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# Aquatic Management Survey to Identify Factors Related to Injuries, Accidents, and Deaths at Aquatic Facilities

Leland Yarger

The purpose of the study was to identify factors related to serious injuries and deaths sustained at senior colleges' and universities' aquatic facilities with respect to the aquatic management oversight of the facility. Surveys were mailed to senior colleges and universities that are listed with aquatic departments, and there was a 32.7% return rate. The study sample group consisted of 446 aquatic management professionals. The sample group consisted of senior colleges and universities ( $N = 446$ , responses = 146) listed in the National Intramural Recreational Sports Association (NIRSA) *Recreational Sports Directory (RSD)*, 1997 issue. This sample group was determined by each school's listing of aquatic departments or aquatic positions in the *RSD*. Participants were voluntary respondents located in the United States. Because senior colleges and universities are often the places that professional training and education originate, they are also an excellent source for analysis. If factors can be identified from aquatic management professionals to help reduce serious injuries and deaths at aquatic facilities, education about these factors can be provided to all aquatic facilities to help administrators and patrons reduce serious injuries and deaths.

**Keywords:** education, training, certifications, aquatic experience

Every year serious injuries and deaths take place at aquatic facilities. Some of these incidents occur at facilities with poor supervision, but others happen where supervision appears adequate. There are many contributing factors to the nature of serious injuries and deaths at aquatic facilities. There are cases in which the victim was acting inappropriately before the incident. Still other victims had no warning before the incident; such is the case with medical emergencies. In most incidents of serious injuries and deaths, the aquatic management could have prevented or reduced the severity of the incident with proper planning or support services (American National Red Cross, 1995b).

Aquatic facilities are an important part of college and university recreation programs, as well as communities, in the United States. Aquatic facilities also present risks of bodily harm, for example, drowning. When injuries and deaths occur, often the general question is asked, How could this have happened? The answer is usually simple lack of supervision. As such, the administration of aquatic facility use

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and oversight is paramount to the users' safety and to owners in reducing financial loss (Clayton & Thomas, 1989).

Professional aquatic management positions are becoming visible in the job market throughout the United States. Some senior colleges and universities have had open aquatic positions for some time. The private sector is moving toward hiring aquatic professionals as its aquatic attractions and liability grow (American National Red Cross, 1995a).

As aquatic recreation gains popularity, the number of potential serious injuries increases, as does the number of eligible users of those facilities. Many factors contribute to serious injuries and deaths at aquatic facilities, and employers wish to limit the amount of liability that their facilities are responsible for creating (American National Red Cross, 1995a).

Some factors can be controlled to an extent. It is reasonable to expect that when lifeguards are provided to watch a facility and its patrons, the frequency of injuries and drownings should decrease (Clayton & Thomas, 1989). Is there evidence to conclude that by hiring professionals in aquatic management, risk of serious injuries and deaths sustained at aquatic facilities will decrease?

Senior colleges and universities provide a leading edge on educational awareness for issues around the country. It is reasonable to expect a higher level of experience and training from people in aquatic management positions at these institutions than from aquatic managers of local swimming pools (Thomas, 1986).

The problem that the study addressed was whether the experience, education levels, risk-management techniques, staff training, and frequency of aquatic managers at senior colleges and universities with aquatic facilities and listed in the National Intramural Recreational Sports Association's directory are factors that can be identified to help reduce serious injuries and deaths at aquatic facilities.

## Method

The study was conducted using a descriptive-type research method. The research involves analysis of a questionnaire that used open-form, unrestricted questions and yes-or-no complete responses. The instrument is one standard page and titled Aquatic Management Survey. The first four questions asked about the professional's experience in aquatics and management, educational level and field, and specialized training reflected by current certifications. Questions 5–12 asked about the professional aquatic facility, specifically, the record keeping on serious injuries and deaths at the facility. Questions 13–16 were about the training that the facility aquatic staff received at the facility. Questions 17 and 18 were about the professional's other position responsibilities, if any.

A pilot test of the survey instrument was conducted by five recreation professionals in Carbondale, IL, four of whom had extensive aquatic backgrounds. Modifications were made to the instrument after this pilot test. A second pilot test was conducted with the same individuals, and additional modifications were made. The 446 copies of the final survey first went into the mail in August of 1998. Participants were not given a deadline by which to respond. The last survey entered was received on October of the same year. When the surveys were returned ( $N = 146$ ), the data were evaluated by question, and, in some cases, means were calculated. Answers provided in the open form were noted, and some were grouped into categories.

## Results and Discussion

The study provided an extensive number of results, and the following are presented as the most significant. Table 1 represents the length of time working in aquatics in years by the responding aquatic professionals. It illustrates that 6–10 years was the most common amount of time working in aquatics, with 32 respondents, representing 21.9% of the respondents. By individual single years of experience, 20 years was the greatest listed number of years, at 8.2%, or 12 respondents.

Table 2 represents the aquatic professionals' management experience in aquatics. It illustrates that 1–5 years is the most common length of aquatic-management experience, at 47 responses and 32.2%.

