Austin-Travis County Emergency Medical Services Responds to Drowning Incidents

An Analysis of Drowning Incidents from 2010– 2016

Background

Drowning is defined as the process of experiencing respiratory impairment from submersion/immersion in liquid.[1] Drowning outcomes are classified as death, morbidity and no morbidity.

Every year, drowning accounts for at least 372,000 deaths worldwide, including approximately 4,000 fatalities in the United States. [2,3] According to the National Center for Health Statistics, drowning represents the second-leading cause of unintentional injury-related death among children ages 1 to 14 years of age in the United States.[3] It is also the leading cause of unintentional injury death to children between the ages of 1 and 4.[3] Children ages 1 to 4 have the highest drowning rates.[3]

In 2014, there were 17 deaths due to drownings among Travis County residents of all ages.[4] From 2010 through 2014, there were 12 Travis County children less than 15 years of age that fatally drowned.[4] During the same five year time period, seven children between the ages of 1 – 4 years died from drowning.[4]

Information on the magnitude of nonfatal drownings in Travis County is limited. To gain a better understanding of the magnitude and circumstances of drowning incidents that occur among individuals under 19 years of age, an epidemiological investigation was initiated to analyze Austin-Travis County Emergency Medical Services (A-TCEMS) data on drowning incidents over a six year period.

Methods

Staff from A-TCEMS reviewed all drowning related incidents from July 2010 through June 2016. Those that occurred among individuals only under the age of 19 years were identified. Incidents were excluded if persons were injured in a pool that was not related to a submersion (e.g., a 14 year old female who jumped into a pool and injures her leg). Information on each incident included the date of incident, age and gender of individual, zip code of incident and residency, type of water the individual was submerged in (e.g., pool, bathtub, hot tub), transportation information, and medic notes. Date of incident was further classified by year, month, and day of the week (e.g. Friday, Saturday). If the drowning incident occurred in a pool, the type of pool was categorized (e.g., apartment, community, public, backyard, hotel). Transportation information included whether the patient was transported to the emergency room, transported to the emergency room with lights/sirens, transported by Starflight, refused transport, or was dead on the scene. Medic notes included information of what the medic reported. These qualitative data were reviewed and classified into whether the individual exhibited medical symptoms (e.g., loss of consciousness, no pulse, “wet lungs”, lower oxygen levels), if a lifeguard was present, if adults were distracted or child left unsupervised around the time of the

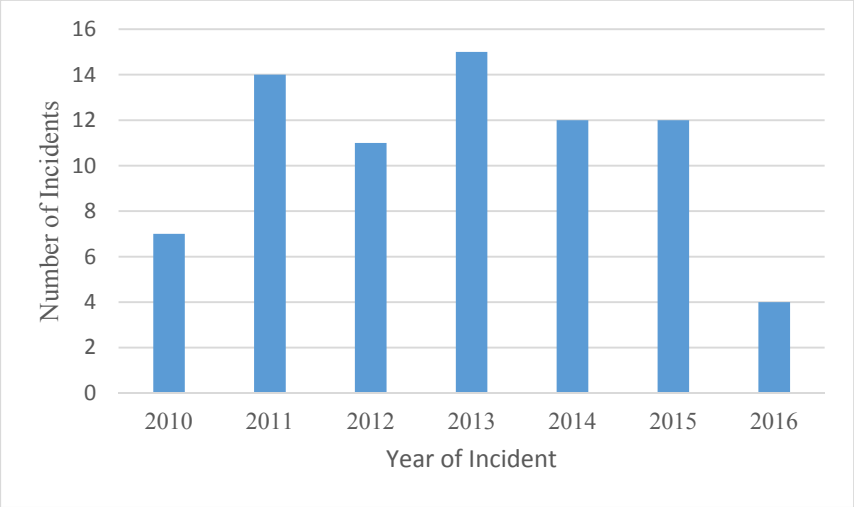
submersion, if cardiopulmonary resuscitation (CPR) and/or rescue breath was performed by bystanders, and the estimated minimum length of time the individual was submerged.

Data were analyzed by Microsoft Office Professional Plus 2013 Excel and CDC Epi Info (version 7.2.0.1).

