixed methods sequential design is to collect and analyze the qualitative data obtained from the initial representatives in the quantitative

sample, thus supporting the intent of this research design that participants stay the same in both stages (Creswell, 2014). The qualitative phase in this research design was complex based on the various job titles each participant held. The collection of qualitative data was obtained from each participant at his or her place of employment using a face-to-face semistructured interview that was recorded digitally. The overall intent of the individualized semistructured interview was to delineate the specific facts that were extracted from each independent quantitative data collection phase as to the uniformity of reporting for fatal and nonfatal drownings and how the data collection retrieved from *at-scene* incidents incorporated into proactive drowning prevention policies and preventative strategies. Finally, the researcher conducted a methodical overview of each independent interview evaluating first the response to each question, and then initial coding extracting common themes and/or lack of connections based on responses and concluded with focused coding that compared the themes against the framework constructs within the reviewed literature. A Microsoft Excel spreadsheet file was created to process the predominant themes.

The defense for using a mixed methods design is based on the responses from the participants to explain and support the findings developed from the quantitative results. The quantitative results illuminate the inconsistencies that are prevalent in the reporting systems for drowning incidents occurring in the selected California regions. The qualitative data provides a clear picture as to the hurdles EMS and public health agencies contend with when seeking to develop proactive drowning prevention programs, effective policies, and preventative strategies. The researcher addresses the results of the quantitative and qualitative phases with a comprehensive analysis in later chapters.

### **Forecast for Chapter 4**

In Chapter 4, the researcher presents the results from the study. The chapter begins with the sample and population that was used throughout the study. It details the findings from the quantitative and qualitative research that address the data collection issues and drowning prevention programs proximal to drowning. Chapter 4 concludes with a summary of findings.

## CHAPTER 4: FINDINGS

The purpose of this study was to examine the data elements collected from submersion forms and investigate how the data are collected, analyzed, and implemented into drowning prevention strategies within the five selected regions in California through participatory action research (PAR). The study examined the available statistical data concerning fatal and nonfatal child drownings in selected regions of California in the years 2000 through 2016. Specifically, the value and completeness of these data were then compared to the comprehensive approach utilized by other developed countries as recommended by the Utstein-style guidelines for reporting drownings. Understanding the impact that child drownings have on society and the global community shapes the purpose of this study, analyzing the instruments used in the selected regions to capture the core and supplemental data elements paralleled with the consistency and reliability of the reporting systems that provide accurate data for an epidemiologist and injury prevention specialist to develop drowning prevention strategies that target age groups who are most *at risk*.

### **Research Questions**

The researcher developed two specific research questions intended to answer these questions through examination of the quantitative and qualitative data. The research questions are:

1. Do the data elements for fatal/nonfatal drownings of children collected by California regional public health and emergency service agencies meet the criteria of the Utstein-style recommended guidelines for uniform reporting of data from drowning?

2. How are the data on fatal/nonfatal drownings of children collected by California regional public health and emergency service agencies incorporated into the formulation, implementation, and enforcement of unintentional drowning policies and preventative strategies?

### **Description of Population and Sample**

The population for this study focuses on regions throughout California. The regions were selected based on a population range between a minimum of 150,000 and a maximum of 3.5 million (State of California Employment Development Department, 2018). The total population for California currently is 39,250,017 (State of California Employment Development Department, 2018). This research focused on the drowning statistics and phenomenological experiences of those public health and emergency service agency representatives who manage the drowning prevention program and/or are the curators for the statistical drowning data. The regions selected in California were based on their ability to support this drowning prevention research, provide statistical drowning data, and provide one or more agency representatives who directly manage or administer the collection of drowning data for their agency after meeting the population criteria. The selected regions were then coded with a pseudonym in order to maintain confidentiality for the regions that participated.

The sample ( $n = 8$ ) consisted of six females (75%) and two males (25%) ranging in age from 25 to 65 years. There were six agency representatives from public health and two representatives from fire/EMS for a total of eight participants. The personal names of the agency representatives are not disclosed and are referred to in this study as *agency representative*. The researcher recruited the active participants utilizing the preferred



probabilistic sampling (Creswell & Clark, 2018) to which the first referral provided another referral to the researcher until the primary and secondary data were captured.

### **Bracketing**

The a priori in bracketing is the reflexivity of the researcher's ability to evaluate himself or herself during the research process. In retrospect, reflexivity also comes from the researcher accepting the participants as partners in the research process and the way the data are collaboratively collected (Schreier, 2017). Gulun (2010) affirmed that the core concept of reflexivity is centered on the awareness of researchers for the many influences afforded them during the research process and ultimately how the study affects them. Creating an atmosphere of trust was essential in order for the participant to answer the questions truthfully (Schreier, 2017).

At the onset of the research study, it was known that the researcher has a significant amount of knowledge and experience that relate specifically to drowning events and the reporting of such incidents; thus, the challenge was to allow the participants to speak on behalf of their experiences authentically. The *epoche* and bracketing implemented by the researcher was to set aside the prejudices and judgments and look at things with an unbiased eye. The researcher put assumptions to one-side and focused on the personal accounts from the participants.

Understanding the value that comes with the familiarities of subject matter can also inject bias into the equation. The researcher in the initial phase of the study understood the significance in shelving the biased opinion that would be encountered when interacting with participants during the interviews. The notes for these personal biases were documented after the interview and later discussed with the committee chair

throughout the qualitative portion of the study. The bracketing process prompted the researcher to dispose of personal experiences, biases, and preconceived notions on the study along with tabling research that disclosed similar theories and findings surrounding this topic.

### **Quantitative Data Collection Procedures**

Upon receiving approval from the university's Institutional Review Board (IRB), the population was identified through probabilistic sampling. As a preferred strategy for quantitative research (Creswell & Clark, 2018), probabilistic sampling was selected based on its capacity to obtain large amounts of quantitative drowning data that support this study. The quantitative data were obtained based on the random selection of regions that were considered paramount to fulfilling the database with statistical information that would also be supported by active participants from the same regions. The quantitative data that was requested from the participants through e-mail had to meet the following criteria: (a) the statistical data had to reveal fatal and nonfatal drownings for 2000 through 2016, and (b) the statistical data had to reflect fatal and nonfatal drownings for children aged 1 through 17 years. As part of the sequential mixed methods research data acquisition, the statistics were asked for in advance of the interview in order to interpret the data for statistical meaning. The statistical data were secured in an external hard drive that is password protected due to the sensitive nature of the material.

### **Qualitative Data Collection Procedures**

Upon obtaining permission from the university's IRB, the participants were selected based on the following criteria: (a) responsibility for managing the drowning prevention program and/or (b) direct access to quantitative drowning data. The criteria

were established to support the research questions that were centered on fatal and nonfatal drowning statistics and the reliability of active drowning reporting systems. The group was accessed through e-mail, and a snowball sampling materialized that identified those participants meeting the established criteria. There were seven participants who emerged from the snowball sampling for the selected regions in California. During the course of the interview process, the participant from Simonsville dropped out of the interview, and the quantitative data from the region were destroyed. The removal of this candidate lowered the total number of participants from nine to eight. The validation for this sample size is based on the phenomenological study that concedes a typical range for participants to span from three to 10 (Creswell, 2014). The population was reduced from five regions to four regions based on this outcome.

Accessing participants for the interview required them to sign a consent form. There was an Application to Conduct Research form that was required by Andrew Town to be completed by the researcher and submitted for approval from the Health and Human Services Agency followed up by approval from the board of supervisors. The researcher was notified by e-mail that the Application to Conduct Research was approved and the meeting with the participant was then scheduled. The participants were interviewed privately at their place of employment and asked twenty-three questions in a semistructured process. This purposeful sampling was focused on gaining an introspect of the experiences that participants had while managing the drowning data that was in constant motion (Creswell & Clark, 2018).

The interview protocol (Creswell & Clark, 2018) established for this research utilized a semistructured interview with the participants that was captured on a digital

(EVSITR) voice recorder. The digital recording was used as the protocol measure to secure the interview that would later be transcribed. The interview protocol was implemented as a means to maintain consistent procedures and document all consent forms while conducting each interview. The final aspect of the interview protocol was to validate the transcribed interview by allowing the participants to review their remarks prior to the qualitative data being analyzed. All participants took this opportunity to review their transcripts. There was one participant who asked to have some statements removed due to their sensitive nature. These statements were not related to the research questions. A secondary observational protocol (Creswell & Clark, 2018) was implemented to organize and track the description of events, procedures, current drowning issues and reflective notes that captured emerging themes throughout the data collection period.

The anticipated data collection issues for this study by the researcher were that logistical demands could tamper with the validity of the study if a phone interview had to be utilized not knowing the exact person on the other end of the receiver. The second issue centered on the ethical issues of reporting on the qualitative remarks as near as possible to the intent of the content in order to satisfy the study outcome. In the end, neither of these issues interfered with the outcome of the study.

### **Findings: Quantitative Data Results**

The intent of the Utstein-style guideline for reporting drownings is to develop reporting tables that will assist researchers with reporting methods and provide them the ability to analyze the results from drowning data (Idris et al., 2017). Descriptive statistics are used to compare and contrast the Utstein-style guidelines, column 1 in the table,

against the data elements collected by the participating agencies (Table 2). An x represents the data element is being collected. The data elements scorecard at the bottom of the table represents the total number of data elements collected for the particular table.

Table 2

*Victim Information*

#	Core data elements	AT	TV	PB	JT	Description
		N (%)	N (%)	N (%)	N (%)	
1	Victim identifier		x	x		A number, code, or other information for unique identification of each victim
2	Sex		x	x		Sex
3	Age/birthdate		x			Age in years
4	Age/years	x	x	x	x	Birthdate: MM-DD-YYYY
5	Incident date and time of day	x	x	x	x	Date/time
6	Precipitating event					Is there evidence to suggest a precipitating event or factor is casually related to drowning? Evidence may be obtained at the scene or from hospital or postmortem history/toxicology tests.
7	Was the face submerged (underwater) at any time before or during rescue?					A drowning occurs when a liquid covered the mouth and nose and prevented air from entering the lungs.
8	Preexisting illness					Preexisting illness causing impairment
Data elements scorecard		2 (25)	5 (63)	4 (50)	2 (25)	

*Note.* AT = Andrew Town, TV = Thomasville, PB = Petersburg, JT = Jamestown.

The victim information (Table 2) has essential data elements that are centered on the victim. The core data elements in this table identified Thomasville (63%) and Petersburg (50%) as capturing the *victim identifier, sex, age/birthdate* (Petersburg excluded this identifier), *age/years*, and *incident date and time of day* on the submersion form. The similarities for these two regions are that they actively collaborate together in data sharing. The core data elements consisting of *age/years* and *incident date and time of day* were the only two elements captured by Andrew Town (25%) and Jamestown (25%).

The scene information (Table 3) lists the core data elements that are captured at the scene of drowning incidents. These data are what aid injury prevention specialists in putting the pieces of the puzzle together to determine whether CPR was administered and by whom. In this table, Thomasville (28.5%) is the only region that has *bystander CPR* and *trained responder performing CPR* on their submersion form. The three other regions did not have any core data elements from this table to report.

The pre-EMS scene information (Table 4) lists additional details that can aid drowning reports when first responders arrive at the scene and initiate the rescue. The participating regions did not report any of these core data elements on their submersion forms.

The time points and time intervals from first responders or EMS data (Table 5) list core data elements that are fixed on time intervals for the victim during the drowning event. The two regions that have these data elements listed on their submersion form are Thomasville (12.5%) and Petersburg (12.5%). The regions of Andrew Town and Jamestown did not collect any data elements listed in this table.

The disposition (Table 6) lists four core data elements that focus on the outcome of the victim as a result of the drowning event. Of the four elements, *vital status at discharge* is the category that the regions collect from their submersion form. Ultimately, the regions want to know whether the victim survived to assist with their fatal and non/fatal drowning statistics.

Table 3

*Scene Information*

#	Core data elements	AT	TV	PB	JT	Description
		N (%)	N (%)	N (%)	N (%)	
1	Water temperature					Was the water icy or non-icy? Report the water temperature if known.
2	Who witnessed the drowning					(1) Unwitnessed (2) Witnessed by a bystander (3) Witnessed by a lifeguard (4) Witnessed by EMS (9) Unwitnessed by EMS
3	Bystander CPR		x			Did a bystander (non-EMS person) perform CPR?
4	Bystander ventilation					Was ventilation given?
5	Did a trained first responder perform CPR?		x			Did a lifeguard or other trained first responder with a duty to treat perform CPR or provide ventilation only?
6	Vital status at first trained responder/EMS assessment					AVPU, ABC, GCS
7	Initial cardiac rhythm					Cardiac rhythm from monitor or ECG
	Data elements scorecard	0 (0)	2 (28.5)	0 (0)	0 (0)	

*Note.* AT = Andrew Town, TV = Thomasville, PB = Petersburg, JT = Jamestown.

Table 4

*Pre-EMS Scene Information (Lifeguards and First Responders With a Duty to Treat)*

#	Core data elements	AT	TV	PB	JT	Description
		N (%)	N (%)	N (%)	N (%)	
1	Level of medical knowledge of the lifeguard delivering the patient care					Level of training and certification
2	Time victim was removed from water					Type of equipment used
	Data elements scorecard	0 (0)	0(0)	0 (0)	0 (0)	

*Note.* AT = Andrew Town, TV = Thomasville, PB = Petersburg, JT = Jamestown.