**Table 1 Years of Experience Working in Aquatics**

Years	Respondents	
	<i>n</i>	Percent
1–5	22	15.0%
6–10	32	21.9%
11–15	15	10.2%
16–20	22	15.0%
21–25	18	12.3%
26–30	15	10.2%
31–35	12	8.2%
36–40	4	2.7%
41–45	0	0.0%
46–50	3	2.1%
50+	1	0.7%
No answer	2	1.4%
<i>N</i> = 146	Total 146	Total 100%

**Table 2 Years of Experience in Aquatics Management**

Years	Respondents	
	<i>n</i>	Percent
1–5	47	32.2%
6–10	29	19.9%
11–15	26	17.8%
16–20	12	8.2%
21–25	8	5.4%
26–30	10	6.8%
31–35	3	2.1%
36–40	2	1.4%
41–45	0	0.0%
46–50	1	0.7%
50+	1	0.7%
Under 1 year	3	2.1%
No answer	4	2.7%
<i>N</i> = 146	Total 146	Total 100%

Table 3 represents the types of certifications the responding aquatic professionals currently held. Clayton and Thomas (1989) and Giles and Giles (1998) emphasized that responsible aquatic managers should hold certified pool operator, CPR, first-aid, and lifeguard certifications. Six of the 146 respondents had no current certifications at all.

The total number of responses exceeded 146 and 100% because many respondents held multiple certifications. The rest of the certification responses were less than 2.2% of the total. The most commonly reported certification was lifeguarding, with 72 responses, or 49.3% of the respondents. Twenty-nine respondents, or 19.9%, held the recommended CPO/AFO, CPR, first-aid, and lifeguarding certifications for responsible aquatic managers (Clayton & Thomas, 1989; Giles & Giles, 1998).

**Table 3 Current Certifications Held**

Certification	Responses	
	<i>n</i>	Percent
Lifeguard	72	49.3%
Certified pool operator	71	48.6%
Water safety instructor	71	48.6%
Lifeguard instructor	64	43.8%
CPR for the professional rescuer	60	41.1%
Water-safety-instructor trainer	51	34.9%
Lifeguard-instructor trainer	40	27.4%
CPR	32	21.9%
First aid	25	17.1%
CPR/PR instructor	25	17.1%
CPR instructor	25	17.1%
First-aid instructor	24	16.4%
AFO (aquatic facility operator)	14	9.6%
CPR/PR-instructor trainer	13	8.9%
SCUBA instructor	10	6.8%
CPR-instructor trainer	8	5.5%
First-aid-instructor trainer	7	4.8%
No certifications	6	4.1%
Other answers	38	26.0%

**Table 4 Causes of Any Death Reported in the Prior 18 Months**

Cause	Responses	
	<i>n</i>	Percent
Heart attack	1	33.3%
Sudden illness/Stroke	1	33.3%
Drowning	1	33.3%
<i>N</i> = 3	Total 3	Total 99.9%

Causes of any deaths reported in the preceding 18 months are listed in Table 4. One respondent did not answer the question. Three, or 2.1%, of the respondents reported that their facility had had a death in the last 18 months. Of the reported deaths, one was a heart attack, one was a drowning, and one was a sudden illness/stroke.

Table 5 illustrates facilities reporting having had a death in the preceding 5 years. The total heart-related deaths accounted for 70% with seven responses, and the total drownings account for 10.0% with one response for facility deaths in the past 5 years.

Table 6 illustrates facilities ever having had a death. Heart-related deaths account for 51.0% with 15 responses, and drownings account for 26.7% with eight responses for facility deaths ever.

Table 7 illustrates the percentage of time that respondents reported having other responsibilities in addition to aquatics. The total of 117 respondents did not include 26 respondents who listed “not applicable” and 3 respondents who provided no answer to the question. Of the total respondents, 80.1%, or 117, reported having responsibility other than aquatics in their position.

**Table 5 Causes of Deaths Reported in the Prior 5 Years**

Cause	Responses	
	<i>n</i>	Percent
Heart/Heart attack	5	50.0%
Cardiac	2	20.0%
Drowning	1	10.0%
Heatstroke	1	10.0%
Unknown	1	10.0%
<i>N</i> = 10	Total 10	Total 100%

**Table 6 Causes of Deaths Ever Reported**

Cause	Responses	
	<i>n</i>	Percent
Heart/Heart attack	8	26.7%
Drowning	8	26.7%
Cardiac	6	20.0%
Unknown	3	10.0%
Heatstroke	1	3.3%
Seizure	1	3.3%
Genetic heart disease	1	3.3%
Breath holding	1	3.3%
Sudden illness/Stroke	1	3.3%
<i>N</i> = 27	Total 30	Total 99.9%

**Table 7 Percent of Other Responsibilities Reported by Aquatic Respondents**

Percentage of time, answer	Responses	
	<i>n</i>	Percent
95%	2	1.7%
90%	12	10.0%
85%	4	3.4%
80%	10	8.5%
75%	7	6.0%
70%	4	3.4%
60%	5	4.3%
50%	14	12.0%
40%	7	6.0%
30%	6	5.1%
25%	6	5.1%
20%	4	3.4%
15%	4	3.4%
10%	11	9.4%
5%	3	2.6%
30–40%	2	1.7%
other responses	16	13.7%
<i>N</i> = 117	Total 117	Total 100%

## Discussion

One assumption made in this study was that the respondents at senior universities and colleges on average would have more experience, education, and specialized training than aquatic managers in other parts of society. Furthermore, because senior colleges and universities were targeted for this study, the return rate and responses should be higher and more accurate than one would expect from the public sector. This is in part because of the target population's desire to learn more about their field. Neither of these assumptions could actually be tested because neither a second sample nor a control group was tested.