Results

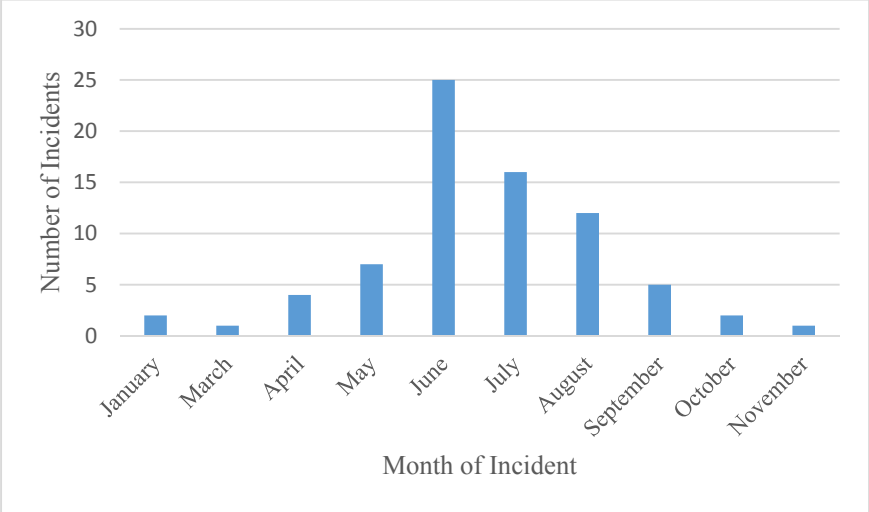
A-TCEMS responded to a total of 75 drowning incidents involving individuals under the age of 19 years between 2010 (July) through 2016 (June). The number of drowning incidents range from 11 to 15 per calendar year (12 months) (Figure 1). Two separate drowning incidents were reported on the same day twice in June 2013 (June 1 and June 10).

Figure 1. Drowning Incidents by Year



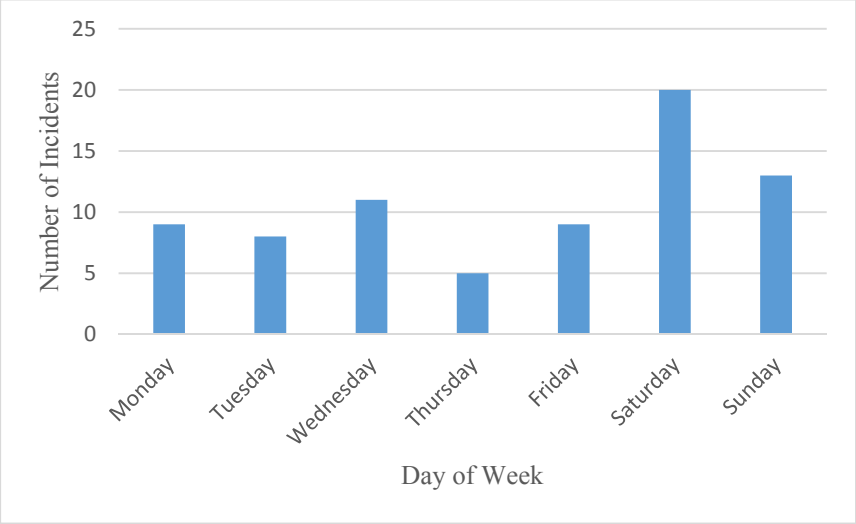
Fifty three (70%) drowning incidents occurred in the summer (June through August) (Figure 2).