Table 5

*Time Points and Time Intervals From First Responder or EMS Data*

#	Core data elements	AT	TV	PB	JT	Description
		N (%)	N (%)	N (%)	N (%)	
1	Time face/airway seen underwater					Hours: minutes: seconds
2	Time victim was removed from water					Hours: minutes: seconds
3	Time of first trained responder/EMS treatment					Hours: minutes: seconds
4	Time CPR first begun					Hours: minutes: seconds
5	Time ROSC was achieved					Hours: minutes: seconds
6	Time first conscious/awake					Hours: minutes: seconds
7	Submersion duration (face underwater)		x	x		Derived from time underwater to time of removal/commencing resuscitation
8	Underwater to first treatment or CPR interval					Derived from time underwater to time of first EMS treatment or CPR
	Data elements scorecard	0 (0)	1 (12.5)	1 (12.5)	0 (0)	

*Note.* AT = Andrew Town, TV = Thomasville, PB = Petersburg, JT = Jamestown.



Table 6

*Disposition*

#	Core data elements	AT	TV	PB	JT	Description
		N (%)	N (%)	N (%)	N (%)	
1	Date of hospital discharge					Document the date of discharge from the hospital
2	Vital status at discharge	x	x	x	x	Did the patient survive to hospital discharge?
3	Cause of death, if patient did not survive					Fill in causes per clinician, such as respiratory distress syndrome,
4	Neurological outcome at hospital discharge, if patient survived					Use an age-appropriate validated scoring system
Data elements scorecard		1 (25)	1 (25)	1 (25)	1 (25)	

*Note.* AT = Andrew Town, TV = Thomasville, PB = Petersburg, JT = Jamestown.

The quality of resuscitation efforts (Table 7) lists *method of administering ventilation* as the only core data element to collect information on the type of airway device used to assist in the resuscitation efforts for the victim. This single core element is not identified on any of the submersion forms.

Table 7

*Quality of Resuscitation Efforts*

#	Core data elements	AT	TV	PB	JT	Description
		N (%)	N (%)	N (%)	N (%)	
1	Method of administering ventilation					Mouth-to-mouth Bag-mask Supraglottic airway device Endo-tracheal intubation Unknown
Data elements scorecard		0 (0)	0 (0)	0 (0)	0 (0)	

*Note.* AT = Andrew Town, TV = Thomasville, PB = Petersburg, JT = Jamestown.

The collection of core data elements recommended by the Utstein-style guideline for reporting drownings are not tracked by the regions in this study (Table 8). The region with the highest percentage for tracking core data elements was Thomasville (31%), identifying nine elements on their submersion form. Petersburg (20%) followed with the collection of six core data elements for their reporting. The regions of Andrew Town (10%) and Jamestown (10%) collectively gathered three core data elements from their reporting.

Table 8

*Aggregate Score*

Overall percentage by region	AT	TV	PB	JT
Total percentage	10.3%	31.0%	20.6%	10.3%
Total items tracked	3	9	6	3
Total possible items tracked	29	29	29	29

*Note.* AT = Andrew Town, TV = Thomasville, PB = Petersburg, JT = Jamestown.

The quantitative results based on the statistical data reveal a very low percentage of core data elements that are collected by the participating regions. The table that represented the highest collection of data elements was found in the victim information table (Table 2), yet it still lacked a significant number of data elements that are not collected by the regions in general. It was also revealed that pre-EMS scene information and quality of resuscitation efforts are not being tracked at all by the participating regions.

The request for statistical data was set on the following parameters: (a) drowning data on children aged 1 to 17 years and (b) data for years 2000 thru 2016. The secondary

statistical data were delivered as an attachment in e-mail from the participants except for Jamestown. The researcher had to file a Public Records request form in order to obtain the statistical data. The data were examined to ensure that they met the requirements as listed in the study and then secured in a password protected external hard drive.

The nonstructured notes by the researcher identified how the data were formatted and tabulated. A central issue hindering the ability to formulate a concise analysis of the aggregate statistical data was *how* the data were formatted. The following is an example of how the statistical data were received: (a) there were two regions that stored the data in a PDF file, (b) one region stored the data in Excel files, (c) another region used a Word file to illustrate its database. The PDFs were difficult to extract data from because there was no age restriction, meaning all ages were present. The files contained a summary of tables that did not allow the researcher to combine or analyze any potential trends in the data. In the two PDF files analyzed, one file listed years 2009 through 2016 while the latter accounted for years 2009 through 2018. Another issue found in the PDF files was that the columns and rows were calculated out but there were inconsistencies from year to year. The overall issue with a PDF file is the inability to combine the file when there are inconsistencies in the reporting.

The data in the Excel files had an abundance of data element headings that were intended to be collected, but several of the data elements were left blank. These files were not consistent year to year with the same data element headings, thus hindering the data from being combined into aggregate results. The regions that had similar submersion forms did not report the same findings, and that also impeded the ability to merge the data. The Excel files did reveal that a significant amount of data can be

accurately reported in this format. The statistics that were reported in a Word document listed the summaries for years 2008 through 2010 on one document and 2010 in another document for fatal and nonfatal drownings aged 0 to 14 years. They also collected hospitalizations and emergency department (ED) discharges for five categories.

The overall picture for the quantitative data results illuminates the need for developing a practical submersion form that captures the core data elements recommended by the Utstein-style guideline for reporting drownings that is used collectively by regions that share the same issues when it comes to drowning. The files used to store the data seem to vary across the regions, thus nullifying the ability to capture the drowning issue in a broader sense.

## **Qualitative Data Results**

### **Interview Question 1**

*Can you describe the steps prescribed by your agency once a drowning has occurred in your county?*

Interview Question 1 sought to determine the mode of operation that public health and emergency service agencies utilize when a drowning incident has occurred within their region. Policy can be a very effective tool when properly used to address inefficiencies in injury prevention programs. Although the total number of reviews on successful injury prevention policies is low, drowning prevention policies for the most part are at the bottom (Vincenten & Gerdmongkolgan, 2014). The intent was to discover how their data collection procedures at the onset of a drowning incident parallel with the statements in support of the Haddon Matrix and Utstein-style guidelines for reporting drownings. Represented in Table 9 are the statements that were contributed by the

agency representative as a way to describe their proceedings for the initial stages of a drowning incident. Each statement is classified as corresponding with either Research Question 1 or 2 (RQ1 or RQ2). The table also indicates whether the element corresponds with the Haddon Matrix (H.M.) or Utstein guidelines (U.G.).

Table 9

*Interview Question 1*

HM/UG	RQ	IR
H.M. event	2	That’s actually a little complicated for us. It’s a little more streamlined in Thomasville.
U.G. disposition	1	Here in public health services, my role is really around primary prevention, so not in terms of response.
H.M. event	2	We dispatch the units as well as our public information officer.  And then also any unique characteristics of the drowning call whether there were barriers in place at the time, lack of supervision, the circumstances surrounding the drowning.
U.G. scene investigation	1	So, when there is a drowning in the county no matter if it’s a fatal or a nonfatal, the public information officer on duty gets paged. So how it works is we get a page, we get an e-mail, and we get placed on the call. And then, it’s our job to get all the information, to gather the information.
U.G. scene information	1	The first responders fill out the SIRF report, and SIRF is our submersion incident report form program, and that comes to me in e-mail and then I go into the system to pull up more details about what happened, and then we start looking into the outcome of the child or adult.
H.M. post-event	2	We receive ambulance calls, and we treat, but it’s up to the trauma system and the EMS system to determine where that drowning is routed.
U.G. scene investigation	1	We do not have any specific steps for drowning. It’s caught in our prehospital data, but the same way we catch everything else. There are no specific steps for a drowning.

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

The responses from participants are in accordance with their respected job title and agency responsibilities; however, two emerging themes from Interview Question 1 were noted. The first theme was how the respondent from Petersburg feels as though their reporting system is inferior to the reporting system in another region. The second running theme is from Jamestown and the additional resource they commit to the initial stages of a drowning incident.

### **Interview Question 2**

*Can you describe your job description as it relates to drowning prevention for your county? How long have you been in this position?*

Interview Question 2 sought to find the link between the actual job description of agency representatives as it relates to their role in drowning prevention as well as collateral duties. Injury prevention specialists and drowning prevention advocates can make a social impact on drowning incidents when they are immersed in their community life and apply the proper drowning interventions (Bennett, Linnan, & Chung, 2014). The intent of the question was to uncover their role and responsibility as it revolves around the drowning prevention program. The reference to time spent in their position would establish a timeline for the individual to fully grasp the gravity of their actual duties. Represented in Table 10 are the statements that were contributed by the agency representative as a way to describe their roles and responsibilities as they relate to the Utstein-style guideline data elements and the Haddon Matrix dimensions.

Table 10

*Interview Question 2*

HM/UG	RQ	IR
UG disposition	1	We have residents and physicians who take this data and make sense out of it, because I'm not a data-driven kind of person. So, I collect the information, I try to chase down, with help of my fire colleagues, to get those SIRFs filled out so that we can have relevant statistics.
H.M. pre-event	2	So as part of our injury prevention, the division has been involved with drowning prevention since before me, and in fact at one point there was a drowning prevention coalition in Jamestown and one of my staff had shared that.
U.G. disposition	1	My responsibility is drowning prevention. So, for the past 3 years, I've been responsible for developing a drowning prevention program for Jamestown and the cities that we serve.
U.G. scene information	1	So, my job, again, is to collect the stats to make sure they're accurate as well as I'm on the Jamestown Coalition and we're trying to get everybody on board. So, this is the first time . . . so these stats in 2017, were the first time we had everybody in Jamestown.
U.G. disposition	1	I also attend the Child Death Review team, that's monthly, we meet at the Coroner's Office and discuss any childhood deaths that have occurred. So, if there's a drowning incident that took place, then I'll all share reports with the coroner and the district attorney.
U.G. pre-EMS scene information	1	I manage all injuries related to children birth to 14 in Allen Town.
U.G. disposition	1	I have access to and pretty much kind of oversee all of our prehospital data, which we have used in the past to access drowning- and submersion-related data and provided related data to community partners for them to then do drowning prevention. I specifically don't do any drowning prevention, but I give data to people to do drowning prevention.

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

The responses from the participants are descriptive in that they illustrate the multitude of job duties they conduct for their given agency. The partisan theme for this

question is that Petersburg (U.G.) has to deal with tracking down first responders in order to complete SIRF report whereas Jamestown (U.G.) after 5 years in his position, had finally achieved the ability to get all responsible reporting agencies to submit drowning data. The overall theme for Interview Question 2 from Jamestown was the ability to accurately reveal the drowning issues for their region in 2017 and allow them to move forward with drowning prevention programs that target *at-risk* age groups.

### **Interview Question 3**

*What data collection form does your agency use to collect drowning data on incidents that occur in your jurisdiction?*

Interview Question 3 sought to reveal the specific type of data collection form that participating regions utilize to capture the data elements for drowning incidents. Submersion forms that are actionable are the first-step for public health organizations in establishing uniformed reporting for drownings that include accepted nomenclature and guidelines in order to design accurate data reporting systems (Idris et al., 2014). The intent of this question was to develop an understanding of how the data collection form was created and what particular data elements agencies are seeking to capture drowning information for. Represented in Table 11 are the statements by participants based on their use of self-developed forms to obtain data elements surrounding drownings that draw on the Utstein-style guidelines for reporting drownings.



Table 11

*Interview Question 3*

HM/UG	RQ	IR
U.G. victim information	1	We use a submersion incident report form, the same one that Thomasville uses.
U.G. pre-EMS scene information	1	We certainly partner with the local emergency service provider.
U.G. scene information	1	We use the EPCR mainly to collect our drowning stats.
U.G. victim information	1	Okay. And that's the form that all the PIOs use basically the age, the sex, where it occurred, body of water, if there was an isolation fence or not. And we broke it down to community pools versus backyard pools.
U.G. scene information	1	We call it SIRF, submersion incident report form, and that data is built into the online system.
U.G. victim information	1	We got permission from our lead agency as well as the county, in collecting aggregated information on submersion reports. So, there's no personal health information in the reports that are submitted through the submersion portal.
U.G. scene information	1	We do not have one.

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

The responses from the participants illustrate the use of a data collection form that tracks data elements that are particular to their respective community. There is evidence that Petersburg and Thomasville are utilizing a Submersion Incident Report Form (SIRF) that has been created through a collaborative approach so that both agencies have access

to the data. The region of Jamestown illustrates that through a cohort there is an agreement to use the same form that has specific data elements the agencies are seeking to obtain.

The overall theme for this question demonstrates that all participating agencies use a submersion form to collect data that supports Utstein-style guidelines for reporting drownings.

#### **Interview Question 4**

*Are they paper or electronic forms? How long has your agency used this form? When was it last updated? How is it transported if paper? Is the courier service secure?*

Interview Question 4 sought to develop an understanding of how the data elements from submersion forms are transmitted within the reporting system and how paper forms are transported from the field to the reporting agency office. Drowning incidents are a complex scene, and in support of creating a detailed overall picture of the issues surrounding such events, it is vital that data elements from the scene be incorporated into the submersion form to support the accuracy of data reporting (Idris et al., 2014). The intent of this question was to establish a chronological timeframe for the specific use of the submersion form for each region in order to understand how often the form is revised based on new drowning prevention standards and nomenclature. The security of sensitive data also drives this question in order to gain an insight as to how the agencies properly report drowning data while protecting patients' privacy and security as directed in the Health Insurance Portability and Accountability Act (also known as HIPAA). Represented in Table 12 are the statements from the participants as to how they

detail the format of their submersion forms, the length of time the submersion form has been in use, and how the data are safely transferred from the field to the agency database.

