Evaluating Glendale Fire Department's Pediatric Drowning Prevention Program: Are we saving

children?

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Certification Statement

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and the appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed: _____

Abstract

The problem was that the Glendale Fire Department has not conducted an assessment of its pediatric drowning prevention program. The purpose of this research was to conduct an assessment of the Glendale Fire Department Pediatric Drowning Prevention Program. Descriptive research methodology was used to complete this project.

Four research questions directed the examination and assessment of the pediatric drowning prevention program: a) What evaluation process did the Glendale Fire Department utilize to identify pediatric drowning as a community risk? b) What programs did the Glendale Fire Department implement to reduce pediatric drowning? c) How has the Glendale Fire Department evaluated the pediatric drowning prevention program? d) What is the correlation between the drowning events from 2007-2010 and the Glendale Fire Department Pediatric Drowning Prevention Program?

A comprehensive search through the Learning Resource Center at the National Fire Academy and on the internet was conducted to review current pediatric drowning prevention research. Previous and current drowning program personnel were interviewed and department specific statistical analysis was conducted. Results from the research concluded that a comprehensive community risk reduction model was not utilized for the drowning prevention program, nor was a formal program evaluation. The project review determined that the long-term relationship with the Drowning Prevention Coalition of Arizona has been positive. The results also illustrated that drowning terms and documentation utilized by emergency operations personnel may be inconsistent and additional training is required to assure that accurate information is collected.

It was recommended that the Fire Prevention Section of the Glendale Fire Department analyze the City of Chandler, Arizona drowning prevention program to determine if similar statistics can be achieved in the City of Glendale. The fire prevention section should also provide an updated water incident documentation training to emergency operations personnel to guarantee that accurate information is being captured.

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Introduction

Fire departments throughout the United States provide emergency medical services and respond to thousands of medical calls each day. The Glendale Fire Department, Glendale, Arizona is one of those departments. Although all firefighters enjoy assisting the community, responding to emergency incidents that have occurred due to avoidable injury and death affects firefighters in a negative manner psychologically and emotionally. Perhaps the most catastrophic injury or death emergency response, particularly on the mental health of all first responders, is avoidable tragedy involving children.

In the Phoenix metropolitan area the most glaring example of such a recurring preventable tragedy is pediatric drowning. The frequency of pediatric drowning emergencies in Arizona, specifically in the Phoenix Metropolitan Area, is not a new challenge for prevention and education specialists or first responders. The challenge for all fire departments in Arizona is that the frequency of pediatric drowning is still occurring at an abnormally high rate. This fact is supported by Sexton (2011) who stated:

> Arizona tied with Pennsylvania for having the third-highest number of childhood drownings or near-drownings since Memorial Day weekend. In a report released Tuesday by the U.S. Consumer Product Safety Commission, Arizona had 11 water-related incidents involving those younger than 15. Texas, with 15 incidents, led the list, followed by Florida, with 13. The numbers are part of a 2011 "Summer Snapshot" of 123 cases since the end of May. Although Arizona's numbers are down from last year's total of 30 during the same time period, even one incident is too many, said Kathleen Reilly, a spokeswoman for the agency, an independent federal regulatory commission… Since the

beginning of the year in the Maricopa County area, 23 people have drowned, 12 of them adults. (para. 1-8)

Upon initial review of the article above, Arizona appears to have a high, but possibly typical drowning rate. However, with further examination, the population from the four highest drowning states cannot be compared in a similar manner. According to the 2010 Census, Arizona had the smallest population of 6,392,017 which amounts to a 0.17 crude rate of drowning. Pennsylvania, whom Arizona tied with 11 drownings, contained a population of 12,702,279 which equates to a 0.05 crude rate of drowning, Florida had a population of 25,145,561 which compares to a 0.17 crude rate of drowning, and Texas had a population of 25,145,561 which designates a 0.06 crude rate of drowning. The population comparison among these states accentuates the gravity of pediatric drowning in Arizona after identifying that Pennsylvania has the same drowning rate while possessing a population almost double that of Arizona. Additionally, Texas and Florida have minimally higher drowning rates while both possess a population almost four times greater than Arizona.

The Glendale Fire Department has been involved in injury and death prevention programs since the early 1980s through the Fire Prevention Section. The need to address drowning prevention was recognized initially in the Glendale Fire Department Community Fire Protection Master Plan (1985) which stated:

It is recommended that the Fire Department expand its current public education program to create a special division within the department sufficiently staffed to accomplish the following:

1. Administer an annual Elementary Public Education Program for grades K through 8.

2. Administer monthly news media campaigns and annual Fire Prevention Week activities.

3. Administer special education programs to neighborhood block watch meetings, home owners association meetings, and other community groups when requested.

4. Target fire problem areas within the City for expanded public education programs.

5. Develop and administer an annual swimming pool safety and inspection program.

6. In coordination with the Police Department, administer an annual babysitting clinic.

7. Administer a cardio-pulmonary resuscitation program accredited by the American Heart Association which is capable of instructing approximately 1% of the City's population annually. (p. 58)

During the early 1990s the community service division, which is situated under the Fire Prevention Section in the organization, was reduced to minimal staffing due to budget cuts and the Fire Chief's focus on operational capacity. This strategy continued throughout the 1990s until the focus on injury prevention was renewed in 2001, when the current fire chief was appointed. His vision of fire and injury prevention in partnership with a city manager that wanted enhanced community education resulted in the addition of personnel, updated policies, and a vision of making the city a healthier and safer community for all residents. Beginning in April of 2002 the city manager provided direction to the fire chief that he wanted a door to door campaign started regarding water safety. The fire chief hired a local news station anchor to coordinate the community services division as an executive team member. The new community services director utilized an extensive media campaign and organized four water safety education walks per year that resulted in over 100,000 flyers being delivered to homes and apartments throughout the city from 2002-2005.

Although the community services division has experienced turnover of personnel and a reduction in budget due to the downturn in the economy, the drowning prevention program is one service that has been maintained. The current fire and injury prevention programs include: youth fire setting, occupancy inspection, fire code enforcement, car seat safety, home fire safety, and pediatric drowning prevention. While the youth fire setting program has a robust pre and post assessment evaluation many of the other prevention programs do not.

The problem is that the Glendale Fire Department has not conducted an assessment of the pediatric drowning prevention program. The community continues to lose children annually to drowning emergencies and without an assessment of the current program the department will be limited to a generalized education program and emergency response, rather than focused community risk reduction. The purpose of this research will be to conduct an assessment of the Glendale Fire Department Pediatric Drowning Prevention Program.

The intent of this project is to identify the effectiveness of the current drowning prevention program and to identify possible process improvements in an attempt to reduce the number of pediatric drowning and near drowning emergencies that the department responds to on an annual basis. In an attempt to provide adequate recommendations for this challenge, research of the current program community risk assessment process, intervention strategy process, and evaluation process will be conducted. Additionally, review of all pediatric drowning incident patient care records from 2007 through 2010 will be conducted to determine if any commonalities exist that can provide insight into the casual factors surrounding the pediatric drowning crisis in the City of Glendale. Descriptive research methodology will be used to complete this project. Descriptive research is defined as "determining and reporting the present

status of something… to clarify and report the way things are at the present time" (National Fire

Academy, 2009, p. II-12).

Four research questions directed the examination and assessment of the pediatric

drowning prevention program through this applied research project: a) What evaluation process

did the Glendale Fire Department utilize to identify pediatric drowning as a community risk? b)

What programs did the Glendale Fire Department implement to reduce pediatric drowning? c)

How has the Glendale Fire Department evaluated the pediatric drowning prevention program?

d) What is the correlation between the drowning events from 2007-2010 and the Glendale Fire

Department Pediatric Drowning Prevention Program?

The terms drowning, near-drowning, and submersion will be consolidated into a single

term of drowning for this research project. The methodology surrounding consolidation of these

three terms recognizes that many near drowning events result in devastating long-term medical,

emotional, and psychological effects to both the victim and family. Other prevention experts

including the Centers for Disease Control and Prevention (CDC) support this methodology:

> For every child who dies from drowning, another four received emergency department
>
> care for nonfatal submersion injuries. More than 55% of drowning victims treated in
>
> emergency departments require hospitalization or transfer for higher levels of care
>
> (compared to a hospitalization rate of 3-5% for all unintentional injuries). Nonfatal
>
> drowning can cause brain damage that may result in long-term disabilities including
>
> memory problems, learning disabilities, and permanent loss of basic functioning (e.g.
>
> permanent vegetative state). (Centers for Disease Control and Prevention, 2011, bullets 2-
>
> 4).