Figure 2. Drowning Incidents by Month



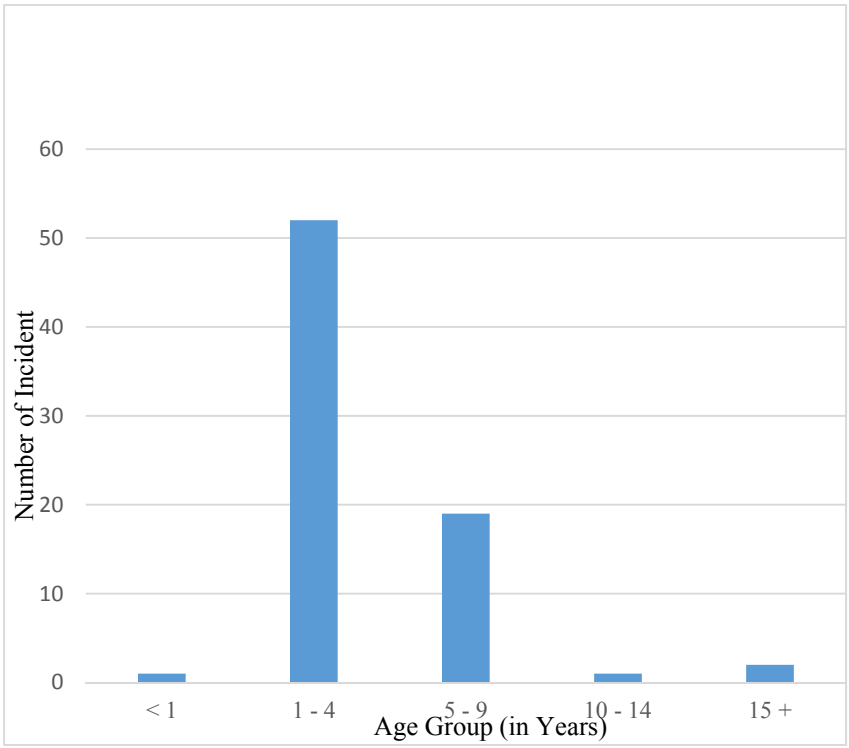
Thirty three (43%) drowning incidents occurred on the weekend (Saturday or Sunday) (Figure 3).

Figure 3. Drowning Incidents by Day of Week



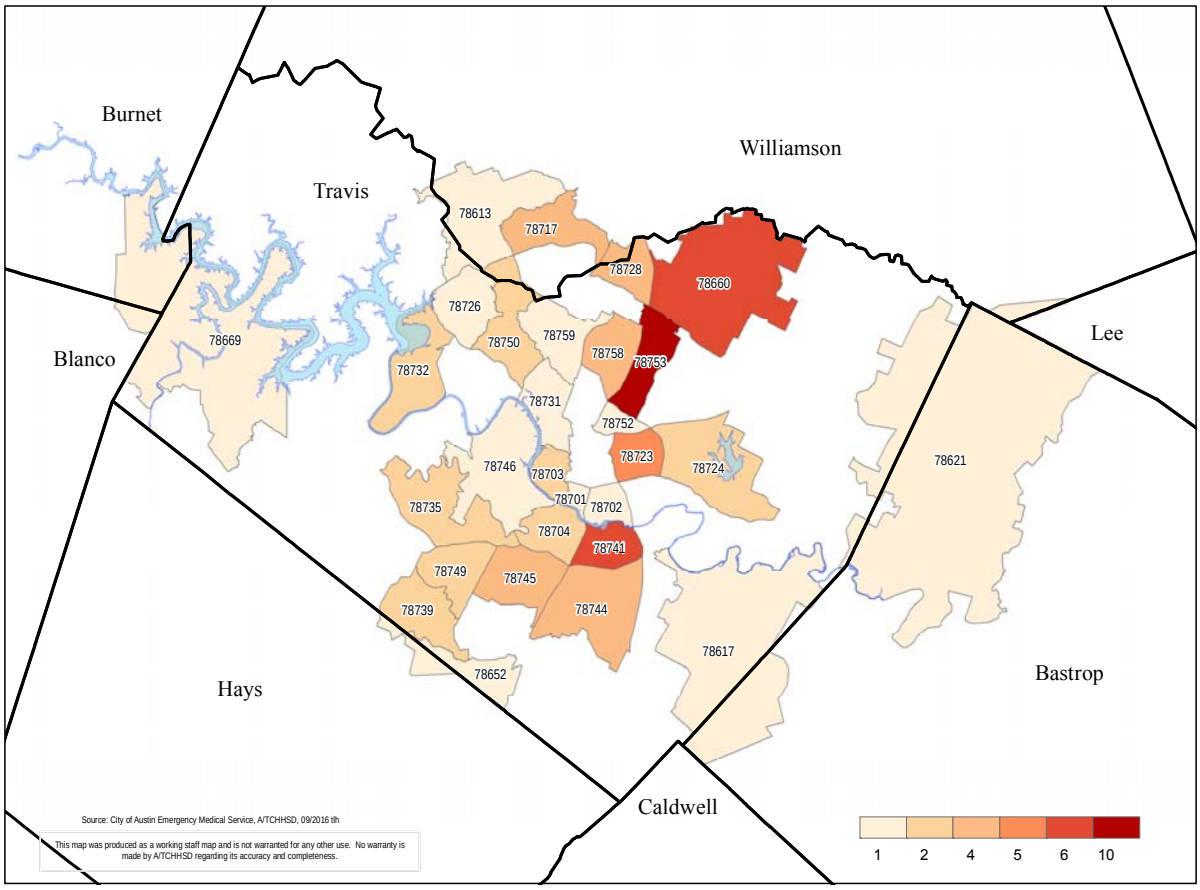
Of the 75 drowning incidents, 57% involved a male. The mean age was 3.9 years, with a range of 10 months to 18 years of age. Fifty two (69%) incidents involved an individual between the ages of one and four years (Figure 4). Twenty seven of the individuals (36%) were three years of age.