Table 12

*Interview Question 4*

HM/UG	RQ	IR
U.G. scene information	1	There's both options. Technically, probably since about 2002 or 3, but that was the very beginning. So, we didn't get a lot those years, and we've tried to build on those, on compliance and getting those submitted.
U.G. scene information	1	We do. But we have at least two iPads on the rigs as far as to my knowledge when we first started the program, we relied a little bit on the paper form but we haven't needed it. On the iPad, it started January of last year of 2017.  Not to the drowning form, no.
U.G. scene information	1	There's no paper.
U.G. scene information	1	Yeah, so there's still the paper form that law enforcement will use. Sometimes they'll scan it and e-mail.
U.G. scene information	1	Electronic  Five years  Six months ago

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

The responses from the participants indicate that they have all converted their submersion forms to an electronic file within iPads that are used in the field to document data elements of drowning incidents. Petersburg and Thomasville still provide submersion forms in paper that are transmitted via e-mail by law enforcement.

The overall theme for Interview Question 4 is that public health agencies have advanced their data collection reporting systems to electronic files that create a database for drowning data.

### **Interview Question 5**

*Does your agency use the new drowning definition as reported by WCOD (2002): Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid and the terminology that supports its reporting (e.g., nonfatal, fatal, morbidity and mortality) for classifying drowning incidents?*

Interview Question 5 sought to validate the use of the internationally accepted drowning definition as reported by the World Congress on Drowning ([WCOD], 2002) by participating agencies as an attempt to advance the quality of their data by instituting the current definition centered on drowning. Public health agencies can increase the accuracy of their drowning data by endorsing the definition of drowning adopted by the World Health Organization (WHO) and the WCOD in 2002 (International Life Saving Federation [ILS], 2007). The intent of Interview Question 5 was to confirm that participating agencies have acknowledged, endorsed, and implemented the universally accepted definition of drowning as part of their drowning prevention curriculum.

Represented in Table 13 are the statements from the participants. The responses from the participants indicate that some of the regions have accepted and endorsed the new drowning definition as reported by the WCOD from the 2002 report with the exception of the participant from Petersburg who was uncertain. An interesting remark from the Thomasville participant acknowledges how consistency plays a role in utilizing established nomenclature when creating public service announcements (PSAs).

Table 13

*Interview Question 5*

HM/UG	RQ	IR
U.G. pre-EMS scene information	1	I'm guessing we do, but because I'm not on the medical side, I don't know for sure that that is official. But our pediatric intensivists are very concurrent with training and things like that. I'm guessing they do, but I couldn't say for sure.
U.G. scene information	1	We've been doing that for about four or five years now.
U.G. disposition	1	It's funny, I just have a trail of e-mails we were just going through this past week since we were putting together this video and that's what we were talking about, on how we're identifying what fatal, nonfatal drowning means. So, we are trying to get consistent with that definition that you just mentioned.  Yeah so, we're reporting it, yeah, we are.
U.G. disposition	1	We use the ICD-10 code that is in the Nemsis 3.4 Data Dictionary for prehospital data.

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response

**Interview Question 6**

*Does your agency have a policy on who is to complete the form and submit it?*

*Who do they submit it to? Is there a timeframe that dictates when it must be completed?*

Interview Question 6 sought to determine whether there are stated policies that illustrate who is responsible for completing the submersion form, who it is submitted to, and what the exact guidelines are for submitting the completed form to the responsible data collection agency for the specific region. The data collection surrounding fatal and nonfatal drownings is a demanding undertaking by those involved. The purpose to track and report drowning data is not one-dimensional. The objective for collecting data is to

bring awareness to the community and public health officials in support of drowning policy initiatives and to develop effective drowning prevention strategies for those most *at risk* (ILS, 2007).

The intent of Interview Question 6 was to show the connection between policy and submersion form submittals by reporting agencies in parallel with who is responsible for completing and timely submitting of the form. A valid policy can enhance an agency's effort to have submersion forms that are completed and submitted within a reasonable amount of time, not to exceed local emergency service protocols, equal to that of patient care forms.

Represented in Table 14 are the statements from the participants. The responses from the participants indicate that in order for them to report the findings from fatal/nonfatal drownings in their regions, they need to have the support of first responders who are responding to these emergencies and support from the public health agency representing the region of Petersburg. A policy from Thomasville indicating who is responsible for submitting submersions forms could be outdated. There is also an indication that employee turnover compounded with entering data manually is problematic. Andrew Town requires their submersion forms to be submitted within 48 hours. The overall theme from Interview Question 6 is that data collection is reliant on a number of resources and support from *all* is required for public health agencies to acquire accurate data in a timely manner.

Table 14

*Interview Question 6*

HM/UG	RQ	IR
H.M. event	2	My agency does not have any, no. They don't even know that I'm doing it, probably. I mean, it's one of these things where it started, and public health in Petersburg was initially collecting the data. Sadly, our Department of Public Health in Petersburg does not invest a lot of time in this issue. So, while there's no policy or whatever, it definitely falls under my job description in what I do regularly.
U.G. scene information	1	No, it's the paramedic on scene. I think immediately after the call. They get a few minutes but I don't know exactly.
U.G. scene information	1	If we do, that would be very outdated. Yeah at least probably over five years.  So, that was always a difficulty years ago, trying to get it to everything. And then with turnover and everything like that, and us putting in the forms manually and everything on top of that, it was difficult.
U.G. scene information	1	We ask that the fire chiefs do it.  They submit it directly to me. We'd like it done within 48 hours.
U.G. scene information	1	We don't have a form.

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response

**Interview Question 7**

*How does your agency analyze the drowning data collection that is provided?*

*How is it used within your organization?*

Interview Question 7 sought to build upon Interview Question 6 in understanding how the agencies analyze their data that have been collected by first responders and utilized within the agency to effectively critique their current drowning prevention

program. The Haddon Matrix has morphed into an essential tool for injury prevention specialists as one of its features is its ability to construct injury prevention ideas of several types. The two features of the framework are the design technique for understanding the cause of injuries and the countermeasures that can reduce the consequence of the incident (Runyan, 1998). The intent of Interview Question 7 clarifies whether the participating agencies are effectively using the data that are acquired by first responders to evaluate their current data collection process and develop criteria that can validate their current drowning prevention programs against the three dimensions (pre-event, event, and post-event) of the Haddon Matrix.

Represented in Table 15 are the statements from the participants. The responses from the participants indicate more funding is needed from policymakers in support of creating increased public awareness for drowning through a number of prevention instruments (e.g., water watcher tags). Some organizations report the ability to have internal research and epidemiology departments assist in creating illustrative data reports addressing specific issues that can be distributed to stakeholders and the public. There was discussion that the data can be better used and acknowledgement that there are identified gaps in reporting. It was also noted that there was no exact reporting system for drowning like that for other major public health issues.

The overall theme for Interview Question 7 is that while some organizations have internal departments that can assist with categorizing quantitative data, there are other agencies that require more funding to develop consistent drowning prevention programs that can be delivered to the community. An underlying tone acknowledges that there are identified gaps in reporting that can hinder the progress of accurate data collection.



Table 15

*Interview Question 7*

HM/UG	RQ	IR
H.M. event	2	<p>So, whatever stands out that looks relevant is what's pulled from the data. And then we know what to focus on for our prevention efforts, too, trying to get different areas involved, and more prevention strategies, or provide more swimming lessons to kids in those areas if we can, depending on what is extracted.</p> <p>One, it could be better used in our organization.</p> <p>So, I think that we're looking at implementing it in a little different way, as we realize what we're missing and where the gaps are.</p>
U.G. disposition	1	<p>We take it and we break it down into many different forms so there's an age breakdown, what happened whether it was a pool drowning, lake, body of water.</p> <p>So, we try and breakdown all the factors related to drowning and put it together in a report and then see trends.</p> <p>So, we use that data to tailor our approach to education.</p>
U.G. scene information	1	<p>We have a research unit, so they have the agreement with the state to get those data released if not publicly available data.</p> <p>This is a big deal to me, so I realize I doesn't fit the form and all that other stuff, but that's why this is such a big deal to me, is like we need to have consistent reporting.</p> <p>I don't have a system for drowning, and so that's why as me, just little ole me, I'm trying to create this system so we have consistent reporting to the public and so we can use that for surveillance, for planning and response.</p> <p>We do want to share that very widely because I think it's helpful when policymakers, decisionmakers and just everyday folks can understand what the problem looks like. It's hard to take action when it's not a data-driven process.</p>
H.M. post-event	2	<p>It gets sent to the board of supervisors. It gets sent to all of our board members. It gets sent to the battalion chiefs and executive management. They're all looking at this and then if there's a trend especially if say it's an area where we need to add another language.</p>

Table 15 (continued)

HM/UG	RQ	IR
U.G. disposition	1	<p>Well we have our epidemiology department, and so they put together this.</p> <p>And so, when I first started it hadn't been updated in a while, so when I got on board that was the last time they had updated it was 2015. And so, they will take all the information and be able to put it in those graphs. They do the ages, and they break it down where the incident occurs, or they can break it down by time of day. And so, they put together these briefs for us to distribute.</p>
U.G. scene information	1	<p>And one of the key findings is we found 50/50 owned to rented, most of the young. . . . All of the kids under 14, it's in a pool, in ground pool. The older ones, they're all ocean. And 50% of them, of the children, birth to 14, it was lapse in supervision.</p> <p>It's mostly out in the community how we use that because that's what's going to make the difference.</p> <p>We've appealed to the county board of supervisors to fund additional water watcher tags and public awareness with supervision being one of the key factors in mitigating drownings.</p>
U.G. disposition	1	<p>We analyze all provider impressions for anything out of the ordinary. We don't have any specific analysis we do for drowning, but we analyze all provider impressions, but there's dozens and dozens and dozens of provider impressions that get analyzed just kind of as a group. We do provide drowning-related statistics to several community partners, as I said before, to do drowning prevention.</p>

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

### **Interview Question 8**

*Does your agency forward the results of the analyzed data to another department, agency, policymaker?*

Interview Question 8 sought to understand whether the analyzed data for the participating agencies are disseminated to other agencies as special request or are

automatically developed into a report that is available online. Partnering with affiliates who share the same goal of reducing drowning incidents is an effective approach to keeping the drowning message at the forefront in public awareness. The partnership between the United States Lifesaving Association with National Oceanic and Atmospheric Administration (NOAA) National Weather Service and National Sea Grant Program is an excellent example whereby joining forces can raise public awareness of rip currents (ILS, 2015). The intent of Interview Question 8 was to gain a better understanding of how analyzed data are released to stakeholders, policymakers, advocacy groups, public health agencies, and other special interest's groups as part of a collaborative effort to decrease the number of drownings annually. The collaborative efforts put forth by participating agencies through effective partnerships will promote the effectiveness of drowning prevention programs as reliable data can support preventative drowning strategies throughout.

Represented in Table 16 are the statements from the participants. The responses from the participants indicated that although analyzed data are forwarded to administrators and drowning coalition advocates, there are no automatic disbursements of the quantitative data to external agents unless specifically requested. There was also discussion that distribution of data could be improved in order to create a conversation with other coalition advocates in an effort to reduce the potential of duplicating preventative efforts.

The overall theme for Interview Question 8 is the increased development for collaborative efforts by all drowning prevention coalition advocates in order to reduce the potential for duplicate efforts when funding is often limited. The advancement of

drowning prevention measures is reliant on research efforts by those who have internal departments that can assist.

Table 16

*Interview Question 8*

HM/UG	RQ	IR
H.M. pre-event	2	We forward all of our ED hospitalization and fatality to the county.
H.M. pre-event	2	That’s something that I definitely . . . I think we could do better at, is getting that information out to who it needs to go to.  So, as soon as it comes in we’ll update our records and everything, but pretty much any other agency, especially First 5 when they ask for it, we’ll try and keep it up to date as best as we can. But it really depends on the other agency’s needs, or a news reporter or something.
H.M. pre-event	2	It goes to the county. So, we are collecting the stats for the county.  Right, it goes to the Drowning Coalition. And then, it gets spread out for other organizations that use it. Some of the hospitals use it.
H.M. pre-EMS scene information	2	So, on the taskforce luckily is a really diverse group with all the same interest in drowning. And they get a copy.
H.M. event	2	We do want to share that very widely because I think it’s helpful when policymakers, decision makers and just everyday folks can understand what the problem looks like. It’s hard to take action when it’s not a data-driven process.
H.M. event	2	We have been involved in policy peripherally.  So, it’s just one of those things where, sometimes we don’t even know who’s working on certain issues, and obviously, blending those efforts would make a huge difference.
U.G. scene information	1	So, policy there. But as far as reporting out to other agencies, we’re glad to share information, but we don’t as a matter of course, report out to any other agencies other than just through the coalition meetings at the drowning prevention portion every month.  I mean, again, it’s community partners, and with anything out of the ordinary with drowning, we would take action, but we’re in such a transition year for data collection right now that we haven’t really looked at it in the last couple of years.

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

## **Interview Question 9**

*Does your agency develop any policies or programs directed at adolescent drowning prevention? If so, what types?*

Interview Question 9 sought to understand the policy and program implementation that participating agencies have developed based on the analyzed data from drowning incidents. The effectiveness of policies and procedures within a drowning prevention program can be easily identified as beneficial when played out in a variety of scenarios. The Haddon Matrix has the ability to assist public health agencies in preparation of large-scale incidents as compared to the drowning issue (Barnett et al., 2005). The intent of Interview Question 9 was to gain a better understanding of the policies and programs that have been created based on the data findings in support of proactive drowning prevention policies and programs.