Additionally, this consolidation aligns with the American Academy of Pediatrics which utilizes

the following explanation for drowning:

> In 2002, the World Congress on Drowning and the World Health Organization revised
>
> the definition of drowning to be "the process of experiencing respiratory impairment
>
> from submersion/immersion in liquid." … The terms "wet," "dry," "active," "passive,"
>
> "silent," and "secondary drowning," as well as the term "near-drowning," are no longer to
>
> be used. The new definition and classifications are more consistent with other medical
>
> conditions and injuries and should help both in drowning surveillance and collection of
>
> more reliable and comprehensive epidemiologic information. (Weiss, 2003, Introduction,
>
> para 2)

Background and Significance

The Glendale Fire Department (GFD) was established in 1912, protects the fifth largest

city in Arizona, and includes a primary response area of 58 square miles in the northwest region

of the Phoenix Metropolitan Area (City of Glendale, Arizona, 2011, bullet 10). The population in

the City of Glendale was 226,721 when last estimated in 2010 (U.S. Census Bureau, 2011). The

department provides emergency medical services, fire suppression, hazardous materials

response, technical rescue response, fire inspection, fire investigation, community education, fire

and injury prevention, and crisis intervention services to the City of Glendale, Jobing.com Arena,

The University of Phoenix Stadium, and surrounding 22 communities as a member of the

Phoenix Regional Automatic Aid Response Consortium Agreement. GFD is one of two original

Phoenix Regional Automatic Aid Response Consortium partners with Phoenix Fire Department

in the late 1970s. The department responded to 31,425 emergencies in 2009 (Glendale Fire

Department, 2010, p. 3). Emergency response is executed through the deployment of nine fire

stations. The agency has been accredited through the Center for Public Safety Excellence since 2002 and received an Insurance Safety Office Public Protection Classification of 2 in 2009.

The department is comprised of 293 paid personnel that include 236 sworn, 47 non-sworn, in addition to 150 non-paid volunteer personnel. Ten positions became vacant in 2009 due to an underperforming tax base. The volunteer personnel are members of the crisis response team. "The Crisis Response Team (CRT) is made up of dedicated volunteers trained by the Glendale Fire Department and Maricopa Association Governments (MAG) to assist firefighters, police officers and the citizens of the West Valley during 911 calls. They specialize in being compassionate and professional during a time of need to those experiencing a crisis." (Glendale, Arizona Crisis Response, n.d., para. 1). The organizational structure (Appendix A) begins with the fire chief; who has four directs reports that include assistant chiefs, the fire marshal, and an executive program manager. The assistant chiefs have deputy chiefs that are direct reports to them. The deputy chiefs have division chiefs, who are administrative battalion chiefs, or battalion chiefs that are direct reports. Division chiefs and battalion chiefs are the same rank and their title is dictated by their function within the fire department. Captains report to battalion chiefs, if they are emergency responders or division chiefs if they are filling administrative roles.

The City of Glendale experiences warm weather in seven out of twelve months with average high temperatures above 80 degrees Fahrenheit from April through October (Weather.com, 2011). The extended warm weather influence results in many single family residences and most multi-family residences containing recreational swimming pools. The end result of the warm weather and access to pools provide an environment that facilitates pediatric drowning. This fact is supported by Flood (2010) who advised, "Warm weather, long summers, and the presence of more than 300,000 residential swimming pools make Arizona prone to

water-related incidents" (p. 4).

The City of Glendale crude rate of fatal and non-fatal drowning for 2007 was 1.62 per 100,000 citizens. This rate was well below the 2007 combined national crude rate of 5.64 for ages 0 to 15, when combining the national rate for non-fatal-injury of 4.37 and fatal rate of 1.27, as reported by the CDC Web-based Injury Statistics Query and Reporting System (2011). Data from 2007 was examined due to the fact that it is the most current data available from the CDC. The city however has experienced an increase in drowning emergency response since 2007 and the degree of growth is alarming. Pediatric drowning incidents have exponentially grown from four in 2007 to fourteen in 2010 which denotes a greater than two hundred percent increase in emergencies over three years and a 2010 crude rate of 6.17. The city has not experienced a level of drowning rate this extreme since 2004 when the crude rate was 6.00. Additionally, the 2010 City of Glendale crude rate of 6.17 is significantly higher than the City of Chandler, Arizona, which contains a population of 236,123 with a crude rate for drowning of 0.42 in 2010. This local comparison underscores the critical issue of pediatric drowning prevention for the GFD.

The Executive Analysis of Community Risk Reduction Course (EACRR) curriculum at the National Fire Academy (NFA) educates students through five comprehensive units of material that include:

Unit 1: The Executive Fire Officer as a Community Risk-reduction Strategist

Unit 2: Assessing Community Risk

Unit 3: Intervention, Program Design

Unit 4: Leading Organizational and Community Change

Unit 5: Organizational and Community Politics (National Fire Academy, 2011, p. v).

The prevention program that this applied research project is evaluating encompasses all five

units covered in the EACRR course; however, since it is an existing program this research

project will concentrate on information contained in Unit 2 and Unit 3. The current fire chief is

an advocate for risk reduction which eliminates the need to address Unit 1 and the local

politicians avidly support drowning prevention so Unit 4 and Unit 5 will not be covered.

The curriculum details a community risk reduction model that includes the steps of:

Getting Ready, Assessing Community Risk, Intervention Strategies, Action, and Evaluating

(National Fire Academy, 2011, p. SM 1-4). The research project will focus on the fifth step of

the community risk reduction model through assessment of the GFD Pediatric Drowning

Prevention Program. The first four steps of the community risk reduction model steps may be

restructured by the fire chief after presentation of this research project results. This project

applies to the U.S. Fire Administration Strategic Plan Fiscal Years 2010-2014, Goal 1: Reduce

risk at the local level through prevention and mitigation and Goal 2: Improve local planning and

preparedness (United States Fire Administration, 2010, p. 13).

In summary, the primary goal of this research project is to assess the GFD Pediatric

Drowning Prevention Program to determine: how drowning was identified as a community risk,

identify what programs have been implemented to prevent drowning, identify the evaluation

process of the programs, and determine if any correlation exists between the drowning events

that have occurred from 2007-2010 and the prevention programs. The secondary goal is to

provide recommendations of possible solutions for program improvement to the fire chief. It is

hoped that a plan can be created to decrease the amount of pediatric drowning that occurs

annually in the City of Glendale. The paramount achievement would be to create a plan that

results in zero pediatric drowning incidents.

Literature Review

Comprehensive pediatric drowning research has been completed by many qualified researchers and authors including executive fire officer research projects over the past few years. The impact of pediatric drowning has been evaluated at the micro level by local agencies, median level by state agencies, and macro level by federal agencies. Drowning was the leading cause of injury death in the United States from 2000-2006 for children that were 1 to 4 years of age (Borse et al., 2008, p. 4). The death rate for drowning related injuries in the United States from 2000-2006 was 1.4 per 100,000 and "The rate was highest among children 1 to 4 years of age (3.0 per 100,000), followed by children less than 1 year and those 15-19 years (1.6 per 100,000)" (Borse et al., 2008, p. 53).

The State of Arizona evaluates all child fatalities annually and identifies the percentage of drownings within those fatalities. The number of child drowning fatalities for the State of Arizona since 2007 is increasing in a similar manner to the drowning statistics identified previously in this research paper for the City of Glendale. Shacter (2010) noted, "In 2009, there were 35 child deaths due to drownings, which accounted for four percent of all child deaths… the 2009 rate has increased 43 percent since 2007 when the drowning rate was 1.4 deaths per 100,000 children" (p. 42).

The medical community has identified pediatric drowning as a major concern and the American Academy of Pediatrics is another professional organization that has researched pediatric drowning and attempted to create solutions for avoidance of future injuries and death. Drowning and near drowning result in devastation to not only the victim, but the family and community as well. This fact is supported by Brenner (2003) who stated:

Case fatality rates vary by age and from study to study. It is estimated that for each

drowning death, there are 1 to 4 nonfatal submersions serious enough to result in

hospitalization. Children who still require cardiopulmonary resuscitation (CPR) at the

time they arrive at the emergency department have a poor prognosis, with at least half of

the survivors suffering significant neurologic impairment. (p. 440)

The outcome of a drowning for younger children is usually more destructive due to the fact that

the submersion is usually not witnessed. Quan and Cummings (2003) discovered:

Children 0–4 years tended to fall into swimming pools or open water in urban settings

while no one was around. Once retrieved from the water, they usually received bystander

resuscitation, pre-hospital and emergency department care, and were usually admitted to

a hospital where they died. (p. 165)

The aforementioned impairment suffered by pediatric drowning victims that survive, in addition

to the number of fatalities from the victims that do not, underscores the need to prevent all

pediatric drowning cases before they occur.