The following responses related to the research questions:

***What are the relationships between aquatic management personnel experience, certifications, education, and the frequency of subordinate staff training?***

When managers had no aquatic experience before their current position, they were less likely to provide regular in-service training than managers who had prior aquatic experience. More than 23% of the managers without prior aquatic experience provided no in-service training for their staff, while only 13.1% of managers with aquatic experience failed to provide in-service training to staff. Aquatic manager groups (about 13% each) both with and without prior aquatic experience failed to provide on-site specific training to staff.

When certifications for responsible aquatic managers were reviewed, only 10.6% of the managers with no prior aquatic experience met the guidelines. Just over 24% of the managers with prior aquatic experience met the same guidelines. In addition, 10.6% of the managers without prior aquatic experience had no current certifications, and only 2% of the managers with prior aquatic experience had no certifications.

***What life-threatening situations at aquatic facilities can be better prepared for and possibly prevented?***

A review of deaths reported at aquatic facilities indicated that the following percentages were heart-related: deaths reported in the last 18 months, 33.3%; deaths reported in the last 5 years, 70.0%; and deaths reported ever, 51.0%.

According to the recent literature, if an automated external defibrillator can be used on a victim with a heart-related failure to apply a shock within the first minute of being in an intermediate rhythm called ventricular fibrillation, the victim survival rate is about 85% (Law-Heitzman, 1998).

***What educational, experience, and training factors should be considered when choosing an aquatic manager?***

Ideally the aquatic manager should have prior aquatic experience. This experience should be working as a lifeguard, maintenance or pool operator, or instructor of aquatic-related specialties. A primary concern that aquatic professionals apparently learn by actual work in aquatics is the importance of patron and staff safety. There are daily functions of these basic positions that have severe consequences if a person is not trained properly or has no awareness of what training is needed by aquatic staff.

Similarly, aquatic professionals need formal education or training specific to aquatics. Most of the respondents had master's degrees. This finding is appropriate for aquatic professionals working at senior colleges and universities. In the local community, a bachelor's might be an appropriate educational degree to serve at a managerial level.

***What responsibilities do aquatic managers have in addition to aquatics, and do they affect aquatic responsibilities?***

Many of the aquatic managers (71.3%) had responsibilities other than aquatics. Nearly half the aquatic managers with other responsibilities spent 50% or more of their time on responsibilities outside of aquatics. The most common response for what those responsibilities were was dealing with facilities, which took 10–90% of a manager's time. The next significant finding was that respondents who listed recreation director for other responsibilities spent 50–90% of their time away from aquatics. This large amount of time associated with other responsibilities in itself must affect the quality of oversight those individuals provide for aquatics.

***What relationships were common to management, facilities, staff, and training when deaths were concerned?***

Clear relationships for cause and effect could not be assessed because so few of the facilities reported deaths, which is fortunate, of course. Some of the information allowed relationships to be drawn in a broader scope. Further study is needed to establish any causal relationships.



## Conclusions

Based on the results and discussions already presented, the following conclusions can be drawn from these survey results:

- Over 80% of the respondents did not have the minimum training and certifications recommended for responsible aquatic management.
- About 32% of the respondents had had no aquatic experience before becoming aquatic managers.
- About 95% of the aquatic facilities tracked serious injuries. This fact provided the ability to create preventive policies to reduce injuries if they were routinely examined and analyzed.
- The three deaths that occurred in the preceding 18 months included one heart attack, one drowning, and one stroke or sudden illness. All three of these deaths happened at facilities where the managers did not meet the qualifications for responsible aquatic management.
- Seventy percent of the deaths that occurred in the preceding 5 years were heart related; 10% were drownings.
- Half the deaths that had ever happened at the responding aquatic facilities involved heart failure. Thirty percent of reported deaths were the result of drownings.

## Summary and Recommendations

Further study is required in aquatic management specifically dealing with the impact of managerial experience, training, and other characteristics in relation to injury and death rates.

- With the relatively high incidence of heart-related deaths in aquatic facilities, all aquatic staff should be trained in the use of automated external defibrillators. Automated external defibrillators should be required in public swimming facilities just as first-aid kits are.
- A national aquatic management curriculum should be investigated, including the development of specialized certifications for swimming pools, water parks, and open-water (surf and nonsurf) environments.
- Legislation governing procedures and requirements is currently in place for the medical community, such as EMT training and work requirements. A similar set of procedures should be considered for all rescue personnel and their management staff.

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