Represented in Table 17 are the statements from the participants. The responses from the participants suggest that there are major issues surrounding the physical drowning environment-injury scene when attempting to initiate drowning prevention measures. There are some physical environments that are difficult in which to implement protective barriers based on sheer size of the location. There was a dichotomy between drowning prevention measures aimed at adolescents against no policy or specific program implemented. The focus is on children 5 and under. There was an agency that had the opportunity to push their drowning prevention message on a local television channel.

The overall theme for Interview Question 9 illustrates that there are physical drowning environments that cannot be secured with barriers based on the sheer

magnitude of the area. There was also a clear delineation between organizations that have public education programs aimed at adolescents and those that do not offer specific drowning prevention programs.

Table 17

*Interview Question 9*

HM/UG	RQ	IR
U.G. scene information	1	<p>Not specifically. Certainly, there have been some incidences where we would like to do that, or we would be interested.</p> <p>Because it's managed by the California Waterway and Aqueduct.</p> <p>I don't know, I looked it up. And it's at a state level, so it's not like I'm going to be able just to call and say, "Hey, what's going on?"</p>
U.G. disposition	1	<p>We mostly do education programs toward adolescent drownings. So, we've gone into schools that let us do drowning prevention presentations. We push it out through social media. And our main target is the adolescent drowning versus adults or seniors.</p>
H.M. pre-event	2	<p>Yeah, the water watcher tags. So, we stress that. And then also, swim with a buddy. And then, they do filler shows late at night and so forth. And that's what we talked about, drowning, because they have a lot of pools in the community and they're just encouraging their residents to at least have somebody there by the pool, sitting there.</p>
U.G. disposition	1	<p>At this current time, we have not developed any policies of programs directed at adolescent drowning prevention.</p>
H.M. pre-event	2	<p>We support our community partners in their efforts.</p>

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

## **Interview Question 10**

*Does your agency review drowning statistics, policies, strategies from other agencies, states, or countries? Does your agency share the collected data with any other agency and/or group?*

Interview Question 10 sought to recognize the efforts made by the agencies to broaden their drowning prevention programs through comparison with agencies that are similar in demographics, data collection and reporting systems, environment, and population. Agency partnerships are the embryotic stage for developing strong national and international advocacy groups for the larger framework at the global level in order to reduce drowning (ILS, 2014)

The intent of the interview question sought to determine how data were shared with those particular regions in support of drowning prevention programming. Drowning is a complex event that requires the input and assistance of many resources from the outset to disposition of an incident. The sharing of comprehensive data can benefit *all* who seek to aggressively pursue drowning prevention strategies for their communities.

Represented in Table 18 are the statements from the participants. The responses from the participants have addressed a number of key aspects with regard to quantitative data based on drowning. There is indication that a collaborative effort has been put forward to see the differences in quantitative data while acknowledging that there is minimal support from the public health department, which could hamper efforts to collect accurate data going forward. The issue on sharing drowning statistics is upon request only by some organizations. Agencies are making the attempt to capture effective drowning prevention strategies that are being implemented by other states and coalitions.

Table 18

*Interview Question 10*

HM/UG	RQ	IR
U.G. scene information	1	<p>We don't regularly get numbers from anybody other than Thomasville. But certainly, our numbers are not as accurate as theirs because of the way their system works.</p> <p>Again, as I mentioned, our public health department has not been as supportive with this issue, so I wonder if there are indeed some politics involved with that. And I don't know that that's the case, but it's possible.</p>
H.M. event	2	<p>We don't collect data.</p> <p>Well, to look at programs and policies, definitely.</p>
H.M. event	2	<p>We do a lot of other states and agencies to see what they're doing.</p> <p>We have shared so far with just cities that ask for it. As we've grown, we've gotten more interest from other city's departments and we'll share it if they ask for it.</p>
H.M. pre-event	2	<p>Yeah, so we share with any agency that requests.</p> <p>We do look at the different areas.</p> <p>And so, we're near the highest on fatal drownings in the area. And that's why we've pushed this for so many years.</p>
H.M. pre-event	2	<p>Our agency reviews drowning statistics and strategies from Safe Kids World Wide.</p> <p>We share our data among other internal public health departments, first responding agencies, and local media upon request.</p>
H.M. pre-event	2	<p>No. We do an annual report to the community.</p> <p>And so, we report out on the drownings that we see, fatal and nonfatal. So, we do that annually and the public is welcome to attend.</p>
U.G. scene information	1	<p>No.</p>

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.



There is an inclination to look at other agencies and their policies. The internal workforce of drowning prevention coalitions provides the opportunity to review quantitative data and strategies at the global level.

The overall theme for Interview Question 10 is the collaborative efforts that are created by effective partnerships. Working across sector lines provides organizations the ability to disseminate the same message even when there is lack of support from a home agency. The conscious effort to step out of the silo and review what other states and agencies are doing are clearly effective measures with minimal financial costs.

### **Interview Question 11**

*How does your agency validate the data? Do you feel there any deficiencies within this data collection process?*

Interview Question 11 sought to recognize the efforts put forth by participating agencies in validating the data collected based on drowning incidents. The second question was specifically aimed at the data collection process and potential for deficiencies. Combating the public health issue of drowning requires that the quantity and quality of collected data are constantly improved upon, and unfortunately, many countries around the world find this goal hard to achieve (ILS, 2007). The intent of Interview Question 11 was to hear first-hand from the agency representatives of the deficiencies in the data collection process that paralleled the data elements from the Utstein-style guidelines for reporting drownings. Valid and comprehensive data can effectively boost current programs. In order to develop legitimate data, agencies should develop protocols that are supported by internationally accepted drowning reporting guidelines.

Represented in Table 19 are the statements from the participants. The response from the participants yielded an overarching belief that the data collection system is prone to error. There are opportunities for inconsistent reporting, and those responsible to complete the form do not fully understand the significance for each data element on the submersion form. The perspective for collecting data between fire and police can dictate what data are collected. Oftentimes a fatal or nonfatal drowning does not paint a clear picture of what happened at the scene. With all the efficiencies that electronic reporting offers, there are still some inherent flaws within the system. Paramedics responding to such incidents have improved the reliability for data reporting as well as follow-up investigations. Unreliable data are a complex problem and come from a number of areas including lack of compliance for reporting by the fire service, lack of accurate information to dispatchers, or self-transport of victim by family.

The overall theme for Interview Question 11 is multifaceted in regard to the complexities that surround drowning incidents. The scene is chaotic and decision making can be hampered. The accuracy of collecting data at the scene requires trained personnel who can see the entire picture and then be supported with a follow-up investigation by a trained investigator. Educating public safety agencies as to the importance of each data element is crucial to developing a complete understanding for collecting at scene data information.

Table 19

*Interview Question 11*

HM/UG	RQ	IR
U.G. victim information	1	<p>But certainly, there's room for error. We definitely know there's room for error. People who are filling out the forms sometimes don't seem to have a clear understanding of what some of the areas mean.</p> <p>I think that's just based on what the focus of that person or those people are. Fire is going to be dealing with the medical end, and law enforcement's going to be dealing with the environmental end, mostly, and the issue that led up to it.</p> <p>But sometimes, some of the information is a little erroneous.</p> <p>There's knowledge in knowing that there was a nonfatal submersion or a fatal submersion, but that's very limiting.</p> <p>So, I think that's really one of the bigger deficiencies, as well as the other that I mentioned.</p>
U.G. victim information	1	<p>Do I feel that there's deficiencies? Yes. So, in terms of validating it, so again, why I'm really relying on the state data because that validation system is very robust.</p> <p>Again, it's a paper form. It's relying on people filling it out and I think that that's challenging,</p> <p>So, one of the things too that's really important to public health is to not replicate what somebody else is doing and create competition.</p>
U.G. victim information	1	<p>We follow up with the coroner too to see that the data is valid. We follow up with the fire agencies. Is it the best approach? I think we can do better. But so far, it's what we've been working with.</p> <p>Yes, there is definitely deficiencies and like I mentioned before, we're working to correct them.</p> <p>So, we're not able to gather the people who they pulled their 2-year old out of the water and immediately drove to the hospital themselves.</p> <p>But again too, we're just relying on outside fire agencies providing us with their data. So, could they miss a call or two? Of course, absolutely.</p>
U.G. pre-EMS scene information	1	<p>Where there is a lapse is if it comes into dispatch as a 911 hang up or an unconscious person or a respiratory.</p> <p>We're much better now because the paramedic doing the form,</p> <p>But again, it's garbage in, garbage out if the person doing the report doesn't click on that, that gets lost.</p> <p>There are some flaws. We are getting better.</p>

Table 19 (continued)

HM/UG	RQ	IR
U.G. scene information	1	<p>And so, I do notice that when they fill out the SIRF reports that there could be information that's incomplete, they didn't fill it all the way out, or it's just conflicting as far as what the activity was before the child got to the water . . .</p> <p>So that is an interesting, and a struggle that I see.</p> <p>That, okay, there's not stuff always consistent, the reporting.</p>
U.G. scene information	1	<p>In terms of the Safe Kids and our submersion report form, again, we're working closely with the fire chiefs across the county to have them make it mandatory that they submit submersion reporting form but as I mentioned earlier, the reporting is less than 10%.</p>
U.G. disposition	1	<p>Well, we validate our prehospital data in general, and that's a part of our prehospital data collection system.</p> <p>Well, sure. . . . There's a lot of specific data that gets collected specifically for drowning that we don't collect just because we're just using our prehospital care record and not a specific form.</p>

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

### Interview Question 12

*What are the current drowning prevention strategies utilized by your agency today? How long have they been in place? Do you have evidence-based data that reveals these programs as successful?*

Interview Question 12 sought to explore the length of time that drowning prevention strategies have been instituted by the participating agencies and whether evidence-based data support the effectiveness of the programs. The continuance of reliable data collecting can direct agency resources in developing effective prevention strategies aimed at the real issues within the population (ILS, 2007). The intent of Interview Question 12 was to analyze the evidence-based strategies that agencies are

using to reduce the number of drownings in their region, and how long they have been implemented for.

Represented in Table 20 are the statements from the participants. The responses from the participants have revealed that the data identified particular cities with a drowning issue, and the data also provided the opportunity to address the issues with target drowning prevention programming. The data also revealed that a pool party atmosphere can promote complacency among adults. Program agents need to make a concerted effort in getting their message through to the public. Drowning coalitions have made it a point to validate their curriculum and strategies. Trends surrounding drowning incidents drive the media campaigns. Although internal and external partnerships in the drowning community have provided opportunities to grow drowning prevention programming, funding still impedes the ability to outsource specific drowning prevention programs.

The overall theme for Interview Question 12 is that data can reveal trends in drowning, thus allowing agencies and coalitions to address these issues with specific drowning prevention programming. There is a distinct difference in that public agencies have difficulty in validating their drowning prevention programs as opposed to external coalitions who have already taken the first-step to do so. An essential component of getting the message out is through collaborative efforts and effective partnerships in order to reduce agencies having to rely on internal funding.

Table 20

Interview Question 12

HM/UG	RQ	IR
U.G. disposition	1	<p>We've got to practice what we preach. We've got to walk the walk. So that's the basic thing that we can interface with families. But we try to make it fun and interactive, too. We don't just want to talk at people.</p> <p>I would say, yes. I think Safe Kids Worldwide is really good about validating the curriculum and the strategies we use to inform.</p>
U.G. disposition	1	<p>So, we've worked with them to specifically target the residents in their cities, Moab especially because when we looked at our data, they had the highest number of drownings outside of certain cities, Also, with our data, we noticed that a lot of drownings were happening at pool parties, barbecues. There's so many adults around, everyone assumes someone else is watching.</p> <p>Right now, we're just working on our statistics. So, since that program's been in place, specifically in Moab, they have gone down every year.</p> <p>But I'd really like to get a sample target survey out there to see if it's working or not. See if the data supports what we're actually doing.</p>
U.G. disposition	1	<p>So, we've told everybody that our numbers are going to continue to go up because we're more accurate. But our numbers might continue to go up on the nonfatal</p> <p>And so, there was a few years back that we had 53, 53, 52 fatal drownings in a year and this year we had 42.</p> <p>We are finding that the numbers of our fatal drownings are going down. So, we believe that we are making a difference.</p>
H.M. pre-event	2	<p>And last time we got funding there's not only the education side, but we were able to provide swim lessons for infants and for older children.</p> <p>So, we had a contractor, because we, public health, we don't provide swim lessons.</p> <p>Our main strategy for all of our programs, including drowning prevention, is by means of health education/promotion. We utilize the Consumer Product Safety Commission's Pool Safely campaign.</p> <p>Since we rely on grant funding for all of our programs, we have not been able to provide drowning prevention education consistently throughout, thus not allowing us to gather enough data to determine if the program is successful.</p>

Table 20 (continued)

HM/UG	RQ	IR
H.M. pre-event	2	<p>We do media campaigns. We do programmatic programs pending on what's trending.</p> <p>We also work with Board of Supervisors to fund water watcher tags and banners with slogans on them to raise awareness about drownings.</p> <p>Recently, two taskforces within Safe Kids have joined together with realtors to educate them about window safety and new barrier law.</p>

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

### **Interview Question 13**

*What is your understanding of drowning prevention strategies that are aimed at reducing drowning deaths?*

Interview Question 13 sought to examine the phenomenological experiences of the participant in developing drowning prevention strategies and the impact they can have on reducing fatal drownings in their region. Interventional strategies have unmasked their importance as systematic, substantial, sustained, and service linked. This approach aimed at drowning prevention strategies will build momentum for equality while expanding the network at the national and regional level (ILS, 2015). The intent of Interview Question 13 was to probe the knowledge of the participant as it relates to critical drowning prevention programs. Represented in Table 21 are the statements from the participants.