Pediatric drowning reports consistently convey that a disproportionate number of

drowning victims are found from zero to four years of age. Quan and Cummings (2003)

discovered that, "The highest rates were among those 0-4 years…. Among 0-4 years, rates were

nearly equally distributed between swimming pools and open water; their highest drowning rates

(11 per million) were in swimming pools" (p. 164). This fact is further substantiated by Gipson

(2011) who established:

 Children younger than 1 year of age accounted for 4 percent of the estimated pool- or

spa-related submersion injuries. Children between the ages of 1 and 3 years (12 to 47

months) comprised approximately 64 percent of the estimated number of children

treated for pool- or spa-related submersion injuries. An additional 11 percent of the

estimated childhood pool- or spa-related submersion injuries occurred in children 4 years

of age (48 to 59 months). (p. 7)

The State of Arizona has a drowning issue specific to swimming pools which may not be

consistent with other parts of the United States. The state is fortunate to receive seven months of

warm weather that facilitates utilization of residential swimming pools which can be found in

many single and multi family homes. Table 1 below denotes the preponderance of drowning that

occurs in swimming pools throughout Maricopa County.

Table 1

Drowning Water Type by Age Group, 2009

Water type	Years of Age of the Victim						Total
	0-4	5-14	15-34	35-64	65+	UNK	
Bathtub	7		2	1			10
Bucket							
Canal/Irrigation Ditch		1	1	2			4
Fish/Decorative Pond	2						2
Other							
Pool, in ground	46	4	4	10	6	3	73
Pool, above ground	1						1
River/Lake			4	1	1	1	7
Spa	3		1	1	1		6
Toilet							
Unknown							
Missing							
All water bodies	59	5	12	15	8	4	103

Note: Adapted from *"*Water-realted Incidents in Maricopa County, 2009*"*. Copyright 2010 by Arizona Department of Health Services, Bureau of Public Health Statistics. Only life threatening incidents are included in the analysis.

Quan and Cummings (2003) provided additional insight into this unique problem when

they concluded, "In other parts of the U.S. most children less than 5 years fall into swimming

pools since swimming pools are more common in warmer climates and drowning rates for young

children are higher in most of the southwestern U.S." (p. 167). Home pools are most often

responsible for death or injury in children under the age of 15. "The majority of reported deaths

(72 percent for pools or spas) occurred in residential settings…The victim's home accounts for

the largest percentage (44 percent) for all location categories for victims younger than 15 years

of age (Gipson, 2011, p. 7).

The previous information portrays that Arizona, and specifically Maricopa County which

contains approximately sixty percent of the state's population, is not making an effort to address

the pediatric drowning problem. Belief in this concept would be unfounded and untrue. Most

public safety agencies including the GFD, hospitals, and pediatric activist groups are actively

involved in the battle against pediatric drowning. This effort was recognized by King (2009) who

stated, "It was evident that the Phoenix metropolitan area leads the way in prevention messaging

by the successful employment of programs used by many of the public safety agencies" (p. 35).

The path to develop an effective community risk reduction program is clearly delineated

through the EACRR curriculum. The GFD Pediatric Drowning Program can be categorized as a

form of primary prevention as detailed in the EACRR curriculum. The National Fire Academy

(2011) illustrated, "The intent of primary prevention is to prevent events that might result in

injuries or property loss" (p. SM 1-10). The message to supervise children around water with

drowning prevention efforts illustrates a primary prevention effort. "Primary prevention efforts

seek to enhance well-being by reinforcing healthy behaviors and discouraging lifestyles that may

eventually lead to injury or illness" (National Fire Academy, 2011, p. SM 1-10).

A critical factor in determining solutions for any community risk reduction crisis involves

determining casual factors of the particular problem. "Casual factors are factors that contribute to

risk of life, property, environment, or community vitality…. While assessing community risk,

focus should be placed on casual factors at the highest level with direct impacts on life, property, environment, or community vitality" (National Fire Academy, 2011, p. SM 2-6). The determination of casual factors must be the first action in the development of all community risk reduction programs. "Casual factors must be addressed in order for risk to be reduced. Evaluate casual factors to be sure they affect risk directly. If they do not, continue the assessment process until factors which do are identified" (National Fire Academy, 2011, p. SM 2-6).

Many experts believe that a public safety education (PSE) message must be sent to a specific target group for it to be received successfully. Many departments that provide PSE programs including the GFD utilize schools as a primary source of education delivery. One challenge to this approach is that the audience who may provide the greatest impact may be missed. This ideology is supported by Crawford (2009) who indicated:

> Educating schoolchildren is only one major part of a comprehensive public education strategy. The other is to take the message directly to the public, usually using one or more of the media. Because resources generally applied to public education programs are at a low level, the effort to reach the public outside the school system must commonly be prioritized and targeted.
>
> > To produce a true target audience, a fire department needs to analyze its data about the community's fire and or injury problem and then decide which public education strategies are most appropriate for controlling those losses. Taking this approach usually leads to the conclusion that there are several other target audiences besides schoolchildren…. (p. 377)

The intent of the GFD Pediatric Drowning Program is to provide education and behavior change intervention of dangerous water safety actions in our community before a drowning

occurs. The educational process must be continual and provide sustained reinforcement if behavior modification is to occur. This fact is exemplified by the National Fire Academy (2011) which stated:

The purpose is to influence voluntary behavior change in such a way as to increase the ability of people to control their own destiny….

In order for the educational approach to work properly, there needs to be reinforcement on a continuous basis, and it needs to be targeted….

Active interventions depend on someone doing something in order to be safe…

Educational programs and materials include information to increase knowledge, change attitudes, and encourage behavior change; they also are measurable. (pp. SM 3-13-SM 3-14)

As previously described the GFD is one of 23 agencies that participate in the Phoenix Regional Automatic Aid Response Consortium. Although the consortium recently began adoption of the Incident Command System (ICS), as directed by the National Incident Management System (NIMS), the basis for all incident operations previously was the Fire Ground Command System (FGCS) that was developed by former Phoenix Fire Department Fire Chief Alan Brunacini. The seventh function of command established in fire ground command is: review, evaluation, and revision. Brunacini (2002) identified, "While, review, revision, and evaluation is the seventh function, it is something that the IC does throughout the incident, beginning in the front end of incident operations" (p. 325).

Assessment, which can also be identified as evaluation during an emergency event or incident, is identified as a core process in the NIMS ICS as the last step of the "Planning P". This

step in the process occurs just prior to the development or update of objectives for that incident

or event. It should be noted that both FGCS and ICS utilize a circular planning process that ends

with progress assessment or evaluation of progress for the identified objectives.

Figure 1 below identifies the "Planning P" and signifies the placement of assessment progress in

the overall planning process.

Figure 1

The Planning P
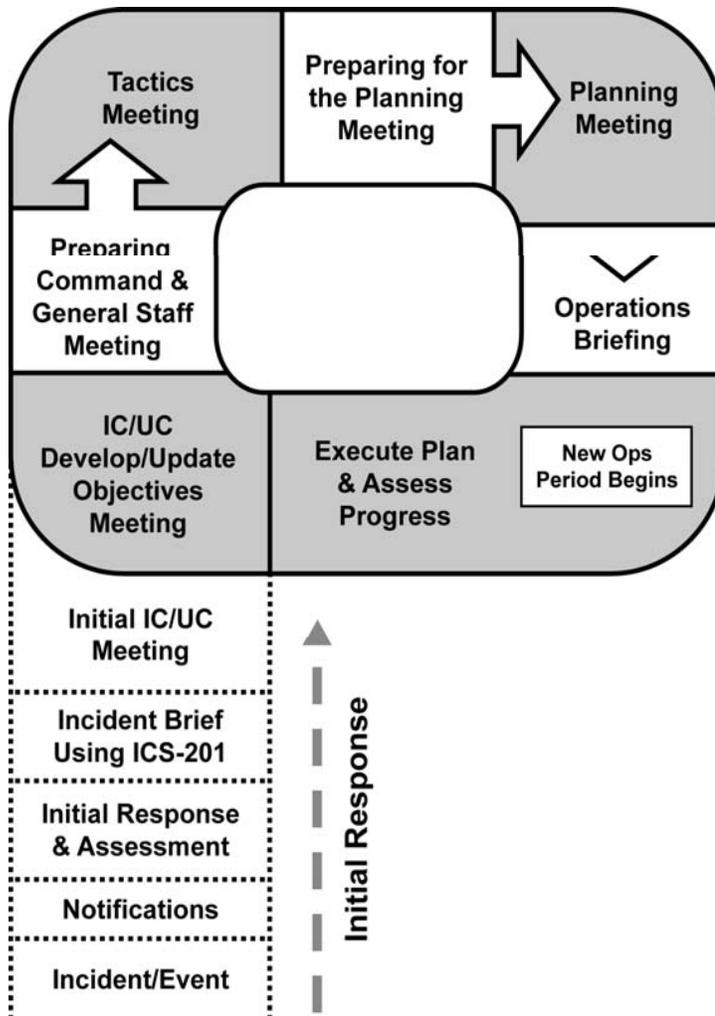
Note: Adapted from *"The Planning Process".* Emergency Management Institute, FEMA.