Figure 4. Drowning Incidents by Age Group



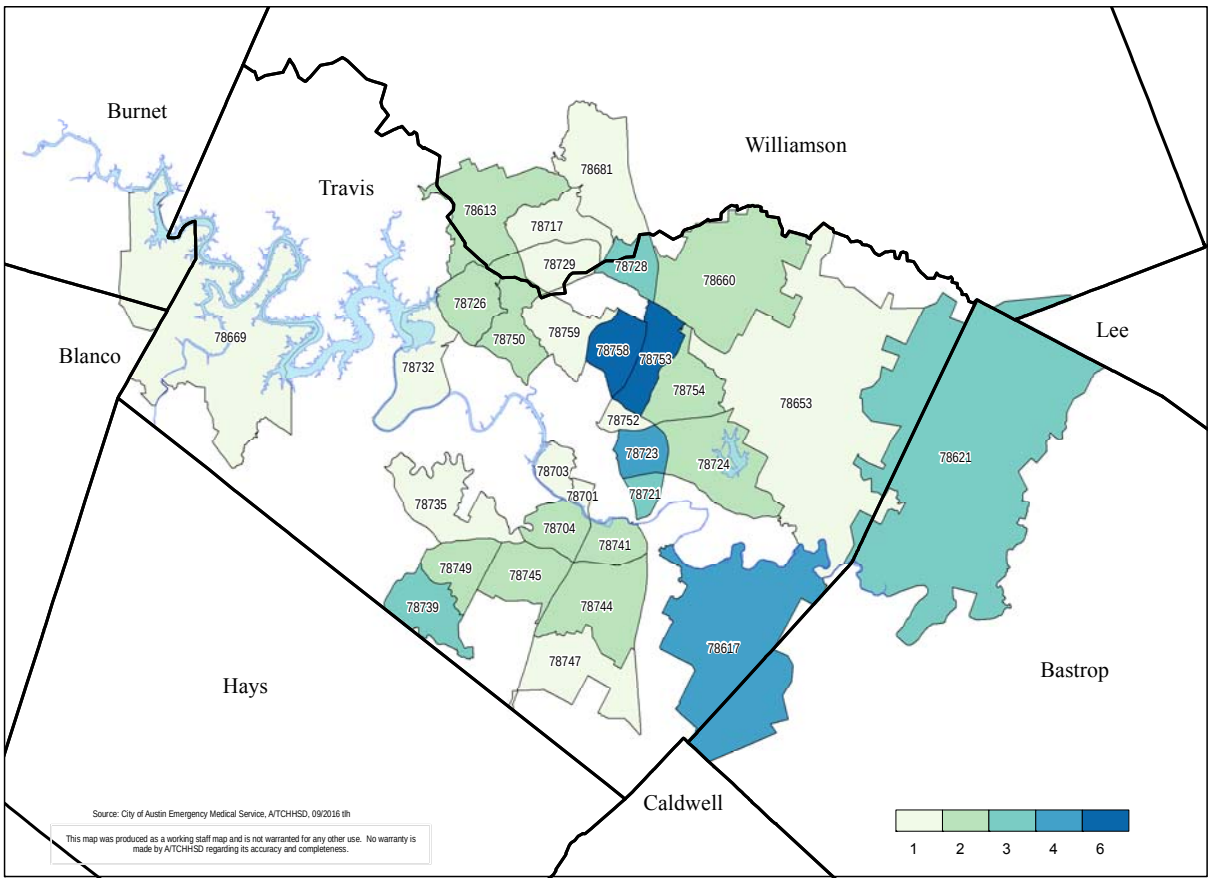
Drowning incidents occurred in 29 different zip codes (Figure 5). Zip code 78753 had the most (10) incidents.