Table 21

*Interview Question 13*

HM/UG	RQ	IR
H.M. event	2	<p>My understanding is that people don't think it's going to happen to them.</p> <p>"I just tell my kid, 'Don't go near the water without me there,'" or whatever their answer is. I've heard a lot over the years. So, for me, I think that is the hardest part of informing.</p> <p>Yet, if you talk to a group of 10 people, at least two of them are going to have their own near-miss story, whether it was themselves or in their childhood.</p>
H.M. event	2	<p>Well I think it is and we know that through the data, but I think you know to really eliminate the drowning deaths it depends on the body of water and it depends on the target population.</p>
H.M. pre-event	2	<p>And the culture that we're trying to change is it happens to good people, good parents, all classes, socioeconomic groups. It's not just the bad parents who don't care about their kids. This happens to everyone.</p>
U.G. disposition	1	<p>Well, that same year, just in our jurisdiction would be the same, we had 53. I think it was 53 fatal drownings. And so, there was board members that because it happened in their cities that said we need to address this.</p> <p>But we need to have more education on drowning.</p>
H.M. pre-event	2	<p>The best way to reduce drowning is through the following:</p> <ul style="list-style-type: none"> <li>• Reduced exposure to water hazards through use of barriers</li> <li>• Close and capable adult supervision for young children</li> <li>• Improved swimming and water safety skills</li> </ul>
H.M. pre-event	2	<p>I think when you do education, you're often preaching to the choir. I think it's hard to reach those that need to be reached most. But you can send them information whether they read it or implement it, it's hard to quantify. But that's a lot of policy and it's hard to implement that level of policy. It's even hard to implement the new barrier law. It's a tough nut to crack.</p>

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.



#### **Interview Question 14**

*Does your job title provide you the ability to modify or make recommendations to your current drowning data collection form? If so, have you or would you?*

Interview Question 14 sought to define the participant's role in relation to modifying the current submersion form as a means to improve efficiency for collecting specific data elements for the region. The intent of the question was to gauge the capacity of the participant for making changes to further develop the submersion form.

Represented in Table 22 are the statements from the participants. The response from the participants asserted their stance in modifying their submersion form to improve data collection efficiencies. Simply having the ability to modify the form is greatly enhanced when it is done through a collaborative approach for those affected. The personal experiences of the participants helped them to identify where the vulnerabilities are within their submersion form e.g., pool environments. The appeal for developing a comprehensive submersion form can be seen in an attempt to gather data based on disposition of the victim from the hospital. Knowing what the priorities and goals for the agency consist of can provide a vision for the workers who manage the drowning prevention programs. Program coordinators can be hindered by a lack of funding and personnel when grant funding is specific to the topic. Regardless of the economic issues, workers are doing their best to ensure that drowning statistics stay current.

Table 22

*Interview Question 14*

HM/UG	RQ	IR
H.M. pre-event	2	<p>Yeah. I don't know that it's specifically my job. . . . It's just one of those things that I would never do without collaborating with Thomasville, because we want our forms to be the same. It works well for us.</p> <p>And we said, "Okay, how are we going to make this easier to understand for people filling out the form?" We did that in conjunction with one another and agreed to make that change.</p>
U.G. scene information	1	<p>I do have that ability. I have that ability to influence, which is what I aim to do. I'm not in a position to mandate anybody does anything, which would be incredibly inappropriate considering my role.</p> <p>I definitely have the power to influence and I've been using that ability by bringing together folks that don't normally talk to teach other, that are all part of the data puzzle.</p>
U.G. scene information	1	<p>Yes. So, it gives me the opportunity to change that. I definitely think it needs changes. It's really great at breaking down every drowning call as far as the certain conditions surrounding that call.</p> <p>I would just like to get more of the backend data which I think we're getting with the hospitals and with the walk-ins to the ER and see what that looks like. And there, see if there's any modifications we can make after that.</p>
U.G. scene information	1	<p>So, when we first got these forms, we had the breakdowns of ages, but I suggested, I went to John and I said look how many are 50 years and older. So now there is a little box that says is incident involving 50 years or older?</p> <p>And then, we also last year we added this. So, the backyard pool/spa versus community pool or spa so we could break that down. As well as bathtub. See, we have a bucket, fountain, puddles.</p>
H.M. pre-event	2	<p>Yeah, it does allow me, and yes, I definitely would. And it's just hard to . . .</p> <p>Like I already mentioned, with grant funding it's so hard to work outside of things that we're not directly funded for if that makes sense.</p> <p>We're still trying to collect, but to go out and to be able to do more in the community we need funding. We need bodies. We need staff time to dedicate to really look into the data and look into the prevention strategies.</p>

Table 22 (continued)

HM/UG	RQ	IR
H.M. pre-event (continued)		<p>Because according to our funding this isn't our priority, but it's injury prevention. It is obviously one of our priorities.</p> <p>So, us as injury prevention still have to keep track of this and make sure everything runs as smoothly as it can, but then because we don't have actual dedicated time for it then it makes it difficult.</p> <p>Yeah, I think we do the best that we can to make sure everything's up to date even if we don't have grant funding.</p>
U.G. victim information	1	<p>Oh yeah. I currently changed it so we increased the age range. And then, we're also going to add a couple of questions regarding alcohol use or intoxication because we're now looking at adults.</p> <p>It had been birth to 14. And then, we added categories that you'll see here in 5-year increments going up to age 80.</p>
U.G. scene information	1	<p>If we had one, yes. We looked at doing a form a couple years ago, and it's one of those things that, we put it together, we took somebody else's form, we modified it for Andrew Town, and then it's one of those where we just didn't have the resources to keep going, and it kind of just fell off the table.</p>

Note. H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

The overall theme for Interview Question 14 is centered on getting those agents who have the ability to enhance their submersion forms together and make the changes through a collaborative approach. A focus on drowning reductions is accomplished when agencies cross sector lines and work together. The organizational goals should address the priorities that revolve around drowning prevention strategies in order to guide workers in program planning. Lack of funding can impede the progress of drowning prevention programs, but the desire to make it work is seen when workers have a passion for their job.

### **Interview Question 15**

*If you could remove/add a section or category on your drowning data collection form, which would it be? Why?*

Interview Question 15 sought to examine the pursuit of the participant to make valid changes to the submersion form in order to further develop the submersion form for accuracy. The intent of the question was to gain an insight from the participant on the need to make-adjustments on the submersion form.

Represented in Table 23 are the statements from the participants. The response from the participants suggests that adding specific data elements to the submersion form can build a broader database for targeting specific issues. In support of this argument is the feeling by participants that outdated data elements may not be getting captured by those making the reports, nor are they needed. Collecting data for the purpose just to have statistics is also counterproductive if they are not going to advance the drowning prevention program. The data elements on the submersion form can also give a broad picture for a complex emergency scene for first responders. Since the addition of electronic submissions, there has been an increase of good information and this type of data can help agencies focus their programs where they are needed most.

The overall theme for Interview Question 15 is the constant adaptation of the submersion reporting form to stay current with trending issues related to drowning. It is suggested that some data elements can become outdated and inhibit the ability to develop a comprehensive submersion form that addresses the drowning issues within the

Table 23

*Interview Question 15*

HM/UG	RQ	IR
U.G. scene information	1	<p>I would. . . . One of the areas that I would like to expand on, but I don't want it to be more than one page, but I would like the narrative part to be a little longer.</p> <p>I think a couple parts of the form that are always unknown is when the pool is built, and there was a reason, a method behind that madness, but I don't know that we're capturing that at all. So, I don't know that that's helpful.</p> <p>I was glad that we did add pool party in progress.</p> <p>I think that . . . also, one of the questions that doesn't often get answered is, "Did the person have swimming lessons?"</p>
U.G. scene information	1	<p>Oh, I would probably remove a lot. Yeah, I would probably remove everything that's not actionable.</p> <p>You know, because again, first responders, they got to respond and so some of these forms that I've seen, there's a lot of stuff that we're asking about that in the end we're not going to do anything about.</p> <p>Unless the data are actionable, data for data's sake I don't think is incredibly helpful.</p>
U.G. scene information	1	<p>I don't think so. I think it's all important looking at the entire picture.</p> <p>And since then, we actually just added within the last couple months, whether it was a lapse in supervision, were they already in the water, kind of those things.</p>
U.G. scene information	1	<p>Well I don't think we want remove anything because like the bathtubs, the pool, the lake, the bucket, all of that has occurred and we're able to say that we haven't had any of these.</p>
U.G. scene information	1	<p>So personally, I think there's so much information on that form that can be extracted, and it's like, "Well, here's how many households don't have any barriers," and this versus supervision.</p> <p>But going to electronic definitely really give us good information, because of that ability to . . . Because the narrative section before was just like . . . That's nothing.</p> <p>A lot of times not all the information can be provided, because it is an emergency incident. It depends on who's taking the information. And we find a lot of times they'll mark NA, NA, they weren't sure.</p>

Table 23 (continued)

HM/UG	RQ	IR
U.G. scene information	1	<p>Because I think our form as it is now, it has a lot of details and the people who are filling them out aren't filling out every detail. It's not necessary.</p> <p>But when we look at what we would mitigate, I'm interested in was there a barrier in place? No. Is that going to make us change how much we enforce barriers? Yes.</p> <p>But I think what we can really affect more is the barrier and the supervision.</p>

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

community. A well-designed submersion form that allows first responders the ability to capture core data that can easily be submitted electronically will greatly advance the data collection process.

### **Interview Question 16**

*Do you feel that current drowning prevention controls are adequate enough to reduce the number of adolescent drownings annually in your jurisdiction? Why do you feel this way?*

Interview Question 16 sought to explore the participants disposition and further develop drowning prevention controls that can reduce the number of child drownings annually in the region. The intent of the question was to understand how the participant feels about the current prevention controls and how they could be further developed.

Represented in Table 24 are the statements from the participants. The response from the participants suggests that the progress that has been made to improve drowning prevention programming is still in need of further development. The high quality of data

Table 24

*Interview Question 16*

HM/UG	RQ	IR
U.G. post-event	1	<p>No, I don't. I don't see the numbers shifting for any age group. I think that we have years, that for whatever reason, are worse for adolescents, as far as drowning deaths.</p> <p>So, I don't. I feel like our number would be looking a lot better if we were doing what is meaningful to make that difference.</p> <p>We're missing it somewhere. But we're still working on trying to figure out what that is, because this is . . .</p> <p>This is something that is so preventable, and that's what's really hard about this specific topic.</p>
H.M. event	2	<p>I don't. I mean I think, again, we're making great strides and the problem is getting better, but I think perceived susceptibility is challenging.</p> <p>We've focused, through the task force, we've primarily focused on little kids and older adults, so you even bring up adolescents and that's not really an area that we've targeted a great deal.</p>
U.G. scene information	1	<p>I think we can do better.</p> <p>It's just getting people to listen. And it's still early. It's been 3 years but the first year was really about gathering data, what we can do.</p> <p>And I think as we're getting momentum, that more people are seeing the importance of it. But I think we can still do better.</p>
H.M. event	2	<p>Well you see it in adolescents.</p> <p>We might have nonfatal, but the fatals are small compared to our total numbers, unless you were going to point something out. And then we're like oh. And that's how it is. It's usually it's somebody really looking closely and saying hey we need to key in on this.</p>
U.G. pre-EMS scene information	1	<p>Yeah, I think there's more that we can do. I just . . . I'm just kind of in a place right now. I don't know what do.</p> <p>Lack of funding is definitely limiting. Well, it's nonexistent right now.</p>

Table 24 (continued)

HM/UG	RQ	IR
U.G. pre-EMS scene information (continued)	1	<p>And so, considering that we have less than 20 staff that are out in the fields, and we have so many other programs too, it's very limited what we actually do without the appropriate funding to dedicate that time.</p> <p>We would love to dedicate time to constantly improving our curriculums, and our methods and our strategies, but we don't.</p>
U.G. scene information	1	<p>I think we've got a lot of great people going out to as many community events to raise awareness.</p> <p>Because a lot of times, a lifeguard will make a recommendation that the child go to the emergency room but the parent fails to adhere. And I don't think all of those are reported. There's no system to report what lifeguards report.</p>
U.G. scene information	1	<p>The laws need to be tougher.</p>

Note. H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

has proven to be beneficial for supporting some drowning prevention programs, yet the numbers surrounding drownings have not decreased proportionately. There is a mutual feeling that agencies are missing an important element and that is why they keep forging on to deliver the message to the public that drowning is preventable. Proper funding for public health programs is what drives productivity, and developing effective reporting systems aimed at the entire alliance responsible for reporting drowning incidents can validate the data.

The overall theme for Interview Question 15 is that the data collection is not moving the needle to support the reduction of drowning incidents that are being recorded. The opinion of the group was that there is a missing element that needs to be identified if



drownings within the community are to be reduced. Developing consistent reporting systems is essential in order to close the gaps in data collection.

### **Interview Question 17**

*What is your budget for drowning prevention? Are there any agency-funded programs that provide swimming lessons and/or lifesaving skills for children, specifically those underserved and/or at risk?*

Interview Question 17 sought to explore the financial means the agency has at its discretion in developing drowning prevention programs. The question continues to explore whether there are swimming lessons provided by the agency for those children who are marginalized economically. The intent of these two questions was to explore the specific funding dedicated to their specific drowning prevention program in order to host free swim lessons for those affected economically, surveillance campaigns, and media ads in support of four-sided barriers around pools.