PSE programs are linked directly to operational response. If the PSE program is effective emergency incidents and subsequently the amount of operational responses for that objective should decrease. PSEs should be evaluated in a similar manner to the operational assessment for incident command that was previously described. The NFA identifies that the fifth step of the community risk-reduction model is evaluating followed by modification of risk-reduction initiatives similar to both the FGCS and ICS evaluation or assessment process of incident objectives. This methodology is further supported by Barr (2003) who stated:

> The evaluation or measurement of the effectiveness or success of PSE programs may be somewhat difficult to determine without a great deal of effort, but it needs to be done…. Therefore, there must be some means of measuring the effectiveness of the PSE programs that are delivered.
>
>> Perhaps the simplest means is to monitor the activities within the community to determine if specific types of incidents that match PSE programs are increasing or decreasing. An increase in incidents of a specific type would indicate that additional effort or a change in method of focus is required…. The objectives for the programs must state in some form the type of change in behavior or other type of change as a result of the program….
>>
>>> The reason for evaluating the programs is to find out what programs are effective and which programs are not effective in order to capitalize on available fire and rescue resources…. (p. 1072)

The requirement of monitoring risk reduction programs is further supported by Loflin and Sanders (2009) who recognized:

> After possible control measures are weighed and prioritized and acceptable levels of risk and service are decided on, the final step in risk management is to circle back and conduct a periodic evaluation, or monitoring, of the risk management process itself. The purpose of this monitoring is to identify and weakness in the process so that steps can be taken to modify it and improve it. The intention is to determine what is working, what is not working, and what may have to be done to make risk management more efficient and effective. (p. 54)

Outcome measurements for PSEs can be very difficult to determine. It is important for fire departments to understand the difference between an output measurement and an outcome measurement. Output measurements are what most organizations including fire departments typically evaluate. Examples of output measurements would include: the number of students contacted, the number of swim lessons conducted, the number of car seat installations, and the number of flyers that were delivered to residences. "The most important and most difficult measures to capture are outcomes, for they address the effect that the program, process, or activity has had. Macrolevel outcomes for fire prevention and suppression activities are the deaths, injuries…" (Endicott, 2009, p. 296).

The GFD Pediatric Drowning Prevention Program is an example of an outcomes based program. The purpose of the program is to reduce drowning through appropriate education of water safety to the citizens of Glendale. The importance of providing a program evaluation has been discussed previously in this research project.

McNamara (2006) established:

> An outcomes-based evaluation facilitates your asking if your organization is really doing the right program activities to bring about the outcomes you believe (or better yet, you've verified) to be needed by your clients (rather than just engaging in busy activities which seem reasonable to do at the time).… Outcomes are usually in terms of enhanced learning (knowledge, perceptions/attitudes or skills) or conditions, e.g., increased literacy, self-reliance, etc. Outcomes are often confused with program outputs or units of services, e.g., the number of clients who went through a program. (para. 1)

Creation of an evaluation plan is the next logical step for an organization after determining that a program should be evaluated. Evaluation plans can be utilized in a variety of ways that can be beneficial for any organization. "An evaluation plan is a written document that describes how you will monitor and evaluate your program so that you will be able to describe the *What,* the *How*, and Why it Matters for your program" (Lavinghouze, Jernigan, and Snyder, 2011, p. 2). Although creation of an evaluation report will require the use of potentially limited resources and staffing hours it will produce many positive results. The benefits of utilizing a final report include: dissemination of the evaluation results, the advantage of program sustainability, comparison of anticipated outcomes versus real outcomes, promotion of the program, and program improvement (Lavinghouze et al., 2011, p. 3).

As previously stated, pediatric drowning research has been conducted at the local, state and federal level. In addition to the governmental agency review, medical associations like the American Academy of Pediatrics have conducted research in this subject to prevent future injury and death. The research has indicated that most pediatric drowning victims are from the ages of 0-4 and in the Southwest Region of the United States drowning occurs in swimming pools.

Casual factors must be determined for a community risk reduction program to decrease

the identified risk. The educational process must be targeted to a specific audience, continuously

applied, and evaluated through a formal process after delivery to conclude that expected

outcomes match the actual outcomes. It is imperative for organizations to capture outcome

measurements and establish if a PSE is effectively acquiring the desired behavior modification or

merely obtaining output measurements which the GFD and most organizations evaluate. The use

of an evaluation plan will assist organizations with program improvement, validation for

program sustainability, and a formal document that can be used to disseminate the program

evaluation results.

Procedures

Prior to attending the EACRR course, the researcher had identified that most fire

prevention programs were not effectively being evaluated for outcome measurements. This

conclusion was established through anecdotal research and informal conversations with fire

prevention staff. The researcher recognized this issue as the most challenging management

problem for the GFD Fire Prevention Section in 2011 due to the massive increase in drowning

from 2009 to 2010. The researcher further realized that the current fire prevention staff did not

possess the time required to evaluate the pediatric drowning prevention program due to

decreased staffing, budget reductions, and department priorities.

The researcher also recognized, after completing the EACRR course, that the second

most challenging management problem for the GFD Fire Prevention Section involving risk

reduction was the use of a formal and comprehensive risk reduction program development

model. The researcher determined that this challenge must be addressed if risk reduction efforts

are to be successful in the community. The aforementioned budgetary and staffing reductions

have resulted in subsequent challenges that mandate all programs utilize an effective and

efficient process. While attending the EACRR course, it became apparent to the author that the

greatest application for the knowledge received in the course would be introduction of the NFA

Community Risk-Reduction Model to the GFD Pediatric Drowning Prevention Program.

The descriptive research method was selected to identify the current effectiveness of the

GFD Pediatric Drowning Prevention Program and to propose potential recommendations for

program improvement to the fire chief. Initial research began in the Learning Resource Center

(LRC) at the National Fire Academy while in residence for the EACRR course. The LRC online

catalog was utilized with a title keyword search for drowning and drowning prevention. A

number of books, periodicals, and applied research projects were reviewed prior to conclusion of

the course.

After returning from the EACRR course a comprehensive exploration for data was

conducted through the internet with the dogpile.com search engine once again for the keywords

of drowning and drowning prevention. Dogpile.com was selected as a search engine because of

unique research features:

Powered by Metasearch technology, Dogpile returns all the best results from leading

search engines including Google, Yahoo!, Bing and Ask, so you find what you are

looking for faster.

Each search engine has its own method of searching and each will return different

results. Dogpile looks at all of them, decides which are most relevant to your

search, eliminates duplicates and reveals them to you. In the end, you get a list of

results more complete than anywhere else on the Web. (Dogpile, n.d., para. 1-2)

Dogpile returned a comprehensive list of potential sources.

After completing the literature review, demographic data for the City of Glendale, Arizona was acquired from the U.S. Census Bureau to compare the city statistics with national, state, and local statistics. The local statistics compared to the City of Glendale was the City of Chandler, Arizona as both cities are of the same relative size and population. The author reviewed all drowning incident dispatch data for GFD from 2007-2010. The researcher filtered the data to concentrate evaluation on pediatric drowning incidents that occurred in the City of Glendale. The researcher then utilized the geographical locations of the incidents to create a series of maps that provide a visual representation of where the drowning events occurred throughout the city. The maps that were created can be found in Appendices B through F. The data was reviewed to compare the risk of drowning in the City of Glendale versus national benchmarks that had been established by the CDC, state benchmarks that had been established by the Arizona Department of Health Services, and a local comparison with the City of Chandler.

The author completed the incident evaluation by reviewing all patient care reports and documenting commonalities involving age, witnessed or un-witnessed drowning, and if CPR or rescue breathing was initiated prior to arrival of fire department units. These criteria were selected to assist with categorization of the incidents as submersion, near-drowning, or drowning in this research project. The spreadsheet that was created out of this evaluation process can be found in Appendix G

Although descriptive research was the primary research method for this project, correlational research was used to establish commonalities in the patient care reports. It should be noted that the sum of evaluated incidents from 2007-2010 totaled 30. The number of thirty or n=30 is important to justify that a valid sample was evaluated. The identification of 30 as a

statistically significant sample size is supported by educational research experts Gay, Mills, and Airasian (2009) who advised, "… some researchers cite a sample size of 30 as a guideline for correlational, casusal-comparitive, and true experiment research. For correlational studies, at least 30 participants are needed to establish the existence or nonexistence of a relation" (pp. 132-133).