Figure 5. Drowning Incidents by Zip Code of Occurrence



The residency of drowning patients occurred in 36 different zip codes (Figure 6). Zip codes 78753 and 78758 had the most residents involved in a drowning incident (6 each).

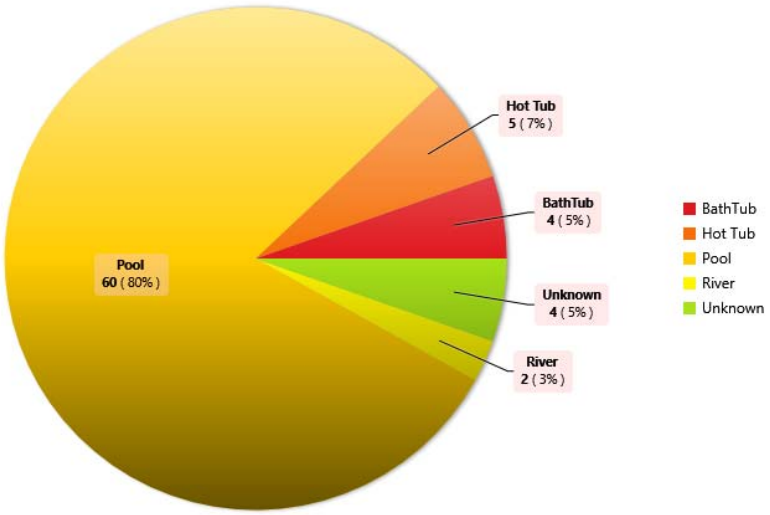
Figure 6. Drowning Incidents by Zip Code of Residency



Thirty eight (51%) of the drowning incidents occurred in the same zip code where the individual resided.

Sixty (80%) of the drowning incidents occurred in a pool (Figure 7). Other known locations included a hot tub, bathtub, and river.

Figure 7: Location of Drowning Incidents



Of the sixty (80%) drowning incidents that occurred in pool, the type of pool was unknown for 35 (58%) incidents (Table 1). Thirteen incidents occurred in an apartment pool, four incidents each in a community pool or public pool, three in backyard pool, and one in a hotel pool.

Table 1. Type of Pool in Pool-related Drowning Incidents

Pool Type	Number of Incidents
Pool (type unknown)	35
Apartment pool	13
Community pool	4
Public pool	4
Backyard pool	3
Hotel pool	1
TOTAL	**60**

Of all the drowning incidents, four (5%) incidents had information to indicate that a lifeguard was present.

In twenty eight (37%) drowning incidents, information indicated that adults were distracted or the child was unsupervised.

In twenty one (28%) drowning incidents, information indicated that bystander CPR or rescue breaths were initiated prior to EMS arrival.

In seventy (93%) drowning incidents the individual exhibited medical symptoms. Of those 70 individuals exhibiting medical symptoms, nearly a quarter (24%) (17) exhibited "wet lungs" and/or lower oxygen levels. (Wet lungs is also known as "rales" which is the medical term for crackles or coarse sounds heard when auscultating lung sounds with a stethoscope; the presence of this finding indicates that there is extra fluid in the lung; in the case of a drowning victim, it is an indication that water has gone in the victim's lungs.)

Sixty nine (92%) individuals were transported to the emergency room; four (5%) refused transport, and two (3%) were dead on the scene. Fifty six (81%) of the transported individuals were transported to the emergency room with no lights/sirens, 11 (16%) were transported to the emergency room with lights/sirens, and two (3%) were transported to the emergency room by Starflight (Table 2).

Table 2. Transportation Information of Drowning Incidents

Transportation Information	Frequency	Percent
Transported to the emergency room with no lights/sirens	56	81%
Transported to the emergency room with lights/sirens	11	16%
Transported to the emergency room by Starflight	2	3%
Total	**69**	**100%**

The estimated amount of time that the individual was submerged was noted in 24 (32%) of the drowning incidents. The mean amount of time submerged was approximately 2 minutes, with a range of 15 seconds to 10 minutes. For those three individuals that were submerged for an estimated time of 5 minutes or longer, two were transported to the emergency room with lights/sirens and one by Starflight.