Represented in Table 25 are the statements from the participants. The response from participants was that the drowning prevention programs sponsored by their regions have not dedicated a specific dollar amount to their budget to fund the program. This type of action has swayed program coordinators to develop vital partnerships with those organizations that can assist in delivering the same consistent message. Expanding drowning prevention interventions is essential to the success of any program, especially those that lack proper funding. The efficiency of program coordinators is demonstrated through their ability to outsource specific services such as swim lessons while reaching as many children as possible.

Table 25

*Interview Question 17*

HM/UG	RQ	IR
U.G. disposition	1	<p>I don't really have a budget. Now that being said, here's how I want to qualify that. If I need something, I'm never told that I can't do it.</p> <p>So, I try to be a good fiduciary of the funding that I get through this program, but I don't really have a budget, per se.</p> <p>But typically, unless there's a grant, I don't know that that happens in our communities very often.</p>
U.G. disposition	1	<p>When I started this activity, I had zero budget, so for the campaign we asked cities for money and so then we as a county have matched those donations dollar for dollar.</p> <p>The Red Cross has those programs. So again, we're not looking to duplicate effort with other organizations.</p>
U.G. disposition	1	<p>Through Jamestown, my budget is really not set. It's whatever my section can provide as well as each division chief in their cities are willing to budget based on the need that they see.</p> <p>So, 2 years ago, we actually partnered one of the swim schools and through a grant we were able to subsidize some of the cost of swim lessons.</p> <p>We're still in the process of distributing those to low-income communities, children who can't swim, to at least wear a life vest if you can't swim and before you go into the water.</p>
H.M. pre-event	2	<p>Okay so we've done a few over the years where we have a partnership.</p>
H.M. pre-event	2	<p>No. When we had big funding, that \$200,000 grant then we had contracted to be able to refer families to that, but right now we don't.</p>
U.G. disposition	1	<p>Zero.</p> <p>Yeah. Occasionally, we'll get some funding. We got \$5,000 of funding for water watcher tags 2 years ago.</p>
U.G. disposition	1	<p>Zero</p>

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

The overall theme for Interview Question 17 suggests that funding is vital to program development and the delivery of essential drowning prevention programs throughout the community. Program directors continue to actively pursue partnerships external to their organization in order to bring awareness to drowning issues. Grant funding can be a great force multiplier, but it is only allocated for specific use when it is made available.

### **Interview Question 18**

*What strategies are in place to increase access and participation for those at risk?*

Interview Question 18 sought to understand the strategies that the agency has enacted in support of providing access for children who are *at risk* to attend swim lessons through transportation provided by the agency. The intent of this question was to explore the options provided by the agency based on transportation needs by children to attend drowning prevention programs that are outside of their neighborhoods.

Represented in Table 26 are the statements from the participants. The response from participants suggest that the drowning prevention strategies for those most *at risk* are just not enough. It is recognized that there are successful programs throughout the country in support of drowning prevention, but in California there are just not enough programs available. There is an understanding that promoting the services of other agencies can help reach the population that live in underserved communities.

Partnerships are just one dimension that can support funding for swim lessons in those marginalized areas in the region. The use of agency websites can be an effective tool to educate parents on the importance of watching their children around open water.

Table 26

*Interview Question 18*

HM/UG	RQ	IR
H.M. pre-event	2	<p>Well, not enough, quite frankly.</p> <p>So, we know that these things exist in the country, but locally here, I don't think that we have enough of those opportunities.</p> <p>But as far as local, ongoing basis kinds of things, I don't think that there's enough.</p>
H.M. event	2	<p>So, a couple things. One is definitely promoting the services that are available through the Red Cross, and it's something we've talked about more is like how to make sure that we're promoting swim lessons...</p>
H.M. pre-event	2	<p>So right now, we have identified underserved communities.</p> <p>So, we try to really target those underserved communities as well that might not get the information because they can't speak the language. And then, we're looking into partnering again for those swim lessons, offering free swim lessons to those communities.</p>
U.G. scene information	1	<p>Basically, the kids go off and play and so we try to encourage them you have to watch your children because children are drawn to the water, water is playtime for them, they think it's fun.</p>
H.M. pre-event	2	<p>We use our website with our collation website to put information on there about access to free lessons, or low-cost lessons, because the community will call and ask about, "Do you know of any free lessons, or low cost?"</p> <p>Thomasville</p>
H.M. pre-event	2	<p>We don't have nothing, no.</p>

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

The overall theme for Interview Question 18 evokes the need to further develop drowning prevention strategies for those in underserved communities. The feeling that

more can be done in delivering essential drowning prevention programming to this portion of the population is key. One aspect is to show support for those organizations that are available to deliver the same critical message. Modern information technology is also another tool that agencies can capitalize on when reaching out to deliver essential drowning prevention information to families with children.

### **Interview Question 19**

*What do you feel is the biggest hurdle that impedes your agency to develop an evidence-based drowning prevention strategy aimed at reducing all drownings in general?*

Interview Question 19 sought to discover what the participant feels is the major challenge that impedes the progress of developing a drowning prevention program that can reduce the number of drowning incidents within the region. The intent of the question was to gain a better perspective on what the agencies are up against in trying to develop a comprehensive drowning prevention program that can aggressively tackle *all* drowning incidents.

Represented in Table 27 are the statements from the participants. The response from participants as a result of hurdles that impede the progress for program development stem from the collection of drowning data. The consensus is the need to obtain *all* relevant data surrounding a drowning event. The lack of an effective data collection process can bring to light the low confidence some have for the data that are reported. Proper funding is another key aspect that can build an effective drowning prevention program. The ability to convince the public that drowning is a serious health issue must

be addressed by multiple drowning advocacy organizations if the problem is to be corrected.

Table 27

*Interview Question 19*

HM/UG	RQ	IR
U.G. disposition	1	<p>I'm not sure that my agency wouldn't support that. I think they would support that, and I think the data's still kind of new, as far as . . . getting enough of it accumulated.</p> <p>I think really, what it comes down to, is that I don't feel as confident in our data because of the collection process being so hit-and-miss.</p> <p>So that's what I think the biggest hurdle is. I don't think it's really agency support as much as really getting more relevant data.</p>
U.G. disposition	1	<p>"Do the right thing because that's the right way to run your program. Don't do it because of a death. Do it because this is what the evidence shows, and this is the way to run your programs and just stay the course" so that's what I try to do.</p>
H.M. event	2	<p>I think the biggest one is just a lot of people don't want to hear it. To them, it's not important. It won't happen to them.</p> <p>And it really requires a lot of evidence that this can happen to you unfortunately.</p>
U.G. scene information	1	<p>Biggest hurdle is just making sure we gather all the data and keep it up on it.</p>
U.G. disposition	1	<p>Funding.</p>
H.M. pre-event	2	<p>I think Safe Kids is the venue to engage other coalition members and the community at large because I don't think one organization can do it on their own.</p>
U.G. disposition	1	<p>A lack of funding and resources.</p>

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

The overall theme for Interview Question 19 illustrates that effective data collection systems are what agencies rely on for accurate data. To develop and maintain efficient reporting systems requires dedicated funding. The drowning problem is widespread and in order to address it head-on requires the assemblage of several forces from within the drowning community and those external organizations that support the mission.

### **Interview Question 20**

*What training should be implemented to those who engage in drowning prevention reporting?*

Interview Question 20 sought to examine the training needs for those individuals who are responsible for completing the drowning submersion form. The intent of the question was to delve into the suggested training and education aimed at those first responders who respond to drowning incidents and have the ability to gather detailed events that surround the incident.

Represented in Table 28 are the statements from the participants. The response from participants centers on the need to train and educate those who complete and submit submersion forms in order to acquire accurate data that are useful. The training provided is to inform those responsible for completing the form the reason why the data are collected and how they are used in the development of drowning prevention programming. The consensus from the group is that the forms are not filled out completely and when submitted, they are lacking some core data elements. There are some data elements that require first responders to ask specific questions of the family, and those are often overlooked. It is also noted that compliance by the fire service for

reporting drowning incidents will enable program directors the ability to follow up on reported incidents. These issues are considered a continual *work in progress* for the success of the program.

Table 28

*Interview Question 20*

HM/UG	RQ	IR
U.G. victim information	1	So, I think that them having knowledge and understanding about what we do with the information would be most helpful, because I think the form is somewhat intuitive.  But if there was an understanding of why we're asking those questions, that might help.
U.G. victim information	1	The fields are pretty straightforward, but really getting people to completely fill out the forms or... both, I think is the training that's needed, and that is occurring.
U.G. scene information	1	That education is the importance.  So, it's been educating too to really open their eyes and say I know you're on this call. It's a terrible call. But these are the questions that we need to ask in order to help us with the better reporting and education.  So, it's really making sure that they gather everything.
U.G. scene information	1	To make sure they can accurately report on that they're putting the data in accurately.
U.G. scene information	1	Sometimes if it's unclear, or there was something big missing that we wanted to find out then we can follow up with the person who filed out their report and try to get more information.
U.G. scene information	1	I have worked with the fire chiefs to do a train the trainer. And they said they'd want to do it but then it doesn't happen.  I think it's a continual work in progress.  And to have another form to fill out, I think they do their very best. It's just getting it hardwired takes some time.
U.G. scene information	1	I mean, no, just show them the form. They already have lots of forms that they, like for abuse and things like that. So, I mean, I don't think this would be too out of the ordinary for them to collect.

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.



The overall theme for Interview Question 20 suggests that first responders could use some updated training to inform them on core data elements that need to be captured while on scene of drowning incidents. The impression of the group is that core data can be captured correctly if reporting agencies know how to obtain it and that can be addressed if all public safety agencies comply.

### **Interview Question 21**

*What do you feel is the problem when it comes to data collection reporting in your region?*

Interview Question 21 sought to explore the challenges that come with the responsibility to collect valuable data that relates to fatal/nonfatal child drownings. The intent of the question was to have the participant diagnose the underlying issues and challenges that come with collecting data that is sensitive information and reporting on it.

Represented in Table 29 are the statements from the participants. The response from participants centers on their experiences from the data reporting systems used within their region. There is the perception that the data reporting systems in use are inefficient as compared to those in other regions. A serious issue focuses on the individual agencies that report drowning incidents and gaining compliance for them to complete all submersion forms completely. Program directors feel as though they must remind reporting agencies that this is part of service they are to provide. The support from internal departments in accumulating the statistical data is a benefit. It is noted that some external public agencies push the accountability to other agencies. There is an effort being made to develop a reliable reporting system that works.

Table 29

*Interview Question 21*

HM/UG	RQ	IR
U.G. scene information	1	<p>Yeah. We don't have a good system in place. It's a hit and miss.</p> <p>So, who reports and who doesn't, and who follows through and who doesn't, again, too much of a hit and a miss, and that's where my frustration lies and why it's so important for us to get a system going like Thomasville.</p>
U.G. scene information	1	<p>The problem is relying on the individual agencies right now. Because it's only as good as the numbers that we're getting. So, we're still missing the full picture.</p>
U.G. scene information	1	<p>Not accurately doing it or some people might not think this is that big of a deal.</p> <p>We are doing a service to the community and we have to encourage the new managers that come in that we need to continue with this.</p>
H.M. Event	2	<p>That aren't connected to the reporting system.</p>
U.G. scene information	1	<p>I think our public statistics unit does a phenomenal job. I know our hospital does a phenomenal job. I think, again, the challenge is getting a specific individual to complete the submersion reporting form.</p> <p>Everybody's busy. We've gone to the fire chiefs. We've gone to the police. We've gone to the ambulance companies. And everybody kind of punts to the other because they're all busy.</p> <p>For the whole county. Yeah. So, he's trying. He's trying to find a system that works. It's just cumbersome.</p>
U.G. scene information	1	<p>Funding and resources.</p>

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

The overall theme for Interview Question 21 focuses on the reliance of first responders to come into compliance for reporting drowning incidents by documenting

and reporting drowning incidents they respond to. Public safety agencies are reluctant to mandate their personnel to submit submersion forms as they push the obligation to other agencies in the system. The inherent flaws of large reporting systems are based on the dependency for accurate data acquired at drowning incidents.

### **Interview Question 22**

*If you could hand off your drowning prevention program to another agency (nonprofit organization or drowning prevention organization), which would it be? Why do you believe in this group?*

Interview Question 22 sought to gain an insight on whether the participant would forward their drowning prevention program to another advocacy group with the same mission and if so, who? The intent of this question was to develop a clear understanding from the participant as to the value of program and whether it would be better suited for another agency to carry the mission forward.

Represented in Table 30 are the statements from the participants. The response from participants describes their stance on handing off their drowning prevention program to an organization they feel is capable to continue the mission. There was overwhelmingly response to keep the program as is while a couple of agencies said they would accept support from others who could help develop the drowning prevention program. Although some agencies have established partnerships with organizations that help them with delivering their mission, others use agencies for specific programming issues.

Table 30

*Interview Question 22*

HM/UG	RQ	IR
H.M. event	2	<p>I don't think I would. Even if public health took it back, I would still ask for concurrent reporting.</p> <p>I'm too far in it at this point. I can't give it up. It's something that is important to me on a person level, and professionally, obviously.</p> <p>But certainly, I would welcome additional help, or additional eyeballs, or whatever.</p>
U.G. disposition	1	Well, I don't know that I would hand off the campaign because I think we've done a really good job with it, so I don't know that I would do that.
U.G. disposition	1	Right now, the healthcare agency. We partner with them and they help us with everything.
H.M. pre-event	2	We wouldn't hand it off to anybody. There's been a couple that I've suggested . . . they don't have the dedicated people to follow up on every single one.
U.G. disposition	1	We wouldn't want to pass off completely.
U.G. disposition	1	And we both have the same philosophy in that it's community outreach. It's fundraising. It's evaluation. And it's doing programs that you can assess the outcomes like educating kids.
H.M. pre-event	2	Safe Kids...And so they're really a very wide-spectrum group and not a focused drowning group, and I think they've had their focus elsewhere recently. I would shift it to them and give them more resources, is what I would do.