The researcher interviewed previous fire prevention personnel, current fire prevention personnel, and the fire chief to ascertain past and present drowning prevention program practices. The researcher chose to interview the fire chief first to learn of his strategic vision for the program and also document the program objectives that were established under his leadership. The remaining subjects were interviewed in a chronologically based timeline beginning with the subject that possessed the most historical experience in the division, followed by progression of increasing contemporary experience, until the current program manager was interviewed. The researcher began the interview with Deputy Chief Patty Frey who is the last active fire department member that was involved with the program from 1998-2003. Chief Frey was assigned to the GFD Community Services Division as a captain during that time period.

The researcher then interviewed Julie Watters who supervised the GFD Community Services Division as the Community Services Administrator which was equal to the rank of assistant chief from 2002-2005. Deputy Chief Elio Pompa was interviewed next as he was assigned to the division from 2003-2004 as a direct report to Julie Watters, assumed all supervisory responsibilities in 2005, and maintained those responsibilities until 2007. Penny Allen, a former fire department employee who functioned as the Community Relations Coordinator from 2005-2008 was interviewed after Chief Pompa. Finally, Lisa Kutis who is the Fire Community Outreach Coordinator and current manager of the program was interviewed last.

The interviews with Chiefs Frey, Pompa, and Burdick, as well as former Community Relations Coordinator Penny Allen and Fire Community Outreach Coordinator Lisa Kutis were conducted over the phone due to scheduling difficulties. The interview with Julie Watters was conducted in person. The following research questions were asked during the interview: a) What evaluation process did the Glendale Fire Department utilize to identify pediatric drowning as a community risk? b) What programs did the Glendale Fire Department implement to reduce pediatric drowning? c) How has the Glendale Fire Department evaluated the pediatric drowning prevention program?

Limitations of the Research

Certain limitations in the administration of this study are realized. The research was completed in the Glendale Fire Department and the City of Glendale which may not be generalized for all fire departments or cities due to the culture, norms, fire department administrative structure, and fire department staffing model. The department is categorized as a metropolitan sized department with 236 sworn operational personnel. Departments and cities significantly smaller or larger may not experience the same challenges. Additionally, the labor-management relationship benefits from an extremely strong alliance may not apply to many other organizations.

The review of incident data and patient care records provides a limited view of what actually occurred on the drowning, near-drowning, or submersion incident. The definition of submersion, near-drowning, and drowning may vary between paramedics and their respective documentation. The ability of a bystander to determine seconds versus minutes may be inaccurate and is strictly dependent upon that individual's ability to estimate a time period and reaction to emergency events. This is important to recognize as one to two second versus one to

two minute submersions are vastly different events. Additionally, some victims may have received CPR or rescue breathing prior to the arrival of fire department unit, not because it was actually required, but because a lay person misunderstood the medical status of the victim.

Assumptions of the Research

It was assumed that all drowning data was documented correctly by dispatchers and paramedics. Furthermore, it is assumed that the previous personnel managing the drowning prevention program did not project any personal bias during the interviews. An additional assumption surrounds the previous managers' understanding of the casual factors surrounding drowning in the city and preventing any personal bias or perceptions to dictate the program progress. The final assumption involves the researcher. The researcher has two children under the age of 10. The researcher has not consciously projected any bias or hypersensitivity as a parent of young children regarding the drowning impact in the City of Glendale.

Results

Through descriptive research, data and information was constructed and evaluated to determine the current effectiveness of the GFD Pediatric Drowning Prevention Program and to propose potential recommendations for program improvement to the fire chief. The four research questions that directed the examination of the drowning prevention were: a) What evaluation process did the Glendale Fire Department utilize to identify pediatric drowning as a community risk? b) What programs did the Glendale Fire Department implement to reduce pediatric drowning? c) How has the Glendale Fire Department evaluated the pediatric drowning prevention program? d) What is the correlation between the drowning events from 2007-2010 and the Glendale Fire Department Pediatric Drowning Prevention Program?

Question 1: What evaluation process did the Glendale Fire Department utilize to identify pediatric drowning as a community risk?

The researcher interviewed previous fire prevention personnel, current fire prevention personnel, and the fire chief to ascertain past and present drowning prevention program practices. The researcher chose to interview the fire chief first to learn of his strategic vision for the program and also document the program objectives that were established under his leadership. The remaining subjects were interviewed in a chronologically based timeline beginning with the subject that possessed the most historical experience in the division, followed by progression of increasing contemporary experience, until the current program manager was interviewed. Chief Burdick advised that the GFD Pediatric Drowning Prevention Program originated in partnership with Phoenix Fire Department's "Just a few seconds" program. The "Just a few seconds" program originated in 1989, "in response to a dramatic increase in the number of pediatric drowning in the city of Phoenix…. The group, comprised of a diverse group of citizens, designed, formulated and produced a public education campaign in a period of six days" (International Association of Fire Chiefs, n.d., para. 3).

Chief Frey stated that the risk was further identified in partnership with the "Water Watchers" and Drowning Prevention Coalition of Arizona (DPCA). The "Water Watchers" partnered with the DPCA in 1999. This partnership was a success and that changed drowning prevention efforts in Arizona. The DPCA (2009) realized that the partnership:

> … enabled us to participate in Water Safety Day, which teaches water safety to thousands of school aged children each year.… we utilized that event as a kick-off for our April Pools Day events, which increases awareness of the issue throughout the Valley. (para. 6).

Julie Watters reported that the City Manager provided direction in 2002 that the fire department should become more active in the community with a door to door drowning campaign. This management guidance, in combination with Julie's previous experience as a seasoned television reported who had covered dozens of drowning incidents, led to the focus of drowning prevention for the GFD. Deputy Chief Pompa reinforced that the partnership with Phoenix Fire Department (PFD) and the "Just a few seconds" program assisted with centering the risk prevention effort on drowning prevention. Maryvale, an aging neighborhood in the City of Phoenix, was a focal point for the Phoenix Fire Department drowning prevention effort. This area of Phoenix was the eastern border of the City of Glendale and specifically the 85301 zip code which contains a sizeable number of drowning incidents for GFD.

Penny Allen conveyed that delivery of drowning prevention efforts were mandated in her job description as duties and expectations. Penny began working in Community Services under Chief Pompa who also provided additional direction in partnership with PFD as noted above. Lisa Kutis related that she continued the multiyear partnership with the DPCA and focused on the previously identified challenges surrounding the 85301 zip code.

All previous explanations of risk evaluation contained parts of the first two steps in the NFA Community Risk-reduction Model. All six steps of the NFA Community Risk-reduction Model were not described in any individual interview or in totality of all interviews. The interview process did address changes in the program during the various transitions of personnel from 1998-2011.

Question 2: What programs did the Glendale Fire Department implement to reduce

pediatric drowning?

Chief Burdick advised that the first water safety walks in 2002 were conducted throughout the city in all council districts. The department suspected through anecdotal evidence that most drowning occurred in specific areas throughout the city. However, all areas in the entire city were covered to avoid perceived inequities for all city council districts. The second walk was initiated in the highest drowning areas and expanded to all council districts throughout the city to once again avoid any perceived inequities.

Chief Frey recounted that the department participated in the DPCA and the DPCA's annual water safety event at Mesa Community College in which children from all over Maricopa County were bused in to attend. GFD in partnership with the City of Glendale Parks and Recreation Department conducted a separate annual water safety day at Glendale Community College that featured a mock drowning, water safety education, and vendor exhibits. The mock drowning was conducted with GFD Paramedics and City of Glendale Lifeguards while the GFD Clowns provided the water safety education. The vendor exhibits featured door locks, barrier devices, door alarms, and pool alarms. Water safety messaging was centered on three Es: Education, Enforcement, and Engineering. The prevention effort also utilized Fire Pals, which are firefighters that teach fire and life safety classes in elementary schools, to educate children about water safety.

Julie Watters stated that multiple water safety walks with extensive sponsorships and strategic planning were conducted. Strategic objectives of the program included extensive use of the media including: coordination of the water walks for peak telecasting times of 5am and 5pm to capture both early morning and early evening news coverage, census tract population density

evaluation for children ages five and under, and evaluation of specific peak days of the week

regarding previous drowning incidents. Flyers with a specific public safety announcement

(PSA), that was water safety focused, in both English and Spanish were also distributed to all

elementary schools in the city for preschool, kindergarten, and first grade students. The

commitment to drowning prevention involved Julie attending national drowning prevention

meetings to speak on the topic of effective media use for distribution of water safety information.

Chief Pompa reinforced that the partnership with the DPCA was continued and the City

of Glendale specific events at Glendale Community College were very effective regarding

citizen contacts. He advised that targeted PSAs were delivered two to three days following an

incident encompassing all forms of media including print, broadcast, and Spanish speaking

television and radio stations. GFD administration also utilized the excellent relationship with the

Local 493 Chapter of the International Association of Fire Fighters to offer a free pool fence

installation program for qualifying citizens.