Discussion

It is believed that this may be the first descriptive epidemiologic investigation of drowning incidents using A-TCEMS data.

The report documents certain epidemiologic patterns: EMS responds to 11 to 15 drowning incidents per year involving individuals under the age of 19 years; these occurred predominantly in the summer months, on the weekends, in pools; and involve primarily children between the ages of 1-4 years. The drowning incidents have occurred in 29 different zip codes throughout the county (zip code 78753 had the most occurrences). Available information indicates that in over a third (37%) of the incidents adults were distracted or the child was unsupervised at the time of the submersion, over a quarter (28%) of all incidents bystander CPR or rescue breaths were initiated prior to EMS arrival, and in five percent of all incidents a lifeguard was present. Of those individuals exhibiting medical symptoms, nearly a quarter (24%) (17) exhibited "wet lungs" and/or lower oxygen levels.

Drowning is an important public health issue, especially for children. During a five year period (2010 – 2014), seven Travis County children between the ages of 1 – 4 years fatally drowned.[4]

Drowning is preventable. Because no single strategy is likely to prevent all drownings, experts recommend layers of protection. This multilayered approach includes four–sided pool fencing, swimming instruction, supervision/lifeguards, resuscitation, and personal flotation devices (i.e., life jackets).[5,6]

The findings in this report are subject to several limitations. This investigation only focused on EMS responses to drowning incidents to individuals under the age of 19 years. This is not a complete picture of the drowning burden in our community. The investigation did not review death certificate information, data on hospitalizations, individuals that might have arrived at a hospital other than by EMS transport, or drowning incidents among people older than 18 years. The investigation also did not seek to determine the medical outcome of the individuals transported to the emergency department.

The EMS record may not have included complete information that could have been useful in this investigation. Patients were treated during an emergency situation with treatment as the primary focus, so data on such details as the circumstances of the drowning (e.g., length of time submerged, bystander CPR and/or rescue breaths, adults distracted or child left unsupervised), pool type, and the presence of lifeguards may have not been noted or recorded. The lack of comprehensive information may have led to the incomplete or misclassification of some conditions analyzed. The investigation may also have failed to identify additional individuals under 19 years of age that experienced drowning that were seen by EMS.

Despite these limitations, this investigation provides valuable data on current trends of EMS responses to drowning incidents. This investigation also provides a foundation for further work to describe and reduce the burden of drowning in our community.

This investigation makes the following public health recommendations:

1. Continue to support efforts for a multilevel approach to drowning prevention, including installing four-sided pool fencing, learning to swim, learning CPR, maintaining close supervision of individuals when in or around water, and wearing life jackets
2. Continue to work with water safety/drowning prevention organizations and coalitions to identify prevention opportunities for the upcoming 2017 drowning season
3. Continue to increase the awareness of drowning as a public health issue by distributing this report to:
    a. Austin/Travis County Emergency Medical Services (A-TCEMS)
    b. Environmental Health Services
    c. City of Austin Code Enforcement
    d. Travis County Child Fatality Review Team
    e. Travis County Medical Examiner
    f. Water safety/drowning prevention organization (Colin's Hope), and coalitions such as Safe Kids Austin and Texas Drowning Prevention Alliance
    g. Organizations that train and certify lifeguards
    h. Injury Epidemiology and Surveillance Branch, Texas Department of State Health Services
    i. Division of Unintentional Injury, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention (CDC)
4. Develop a systematic approach to continue to analyze A-TCEMS data on drowning incidents, including drowning incidents involving all ages
5. Review drowning mortality information
6. Explore conducting an investigation on hospitalizations related to drownings
7. Explore obtaining available data to describe the number and type of swimming pools in Travis County (e.g., data from City of Austin on swimming pool permits, data from Environmental Health Services on the location of public pools)

8. Submit an article of the investigation's findings for publication (e.g., Travis County Medical Society Newsletter)
9. With the upcoming 85th Texas Legislature in session, monitor proposed policy related to drowning prevention

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