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

The overall theme for Interview Question 22 is centered on the fact that agencies have a vested interest in their current drowning prevention campaign and many are reluctant to hand it off to another organization. Support from external agencies would be

accepted in order to advance the program and assist with public education for the community.

### **Interview Question 23**

*What would you consider the Gold Standard if money were no issue in regard to a dedicated comprehensive drowning prevention program?*

Interview Question 23 sought to explore the vision the participant has for the highest standards aimed at their drowning prevention program if funding was not an issue for success. The intent of the question was to explore the essentials in building a dream program that could address the drowning prevention needs of their community.

Represented in Table 31 are the statements from the participants. The response from participants for the closing question were based on the gold standard for a drowning prevention program. There was a significant response for a set budget and consistent funding. Drowning incidents are complex scenes, and the desire to have a multifaceted approach available by public health agencies and public safety are also desired. Part of this approach would be to provide the same message by all drowning prevention advocate groups. An appeal for more workers would also be part of the gold standard as agencies could reach more people in the region.

Program directors would also like to see data tracking enhanced and training provided for first responders who document and report drowning incidents. Support from the media to deliver campaign messages can also enhance program support. Ultimately, hope for swim curriculum in all schools, life vests available and used consistently at all open water locations, and strict policy directed at four-sided barriers for pools along with enforcement statewide.

Table 31

*Interview Question 23*

HM/UG	RQ	IR
H.M. event	2	<p>And so, having an inroad to all of those different avenues for potential issues would really be ideal. And that would mean having a lot more feet on the ground.</p> <p>But again, this is training and buy-in, and things like that. So, there's some really great ideas and things that can be done, but it definitely comes down to budgets, and money, and having enough people to really get out there and do and be in all these different places.</p>
U.G. disposition	1	<p>I would want there to be a couple of main components. One would be certainly policy, so policy around four-sided pool fencing here... and statewide.</p> <p>Policy enforcement would be part of it. Definitely making sure that there's swim lessons available regardless of family or person's ability to pay, I think is very important.</p> <p>Oh, and also training on CPR so that way when people are nearby and god forbid something happens then people can respond quickly.</p> <p>Life vests being used routinely, like even in the swimming pools and stuff. I think there's a lot of floaties out there, but not life vests, and the floaties don't work.</p>
H.M. pre-event	2	<p>The gold standard would be we have curriculum in all the schools. We have ads everywhere. Every HOA pool was required to have signs and water watcher tags.</p> <p>And also, every swim program, county department agency would be pushing out the exact same message when it comes to drowning.</p>
H.M. pre-event	2	<p>Any time we do a school program to get the children from a young age, even from first grade or kindergarten, that we bring that up to be careful, swim with a buddy, don't swim alone, and do the ABC's of water safety from a young age.</p>
H.M. pre-event	2	<p>In order to provide a comprehensive drowning prevention program, it needs to have a multifaceted approach. We would be able to provide/complete the following: Data tracking, to include trainings for first responders. Media campaigns/press.</p>

Table 31 (continued)

HM/UG	RQ	IR
U.G. disposition	1	Oh, I'd do like the Brits. I would make learning how to swim be mandatory PE requirement in all schools by the age of 8.
U.G. disposition	1	<p>I mean, our paramedics have so much to do already in terms of data collection. That's probably one of the other issues here as to why we don't have a form is they already have to collect so much data. But if they could magically fill out this form, that would be great, because then you'd get a lot more data, and then if we had more epidemiologists to analyze that data, and then to work with injury prevention experts to show them the data, show them the deficiencies in how drownings occur, and then them to do community outreach, I guess.</p> <p>Every time you add something to the plate of the paramedic you get a lot of pushback, so . . . And honestly, if it's not required, which it's not, it's going to be tough to push on our paramedics.</p>

*Note.* H.M.= Haddon Matrix, U.G. = Utstein guidelines, RQ = research question, IR = individual response.

The overall theme for Interview Question 23 suggests that consistent funding for drowning prevention programs is highly desirable for the program success. There are aspirations for statewide policies that are supported by enforcement with the intent to save lives. There are suggestions for first responder training and education to develop an understanding on the importance to capture victim and scene information. Drowning incidents have many moving parts, and in order to properly document the core and supplemental elements, there is a need for funding, human resources, and reliable data reporting systems.

### Discussion

The coding process for the interviews was recorded in MAXQDA Analytics Pro 2018 software solution for qualitative, quantitative and mixed methods data analysis

(MAXQDA, 2018; Schreier, 2017). The code system for interviews consisted of two main code headings based on the research questions (RQ1 and RQ2) and an additional code heading (RQ0) to capture themes that were outside the coding for RQ1 and RQ2. The qualitative responses from the participants were then placed in a series of subcodes for the two main code headings (RQ1 and RQ2) and additional code heading (RQ0). Upon coding the qualitative data and identifying themes within the transcript, the data were recorded for a commonality of consistent themes in alignment with the reviewed literature. These themes are considered to be the major findings after a query run in the coded segments from the smart coding tool in MAXQDA Analytics Pro 2018.

The qualitative findings from the interviews unveiled three main themes that meet the criteria for Research Question 2 (RQ2). The main themes were supported with three subthemes that also fell within the criteria. The resulting themes from the smart coding tool revealed that data collection is predicated on public safety providing the first line of workers to document and record the data elements for a drowning incident. The first theme revealed by interviewees was that since public safety agencies are not mandated to report drowning incidents in various regions, it opens the system up to vulnerabilities from inconsistent drowning reports. The context from the participants identified the need for their support in documenting victim information and scene information. Subtheme 1 revealed the lack of support by the local emergency medical authority responsible for planning, evaluating, and implementing policy development for emergency incidents; drowning in this instance. Providing support and resources to local jurisdictions can help on a number of fronts when attempting to reduce the number of drownings. Subtheme 2 also unveiled the need for more follow-up and investigation into drowning incidents.



Participants felt as though follow-up can be difficult when they are attempting to contact the responsible agent who filled out the submersion form to obtain more details.

Subtheme 3 concluded with the need to have hospital staff and law enforcement also aid in documenting and reporting submersion incidents. It is well-documented in the literature that the reporting system is vulnerable to missing submersion incidents when the victims are transported by attending adults.

The second theme revealed unanimously by all participants was that the current reporting system as a whole is flawed. There are many issues that were discussed, but the overarching feeling was that data collection is difficult to achieve on a consistent basis. The first subtheme listed submersion forms as the main issue when attempting to gather valid drowning data. There was discussion that some of the data elements were outdated or were not getting counted on a regular basis. The second subtheme was centered on ambiguity, outdated and nonexistent policies that support drowning response protocols. The conversation alluded to the lack of ability to influence public safety in completing submersion forms, and in a timely manner. The concluding subtheme fell in alignment with the second main theme of a flawed reporting system. The adults who self-transport their children to the hospital without activating 9-1-1 elude the emergency response system that would provide tracking.

The final theme meeting the criteria for Research Question 2 (RQ2) uncovered the feeling by the participants that data collection is reliant on public safety agencies to accurately report on drowning incidents through submersion forms. The group consensus was that accurate reporting for victim, scene, and pre-EMS incident information are the foundation from which public health develops their drowning data. The initial subtheme

identified by participants was the ability to have access to those public safety program managers or internal contacts that can help them track down essential data elements by personnel who were at the scene. The participants felt that there was an advantage to completing submersion forms when they could access public safety program managers responsible for emergency services. The second subtheme voiced the interest of the participants to be actively involved in training public safety personnel on documenting and reporting submersion incidents. They felt as though one of the hurdles was getting the public safety agents to understand why data elements are tracked and the need to obtain accurate scene information, and they believed they could help provide that training. The final subtheme elicited by the participants was the need to develop partnerships with public safety agencies, hospital staff, and those who are associated with the data collection and reporting of submersion incidents in order to close the loop for data breaches.

A significant finding within this research was the dissolution of the region and participant from Simonsburg. At the beginning of the research, the region of Simonsburg was found to have a significant role in the research based on their potential to supply data that met the criteria for the study. Contact with the EMS coordinator was established, and it was discussed early in the research that they would participate and supply the researcher with their statistical data on drowning. Data revealed from 1980 through 1989 that Simonsburg had one of the highest drowning rates of all the 58 regions in California.

During the data collection process, contact with the participant was positive, and there was an understanding that the statistical data would be sent electronically. As the data collection process was nearing the end, contact with the Simonsburg participant

started to deteriorate. As the deadline approached, the researcher made one last attempt to engage the participant and was unsuccessful. It was determined that the region and participant from Simonsburg would be excluded from the analysis, yet their position would be revealed as part of the findings.

The findings revealed in this research were based on four specific regions in California and cannot be construed as existing in other regions proximal to the ones selected. The limitations to the research findings are that particular regions have independent characteristics; thus, their separate situations relating to child drownings are also specific. This research does not assume that the specific findings will be found in other parts of the state or nation.

In April of 2018, the researcher traveled to Tampa, Florida to attend the National Drowning Prevention Alliance (NDPA) where attendees from the United States and other international countries congregated over current issues and technology in support of advancing drowning prevention strategies. In talking with several attendees, the researcher heard that the problems that continue to plague drowning events are centered on data collection from drowning events and the data collection systems that are supposed to support these two processes are simply inadequate. The drowning prevention coalitions (managed by the parents of drowning victims) were emphatic that more needs to be done with the way data are collected at drowning incidents so that targeted strategies and policies can be created to reduce the number of child drownings annually.

It is this type of specificity for regions that illustrates each one is independent of the proximal region; therefore, the results found in this study are to be viewed as specific

to the regions based and in no way convey that the same findings exist in other regions of California. The evidence uncovered at the NDPA conference establishes the need for further research as a result of the unique and independent problems regions have as a result of inadequate data collection and reporting systems. This research suggests that these two issues are not exclusive to the regions within the study and that this research can be used to launch future studies addressing data collection and reporting systems in other locations.

### **Summary**

The intent of this sequential mixed methods study was to investigate child fatal and nonfatal drownings in selected regions of California. The first phase of the study was to analyze the secondary statistical data for the data elements used on the submersion forms as recommended by the Utstein-style guidelines for reporting drownings. The second-phase of the study was to conduct semistructured interviews with the participants and acquire an in-depth understanding of their phenomenological encounters with data collection and reporting systems centered on drowning incidents for their region.

The regions selected in California were based on their ability to support this drowning prevention research by providing statistical drowning data and one or more agency representatives that directly manage or administer the collected data on drowning including the reporting systems for their agency. The selected regions were then coded with a pseudonym in order to maintain confidentiality for the regions that participated.

The sample ( $n = 8$ ) consisted of six females (75%) and two males (25%) ranging in age from 25 to 65 years. There are six agency representatives from Public Health and two representatives from Fire/EMS for a total of eight participants. The personal names

of the agency representatives were not disclosed and are referred to in this study as *agency representative*. The researcher recruited the active participants utilizing the preferred (Creswell & Clark, 2018) probabilistic sampling method as a means to capture a large number of participants while meeting the sample size criteria for phenomenological research (Creswell, 2014) ranging between three and 10.

The regions in California were selected after meeting the preestablished criteria. This was followed by identifying the agency representatives and sending an e-mail chain that eventually unveiled who the key agents were who manage the drowning prevention program and/or have direct access to the statistical drowning data including the reporting systems. The agency representatives were then requested to collect their statistical drowning data for child drownings aged 1 to 17 years that occurred between 2000 through 2016. The statistical data were received by the researcher prior to the individual interviews in order to allow time to analyze the data and establish a history of the drowning problem for the specific region. The collected data were delivered electronically to the researcher based on convenience and the security issues for sensitive data.

The agency representatives participated in a semistructured interview in random order based on their availability. The interview was conducted at the office of employment for each participant, providing a secure location and providing access to agency computers for unexpected issues. The qualitative phase allowed the researcher to ask 23 specific questions that focused on drowning nomenclature, active policies, drowning prevention strategies, data collection, reporting systems, funding, hurdles impeding the accuracy of data reporting, and what participants' vision of a perfect

drowning prevention program looked like. The qualitative data were analyzed to identify consistent themes that answered the research questions.

## CHAPTER 5: DISCUSSION

Drowning is a public health issue that continues to burden communities across the globe. Injuries from drowning are sustained when a person's airway is submerged below the surface of the liquid (most commonly water). Fatal and nonfatal drowning incidents as a whole deal a significant economic setback to families and government agencies as a daily occurrence. In the United States, drowning remains a leading cause of unintentional injury death in children whereas in 2015, there were a total of 1,535 children aged 1 to 17 years who lost their lives to drowning—or four a day (Centers for Disease Control and Prevention [CDC], 2018a). Further, it is estimated that for every death, another four children visit an emergency room because of a nonfatal drowning (CDC, 2018c).

The intent of this research was to study the persistent burden of the public health issue known as drowning. The drowning statistics and reports generated by submersion report forms are not the only goal of data collection (ILS, 2007). It is the foundation to work from when bringing drowning awareness to the forefront for public knowledge, to evaluate and develop comprehensive drowning prevention initiatives, and policies through enforcement to see that they are effective. The reviewed literature coinciding with the participants' experiences reinforced the issue that data collection for fatal and nonfatal child drownings is difficult at best (Martyn, 2014).