Penny Allen reported that the first that citywide water safety walks were conducted, but

then the amount of volunteers and sponsorship greatly decreased and the entire city could not be

effectively covered. She changed the focus to targeted venues and in May of 2006 conducted the

first water safety event in a local mall just before Mother's Day. The event focused on stamping

children's hands with a written contract for parents to provide water safety supervision for the

child. She also used all opportunities to convey the water safety message including: parent-

teacher association meetings, presentations at schools and community pools, and at the end of

fire safety presentations. The program began to concentrate on parents of children aged 0-4

rather than older children. Decreased staffing over the next two years affected the program's

ability to me more productive.

Lisa Kutis conveyed that currently one annual water safety day is conducted in a north or south area of the city at a public pool and free swim lessons are provided. The partnership with the DPCA has been continued as with previous years. "Stewie the Duck Learns to Swim" is a water safety book directed to children ages 2-6. Presentations of "Stewie the Duck Learns to Swim" are provided at libraries, the local Head Start Program, preschools, kindergarten classes, and first grade classes throughout the city. Targeted water safety walks in areas that do not have pool fences and children under the age of six have been conducted in partnership with Cardon Children's Medical Center. The areas were identified in collaboration with the City of Glendale Neighborhood Partnerships Department and through evaluation of satellite photos of homes within the 85301 zip code.

The interviews illustrated that the GFD Pediatric Drowning Prevention Program has continued to address drowning risk through a process of evolution that has been dictated by staffing decreases and budget reductions. Programs have been changed slightly during different program managers. The DPCA partnership has been a constant part of the program structure since 1998.

Question 3: How has the Glendale Fire Department evaluated the pediatric drowning prevention program?

Chief Burdick advised that he is not aware of any formal process that has been used to evaluate the program effectiveness. Chief Frey reported that a pretest and posttest were administered randomly to children that were educated in water safety courses by the Fire Pals, but no evaluation was done for the entire program. Julie Watters stated that there was not a formal process, but during 2006 there was not a single adult or pediatric drowning fatality. This has been confirmed through data retrieved from Children Safety Zone. The data appears to be

credible as a viewer is redirected from the DPCA website to Children Safety Zone for retrieval of drowning statistics.

Chief Pompa related that no formal evaluation process was conducted and decreased budgeting and staffing did not provide the required resources for a process to be achieved. Penny Allen also conveyed that no formal evaluation process was performed and that she wished a statistical analysis could have been performed. She further expressed that the program could have been improved by focusing on new parents, through new parent classes at hospitals, and parents that may be affected by language barriers. Lisa Kutis communicated that no formal evaluation process has been executed; however drowning data from previous years has been utilized in a comparative analysis. She also suggested that it is difficult to ascertain how many lives have been saved through the education process as the saves will not generate an emergency response which is what the department and DPCA currently track outcome evaluation.

All interviews demonstrated that a formal evaluation process has not been conducted to determine comprehensive effectiveness of the program during any year. A limited evaluation of the program was conducted with random pretesting and post testing of students that were educated through the Fire Pal Program during 1998-2003. The testing however was not a global assessment of the program, and focused on the knowledge gained for the students during the program delivery which cannot be considered an evaluation of behavior modification.

Question 4: What is the correlation between the drowning events from 2007-2010 and the Glendale Fire Department Pediatric Drowning Prevention Program?

Although the terms drowning and near-drowning have been consolidated into a single term of drowning for this research project to evaluate the entire impact of the drowning prevention effort, the two terms will be categorized separately for data comparison between the

years of 2007-2010. The methodology has been utilized so that effective evaluation can be conducted to determine what percentage of all drowning incidents have resulted in potential fatalities and also to determine causal factors of the drowning incident. The term of submersion will also be utilized as a separate category to differentiate between a victim that was under water for a very short time period, typically 30 seconds or less, and did not require any rescue breathing or CPR. This research project will utilize the definition of submerge from the Merriam Webster Online Dictionary to classify the term submersion. Webster Online Dictionary defines submerge as "to put under water" (Merriam Webster[®], 2011, bullet 2).

As previously noted, The City of Glendale crude rate of fatal and non-fatal drowning for 2007 was 1.62 per 100,000 citizens. This rate was well below the 2007 combined national crude rate of 5.64 for ages 0 to 15. The city has experienced an increase in drowning emergency response since 2007 and pediatric drowning incidents specifically have grown from four in 2007 to fourteen in 2010 which signifies a crude rate of 6.17. The city has not experienced a level of drowning rate this extreme since 2004 when the crude rate was 6.00. Additionally, the 2010 City of Glendale crude rate of 6.17 is significantly higher than the City of Chandler, Arizona, which possesses a population of 236,123 with a crude rate for drowning of 0.42. Table 2 below conveys the drowning crude rate that occurs with the City of Glendale in comparison to the City of Chandler and the United States.

Table 2

Fatal and Non-fatal Crude Drowning Rate per 100,000 Citizens

Year	United States	City of Glendale	City of Chandler
2004	7.63	6.00	1.36
2007	5.64	1.62	2.07
2010	Unavailable	6.17	0.43

The City of Glendale incident specific statistics for the category of drowning were between 25% as the lowest in 2007 with one out of four victims requiring CPR and 40% as the highest in 2008 with two out of five victims requiring CPR. The incident statistics for the category of near drowning encompassed the greatest divergence from 20% in 2008 to 71% in 2009 with some, but not all victims requiring CPR or rescue breathing. The incident statistics for the category of submersion contained a substantial divergence also with 2009 comprising a 0% rate rising to a 50% rate in 2007 and 2010. The drowning category statistics were also compared with the Children Safety Zone statistics to ascertain the number of drowning category victims that were fatalities. In 2007 the single drowning victim was not a fatality. In 2008 and 2009 both drowning victims were fatalities. In 2010 three out of the four drowning victims were fatalities. Table 3 below articulates the increase in drowning frequency from 2007 to 2010 in the City of Glendale.

Table 3

City of Glendale Incident Specific Statistics

Year	Drowning	Near Drown.	Submersion
2007	25%	25%	50%
2008	40%	20%	40%
2009	29%	71%	0%
2010	29%	21%	50%

The researcher found that the term submersion was used by many paramedics for the chief complaint section of the patient care record. The term submersion was utilized 14 times compared with drowning being used 8 times. The other eight incidents were documented with various other terms. This is significant to identify because the researcher found discrepancies in the reported data for 2008 and 2010 to the DPCA when compared with data retrieved from the GFD records management system. The incongruity involved two pediatric drowning incidents being reported to the DPCA in 2008 when the GFD records system documented five. In 2010 four pediatric drowning incidents were reported to the DPCA when the GFD records system documented fourteen.

Discussion

Although all previous explanations of risk evaluation contained parts of the first two steps in the NFA Community Risk-reduction Model the GFD's evaluation lacked many essential components. The researcher cannot find any evidence that: a project plan was developed, casual factors were developed, priorities were established based on rated risks, acceptable risk was

identified, or risk-reduction objectives were created. It should be noted that no GFD personnel

have previously attended an EACRR course prior to the author. Additionally, the only other GFD

Chief Officer that has attended an EFO Course was in 2001 and the researcher is unsure if

EACRR was part of that course curriculum.

It is apparent to the researcher that the GFD Pediatric Drowning Prevention Program has

continued to progress through a process of evolution that has been dictated by staffing and

budget reductions, as well as being identified low among department priorities. Each phase of the

program has been unique and approached the drowning risk with different programs. It is

evident, as previously stated, that a project plan should be developed, casual factors should be

established, priorities should be established based on rated risks, acceptable risk should be

identified, and risk-reduction objectives should be created.

The risk reduction efforts portrayed in all interviews are evidence of the fire chief, city

manager, and city council's vision to make the city a healthier and safer community for all

residents. Each program manager applied a different set of knowledge, skills, and abilities that

have provided a distinct influence for each stage of the program. As previously identified, the

researcher believes that the program can be improved through application of the missing

activities identified in the NFA Community Risk-reduction Model. Research Question Number

Three accentuates that the most critical missing link of the program is a formal outcome based

evaluation process. The DPCA partnership has been a constant and positive part of the program

structure since 1998 and the DPCA has provided focus for the previous and current programs.

The data analysis completed with Research Question Number Four demonstrates that the

actual drowning category was smaller than expected. As previously reported, statistics for the

category of drowning were between 25% as the lowest in 2007 with one out of four victims

requiring CPR and 40% as the highest in 2008 with two out of five victims requiring CPR.
Comparison of the drowning category statistics with the Children Safety Zone data reinforced
that most children who require CPR and are found floating after an undetermined or extended
amount of time usually expire.

The comparison of drowning crude rates for the City of Chandler versus the City of
Glendale is a local comparison that mandates further evaluation. While both cities are
comparable for population and other demographics the researcher found that the pool barrier
ordinances and subsequent city codes that are enforced between the two cities are not. The City
of Chandler requires that all residential pools have both a primary fencing barrier that is at least
six feet tall and a secondary barrier that meets the specifications of "a 5-foot minimum wrought
iron or block and wrought iron combination measured on the side of the barrier that faces away
from the swimming pool" (City of Chandler, n.d., bullet 1). Conversely, The City of Glendale
requires that the primary fencing barrier is at least five feet tall and a secondary barrier is
required in certain circumstances only. The City of Glendale (2011) Municipal Code states:

> A secondary barrier is required if a child younger than 6 years of age will or does reside
> at the residence. Pools built prior to 1998 do not require a second barrier unless there is
> an alteration or addition that increases the livable area and provides access to the pool; or
> if the residence is sold. (bullet 24)

The use of the term submersion, by emergency response personnel, versus drowning
should be defined and clarified by medical direction to assure that patient documentation and
reporting statistics are consistent and accurate for the DPCA. An additional concern that was
indentified is centered on training of our emergency response personnel for drowning statistic
reporting. The last official training that was offered for the emergency response personnel, that

the researcher is aware of, was in 2000 when the program was started. The lack of reinforcement and training regarding the importance of capturing accurate drowning statistics may be responsible for the 2008 and 2010 inconsistencies.

Recommendations

The information denotes that although the pediatric drowning effort has been active for well over twenty years in the City of Glendale, a more targeted effort must be continued. The researcher recognizes this project is not unparalleled academically or scientifically and additional research should be completed to assist the Glendale Fire Department with development of the community risk reduction process through identification of research based solutions. Although the findings of the research project may not be applicable to fire service organizations globally, they do provide specific recommendations that may be relevant to the Glendale Fire Department. The research provided the following recommendations for review by the fire chief.

1. The Prevention Section of the Glendale Fire Department should further analyze the City of Chandler's low drowning statistics and subsequently the Chandler Fire Department's Drowning Prevention Program to ascertain if specific improvements can be made to the current Glendale program.

2. The Prevention Section of the Glendale Fire Department should use the NFA Community-risk Reduction Model for all risk reduction projects.

3. The Prevention Section of the Glendale Fire Department should provide updated training on the water related incident form reporting to the emergency response personnel. This will assure that accurate information is being reported to the Drowning Prevention Coalition of Arizona.

4. The fire department should recommend to the city council that the swimming pool ordinance is updated to require a secondary barrier for all pools in the city consistent with the City of Chandler Swimming Pool Ordinance.

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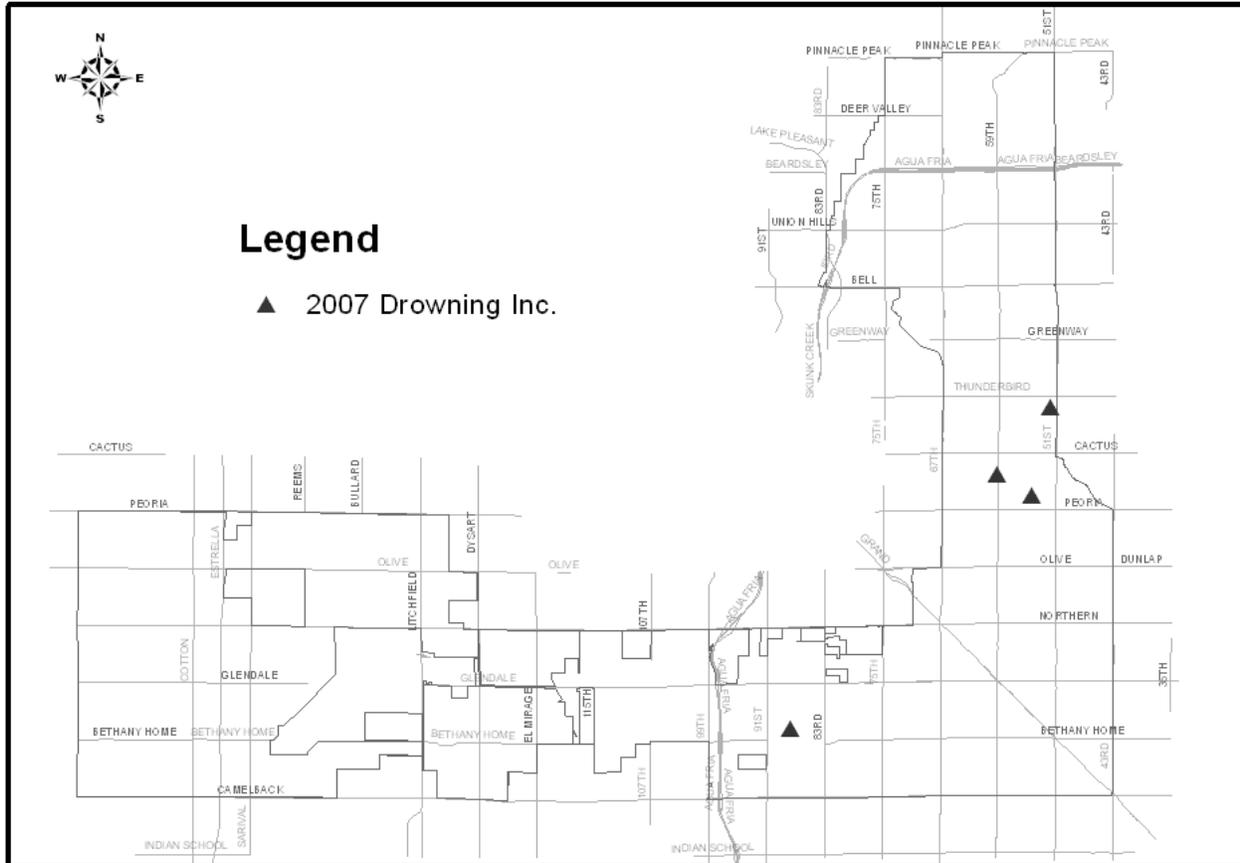   tableservices/jsf/pages/productview.xhtml?pid=DEC_10_DP_DPDP1&prodType=table.

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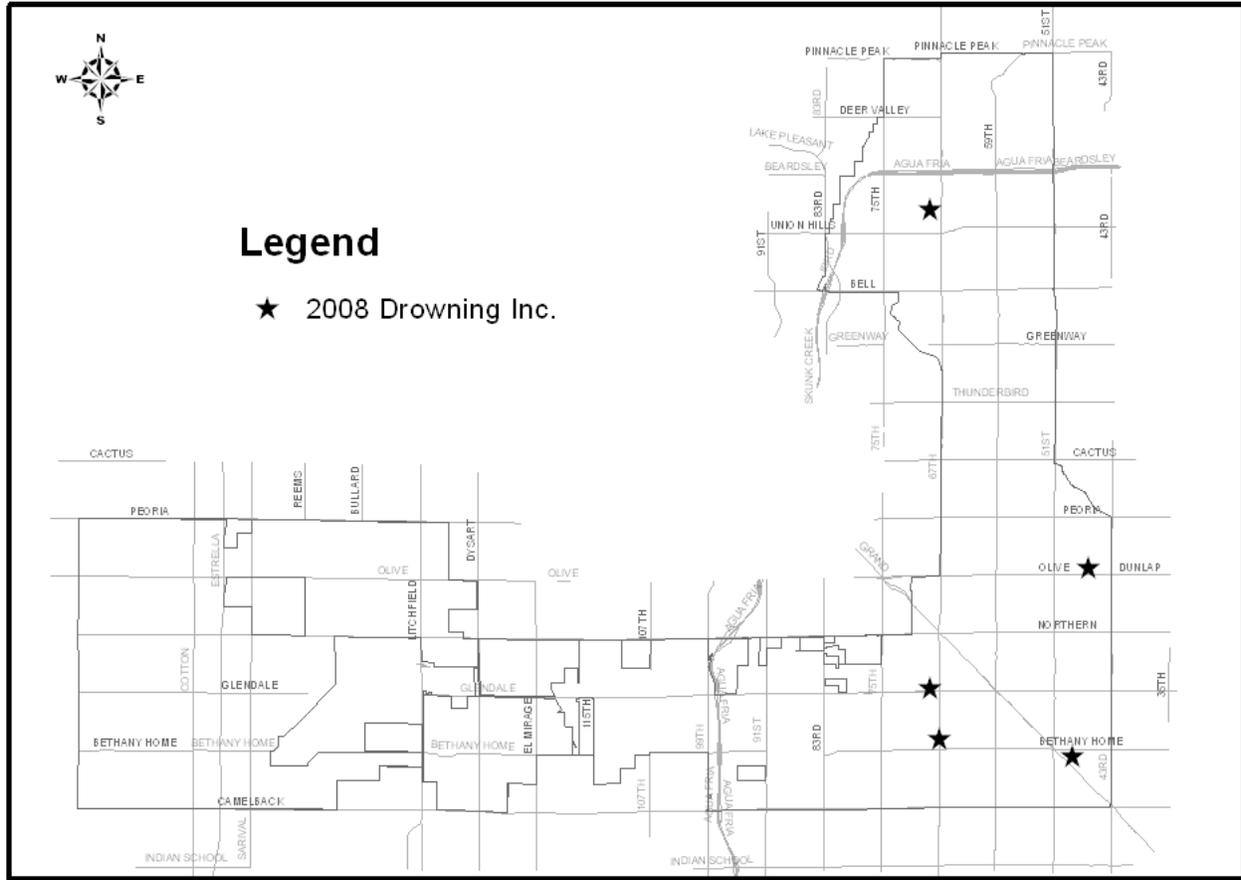Appendix A: Glendale Fire Department Organization Chart