The focus of this sequential mixed methods research study was to investigate the realities of data collection centered on child fatal and nonfatal drownings for the selected regions in California. The objective was to gain insight through the phenomenological experiences of the participants as they utilized the data collection to build their drowning

prevention programs targeting those most *at risk*. To investigate this phenomenological experience, the researcher asked two specific research questions that would support this study:

1. Do the data elements for fatal/nonfatal drownings of children collected by California regional public health and emergency service agencies meet the criteria of the Utstein-style recommended guidelines for uniform reporting of data from drowning?
2. How are the data on fatal/nonfatal drownings of children collected by California regional public health and emergency service agencies incorporated into the formulation, implementation, and enforcement of unintentional drowning policies and preventative strategies?

In this chapter, the researcher summarizes and discusses the results from the study, incorporates the Utstein-style guideline for reporting drownings and the Haddon Matrix for injury prevention model, and provides recommendations that can bolster future data collection efforts through the use of a comprehensive and effective submersion form for future reporting systems. The researcher discusses the limitations encountered in the research design and interprets the findings based on the results for a clear perspective of the study.

### **Summary of Results**

The first phase of the mixed methods research analyzed the secondary data for the data elements used on the submersion report forms for alignment with the internationally accepted Utstein-style guideline for reporting drownings. The second phase of this mixed methods study revealed the phenomenological experiences of the participants



through a semistructured interview that provided an inspection of the data collection processes based on submersion form documentation and reporting.

The results from the quantitative data yielded considerable obstacles for the researcher to apply statistical significance for the collected data on drownings. The analysis of the regions utilizing the recommended Utstein-style guidelines illustrates that Thomasville (31%) collects the highest percentage of core data elements, followed by Petersburg (20%) while Jamestown (10%) and Andrew Town (10%) collect the least number of data elements. The electronic files used to store the drowning data varied from region to region, and within the region, the data element headings also took the same path. The PDF, Excel, and Word files that stored the data did so in no consistent order and compromised the ability of the researcher to display a statistical analysis of the aggregate drowning problem for the participating regions.

The summation of the qualitative data that were analyzed unveiled three main themes that respondents felt were the hurdles they had to overcome when attempting to obtain accurate drowning data that would paint a complete picture of what occurred at the incident scene. The resulting themes also delivered three subthemes for each of the main themes. All met the criteria that supported Research Questions 1 (RQ1) and 2 (RQ2) as they relate to data elements, data collection, and the formulation of the results into drowning prevention initiatives. The first of the leading themes from the participants' phenomenological experiences was the ability to gain an agreement from public safety agencies for documenting and reporting on drowning incidents. They felt that since they respond to these horrible events they had the capabilities to capture significant data while at-scene. Supporting this issue would come from the backing of the local emergency

management authority whose role it is to establish policies dictating accountability and policy compliance. Injuries and death from drownings require extensive follow-up and investigation. The group felt that a necessity to gain a complete picture of the incident would need the support of public safety agencies to assist with obtaining core and supplemental data elements. Data collection is a multitiered process that includes hospital staff as well. There is also a need to have hospital staff complete submersion forms when victims arrive at the hospital unannounced.

The second leading theme participants felt collectively was that the drowning reporting systems in use today are inherently flawed. The data collection is being compromised since the reporting system is vulnerable in many ways. Submersion forms are the beginning point as one of the leading culprits in the reporting system. The data elements that are collected vary region to region, and this does not provide the opportunity to create a database and compare like data across regional lines. Linking comprehensive data to sound policy is a step in the right direction when attempting to build a thorough and comprehensive drowning reporting system that can be accessed by drowning advocates and public health agencies. When a drowning is not counted, it reveals a vulnerable part of the reporting system. Victims that are transported by automobile do not trigger the tracking mechanism in the 9-1-1 emergency response system. These incidents are well-documented occurrences that sometimes don't get counted.

The concluding theme participants pointed out for obtaining the collection of accurate data was the overall reliance on public safety agencies to report on drowning incidents. Submitting submersion forms that are completely filled out with concise data

and narratives builds the confidence of those analyzing the data if they can envision the entire scene. Public health and emergency service representatives revealed that they are available to help train public safety agents to understand the value in capturing all of the data elements. They believed that this type of training could forge partnerships that are needed to contend with this preventable public health issue known as drowning.

## **Discussion of Results**

### **The Utstein-Style Guidelines for Reporting Drownings (RQ1)**

The overall use of core data elements from the internationally accepted Utstein-style guideline for reporting drownings reflects an aggregate total of 72.4% for the collective four participating regions. There is a total of 29 core data elements that are considered feasible for any first responder to gather while at the scene of a drowning event. Utilizing the core data elements from the reporting tables will assist researchers with reporting methods and provide them the ability to analyze the results from the drowning data. Independently, the region with the highest percentage of collecting core data elements from the guideline tables is Thomasville (31%), followed by Petersburg (20%), Andrew Town (10%), and Jamestown (10%).

The establishment of a consistent reporting system that tracks valid and accurate data is the benchmark agencies should strive to create. The collection of child fatal and nonfatal drowning data is cumbersome when the inclusion criteria varies along with the quality, reliability, and a range of submersion forms (Vähätalo et al., 2014).

Inconsistencies in reporting drowning events can be the result of preferences by the institution. Ultimately, these inconsistencies hinder the ability of data collection agencies to operationalize the Utstein-style template in collecting quality data that can improve the

comparability of studies that seek to explain how drowning outcomes can be improved (Venema et al., 2018). The ability to draw upon reliable drowning data to diagnose the *real* issue of drowning requires that the data collected in the field be as accurate as possible.

The significant draw to using the Utstein-style template for capturing core data elements is detailed in the study “Review of 14 Drowning Publications Based on the Utstein Style for Drowning” (Venema et al., 2018). This study revealed the importance that the Utstein-style guideline for reporting drownings has for interpreting the data obtained from the templates when they are utilized. Venema et al. (2018) advanced the idea that the combination of the current Utstein-style guidelines and this study will provoke the use of the Utstein templates by injury prevention specialists in developing a robust submersion form that will improve on the comparability studies on drowning in the future.

### **The Data Collection**

The findings that were identified in the qualitative analysis reaffirmed the context of Research Question 2 (RQ2) that inconsistent reporting of drowning data can influence the outcome of quantitative data results. The researcher qualitatively analyzed participants’ responses based on the questions that were developed from the quantitative data. The quantitative results illustrate the deficiencies that are a result of the arbitrary data that are collected from drowning incidents. It is documented in the reviewed literature that current statistical data do not reveal the full burden that drowning has on the world as a result of neglected standards and methods for reporting drowning incidents (Martyn, 2014). It is an interesting note that participants felt the data were compromised

based on the fact that not all public safety agencies report submersion incident forms to public health. Based on this fact, a participant stated, “I mean, there were so many from last year that were in fire areas that I was never able to get it filled out.”

Gaining compliance from external agencies to accurately report drowning incidents, the field of participants felt as though their agency policies were ambiguous, outdated, or nonexistent to say the least. Serving the public interest requires public health agencies to exercise their responsibility in developing sound policy that is founded on empirical research in order to support the decision making of the policymakers aimed at public health policy (Christoffel & Gallagher, 1999). The subtheme that captured the policy issues for data collection was noted by one participant who stated, “If we do, that would be very outdated. Yeah at least probably over five years.”

Drowning is a multisector event that requires the actions and services of many agencies from the onset to disposition of the incident. One of the primary actions stems from the accurate reporting by public safety agencies. Separate from gaining compliance in reporting, the theoretical framework from the Haddon Matrix addresses the need for different agencies to interact as one when collecting quantitative and qualitative data elements for a collaborative effort in order reduce the injury (Runyan, 1998). The collective feeling by the participants was that there is a real need to obtain *all* relevant data surrounding a drowning event and that as one participant elaborated, “Biggest hurdle is just making sure we gather all the data and keep up on it.”

### **Limitations of Study**

The use of a mixed methods research design is challenging in both the quantitative and qualitative phases. The limitations on both fronts challenged the

researcher to maintain a strict balance throughout in order to remain impartial as momentum was developed for each phase independently. The initial quantitative limitation was the four regions that were left to extract statistical data after one region withdrew from the study. The initial qualitative limitation is that the study participants may not have fully depicted the larger population. Also, prior to conducting the interview with the participants, it was documented in unstructured notetaking that there had been a child drowning in the region the day prior to three of the four interviews. There were setbacks for the participants based on the special circumstances for each drowning.

Despite the multiple limitations in the study, there were many strengths that complemented the research throughout. The drowning incidents that preceded three of the four interviews allowed the researcher to gain an insight into the actions that take place behind the scene as the participants fulfilled their duties with a great deal of efficiency and the highest level of professionalism. Also, the interviews were conducted at the place of employment for security measures and to provide immediate access to resources when an issue arose. The face-to-face interview provided the researcher the ability to also interpret the body language based on questioning for a sense of how the interviewee was feeling at the time. The last strength was provided by the mixed methods design as the statistical data guided the qualitative phase of the study. Thus, the outcome of the findings reflects a complete and accurate account of the quantitative and qualitative analysis as reported and defined by the researcher.

## Recommendations for Future Research

This study has contributed to the body of research on the importance of building consistent and concise submersion forms that identify the data elements that are in alignment with the internationally accepted Utstein-style guidelines for reporting drownings and establish data collection systems that are deemed *reliable* and efficient by public health and public safety agencies. Further action derived from Research Question 1 (RQ1) of this study is to develop a submersion form that is consistent from region to region in identifying core elements as identified by the Utstein-style guidelines yet provides the flexibility to establish data points that reflect a particular region. The results from Research Question 2 (RQ2) also identified further action for establishing a unified command structure based on the Incident Command System (ICS) where agencies work across sector lines in order to create a collaborative effort toward building effective partnerships that address drownings (National Response Team, 2000).

The study has also created additional questions for action research that address the development of a national water safety plan similar to those in Australia, Canada, New Zealand, the Philippines, the Netherlands, the United Kingdom, and Viet Nam. Additional quantitative inquiries suggest the need to improve data collection based on the pre-event of drowning incidents as a way to develop evidence-based strategies for drowning prevention.

A similar study conducted by the World Health Organization ([WHO], 2017) *Preventing Drowning: An Implementation Guide* reinforced the same findings in this study centered on analysis of existing quantitative data and improving data collection systems. Oftentimes, the first step for improving injury prevention initiatives is

establishing the analysis of such data in order to develop the full picture of the problem and those most at risk (WHO, 2017). Therefore, both studies suggest the need to improve on completing submersion forms within an established timeframe that have the data elements reflected accurately. The WHO's research takes it a step further and suggests that there must be a balanced approach of implementing drowning prevention initiatives and improving national surveillance systems and cautions that because waiting for a national surveillance system to develop could send programs into the abyss.

### **Conclusion**

This dissertation provides a comprehensive description of the data elements that are to be collected based on the recommended internationally accepted use of the Utstein-style guidelines for reporting drownings and the importance for building a reliable data collection system that captures the data elements consistently reported from the submersion incident report forms (SIRFs). The Haddon Matrix injury prevention model is a tool available to injury prevention specialists for designing effective drowning prevention strategies supported by the useable data that are electronically submitted by public safety agencies.



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APPENDIX

Survey Instrument

Patient ID: \_\_\_\_\_

Gender= M\_\_ F\_\_ U\_\_  
Age=\_\_\_\_ or  
Date of birth: \_\_\_\_/\_\_\_\_/\_\_\_\_

Location of drowning:  
bucket\_\_\_\_ toilet\_\_\_\_  
bathtub\_\_\_\_ lake\_\_\_\_  
ocean\_\_\_\_ pool\_\_\_\_  
river/flowing water\_\_\_\_ other\_\_\_\_

Date of event:  
\_\_\_\_/\_\_\_\_/\_\_\_\_  
DD MM YY  
Times:  
Call received\_\_\_\_  
EMS resusc.\_\_\_\_

Event witnessed? Yes\_\_ No\_\_  
If yes: time of event=\_\_\_\_  
witnessed/monitored by\_\_\_\_  
layperson\_\_\_\_ healthcare personnel\_\_\_\_

At scene:  
Loss of consciousness Yes\_\_ No\_\_  
CPR before EMS Yes\_\_ No\_\_  
by layperson\_\_\_\_ healthcare personnel\_\_\_\_  
techniques used: rescue breathing\_\_\_\_  
chest compression\_\_\_\_

EMS assessment/management:  
Spont. breathing Yes\_\_ No\_\_ U\_\_ Initial neuro state: GCS: E\_\_ V\_\_ M\_\_  
Signs of circulation Yes\_\_ No\_\_ U\_\_ or A\_\_ V\_\_ P\_\_ U\_\_  
Airway interventions Yes\_\_ No\_\_ U\_\_ or A\_\_ B\_\_ C\_\_

ED assessment/management:  
Spont. breathing Yes\_\_ No\_\_ U\_\_ Initial neuro state: GCS: E\_\_ V\_\_ M\_\_  
Palpable pulse Yes\_\_ No\_\_ U\_\_ or A\_\_ V\_\_ P\_\_ U\_\_  
Tracheal Tube/ ventilation or A\_\_ B\_\_ C\_\_  
Yes\_\_ No\_\_ U\_\_  
Initial temp\_\_ BP\_\_ RR\_\_ SpO2\_\_ FiO2\_\_