Appendix B: Map of 2007 Drowning Incidents

Prepared by GFD Planning

Appendix C: Map of 2008 Drowning Incidents

Prepared by GFD Planning

Appendix D: Map of 2009 Drowning Incidents

Prepared by GFD Planning
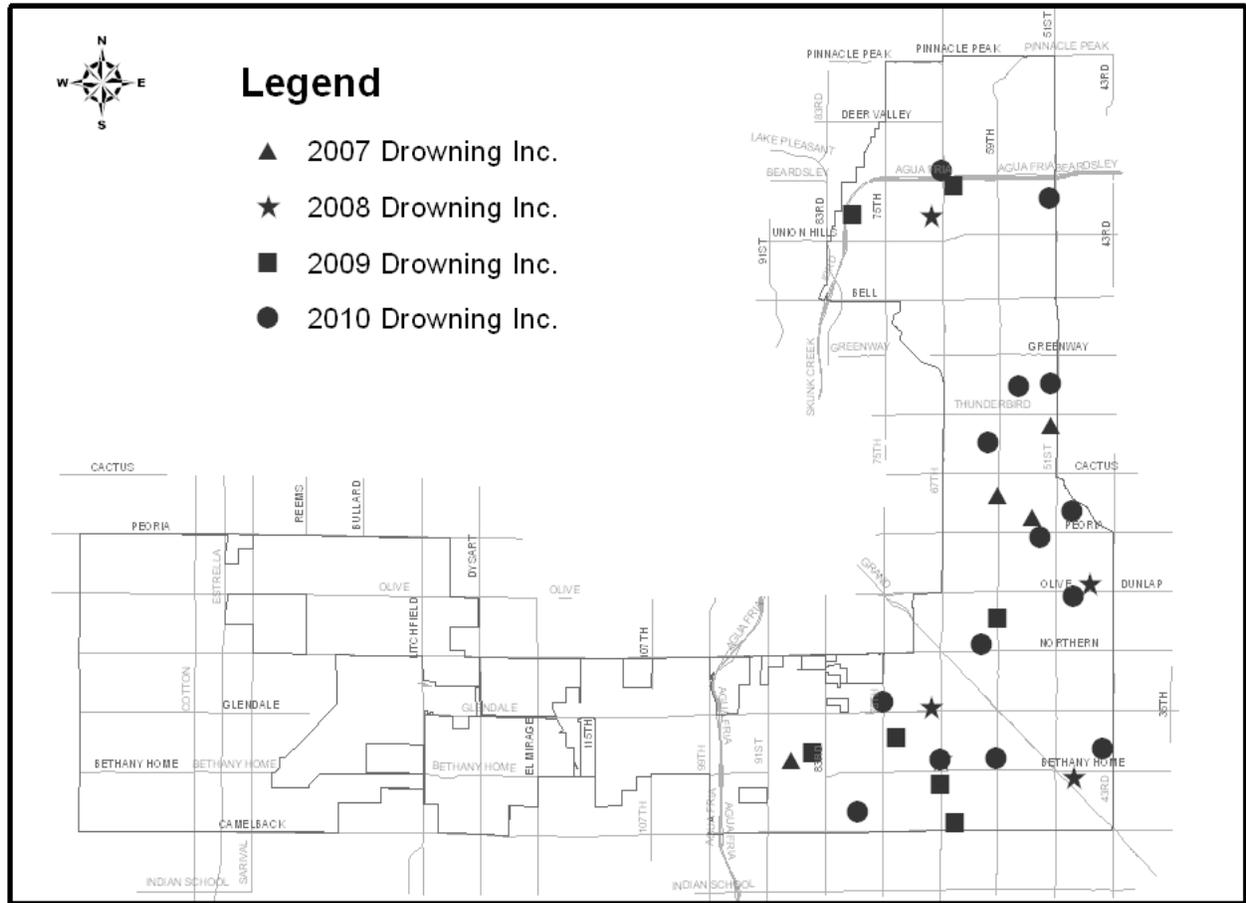
Appendix E: Map of 2010 Drowning Incidents

Prepared by GFD Planning

Appendix F: Map of 2007-2010 Drowning Incidents

Prepared by GFD Planning

Note: The drowning incident documented at 67th Avenue and Bethany Home for 2010 also includes a drowning at the same location for 2008. The 2008 icon cannot be differentiated due to the black and white map colors.

Appendix G: Drowning Incidents and Commonalities

Year	Number	Incident #	Date	FD Unit	Map Page	Age	Incident Information
2007	1	07-067429	03/11/07	191, 153	NW1007	1 year	Drown-? time, Asystole
	2	07-116617	04/29/07	157	NW1006	2 years	Sub - approx. 30 sec
	3	07-137430	05/20/07	154	NW1106	5 years	Near - 1 min
	4	07-161125	06/14/07	158	NW0610	3 years	Sub - Few mins.
2008	1	08-127247	05/07/08	157	NW0905	15 months	Drown - Asystole
	2	08-149150	5/39/08	152	NW0608	2 years	Sub - Few secs
	3	08-201308	07/22/08	155	NW1508	3 years	Near - ? time, limp & rescue breathing
	4	08-249664	09/10/08	26	NW0505	1 year	Drown - ? time, Asystole
	5	08-318251	11/21/08	152	NW0708	8 months	Sub - ? time
2009	1	09-012388	01/14/09	192	NW1509	4 years	Near - 4 mins, CPR
	2	09-023307	01/26/09	158	NW0610	1 year	Near - ? time, CPR
	3	09-134238	05/17/09	151	NW0806	1 year	Near - ? time, rescue breathing
	4	09-140267	05/23/09	152	NW0608	18 months	Near - ? time, CPR
	5	09-158729	06/12/09	152	NW0507	3 years	Near - ? time, CPR
	6	09-174225	06/28/09	155	NW1507	2 years	Drown - ? time, Asystole
	7	09-201158	07/26/09	152	NW0507	4 years	Drown - ? time, Asystole
2010	1	10-026412	01/28/10	152	NW0708	9 weeks	Ped bath tub, Sub, 1sec
	2	10-042081	02/14/10	M155	NW1506	9 months	Ped bath tub - Sub, 1sec
	3	10-117539	05/02/10	151	NW0605	17 months	Drown - ? time, Asystole
	4	10-123021	05/07/10	152	NW0608	6 years	Near - ? time, CPR
	5	10-127507	05/12/10	153	NW1107	15 years	Highschool Pool, Drown - ? time, Asystole
	6	10-130978	05/15/10	157	NW0807	3 years	Drown - ? time, Puleless Electrical Activity
	7	10-131762	05/16/10	153	NW1206	3 years	Sub - ? time
	8	10-135817	05/20/10	152	NW0606	3 years	Sub - <30 sec
	9	10-159164	06/13/10	158	NW0509	11 months	Near - 10-20 sec, CPR
	10	10-167653	06/22/10	156	NW1608	3 years	Sub - 10-20 sec
	11	10-173546	06/28/10	154	NW0906	2 years	Sub - 7 sec
	12	10-202703	06/28/10	153	NW1206	14 years	Mental disability, Sub - ? Time
	13	10-240147	09/04/10	154	NW1005	3 years	Near, 1-2 mins - No CPR, no distress
	14	10-323430	11/27/10	154	NW0805	16 months	Drown - ? time, Asystole

Note: Incident information from patient care reports was reviewed to determine commonalities among drowning, near-drowning, and submersion events. The following abbreviations were used in the table: ? = unknown, approx. = approximate, CPR = Cardiopulmonary Resuscitation, Drown = drowning, min = minute, mins. = minutes, Near = near-drowning, Ped = pediatric, Sub = submersion, sec = seconds.