International Journal of Aquatic Research and Education

Volume 2 | Number 1 Article 10

2-1-2008

A Proposed Framework for Developing a Plan for Research in Lifesaving and Water Safety

Robert Stallman
Norwegian School of Sport Science, robert_keig@yahoo.com

Per-Ludvik Kjendlie
Norwegian School of Sport Science

Recommended Citation
Stallman, Robert and Kjendlie, Per-Ludvik (2008) "A Proposed Framework for Developing a Plan for Research in Lifesaving and Water Safety," *International Journal of Aquatic Research and Education*: Vol. 2 : No. 1 , Article 10.
DOI: https://doi.org/10.25035/ijare.02.01.10
Available at: https://scholarworks.bgsu.edu/ijare/vol2/iss1/10

International Journal of Aquatic Research and Education, 2008, 1, 78-84

A Proposed Framework for Developing a Plan for Research in Lifesaving and Water Safety

Robert Stallman and Per-Ludvik Kjendlie

Lifesaving has come a long way since 1878 in Marseille, when the first world lifesaving congress was held. The last half of the 19th century and up to World War I saw a dramatic and worldwide increase in sea trade, augmented by improved technology. The oceans became crowded, while concerns for safety lagged far behind the increase in tonnage by sea (Golden & Tipton, 2002). An escalation in armed conflict fanned the fire. Drowning statistics were at an all-time high. A tiny but significant seafaring nation like Norway approached 750 drownings per year at the peak, nearly 8 times the current toll and, per capita, over 20 times as great as today (Solberg & Nesheim, 2006).

Little wonder that both governments and private individuals became alarmed, and initiatives to reduce this tragedy emerged. Local efforts led the way, appearing in the form of awareness campaigns, resuscitation education, learn-to-swim campaigns, lifesaving programs, and sea rescue. Several major cities worldwide had already formalized ambitious programs (e.g., The Society for Rescue of Drowning Persons, Amsterdam, 1767, in Bierens, 2006). The seeds of national consolidation were sown, and the first national lifesaving associations were in their fetal stage. The Marseille conference gathered like-minded persons and organizations and institutionalized the need to share and to learn from one another. A secondary effect of the congress was that seeing the progress of others in the nationalization of lifesaving accelerated this development in other countries. The next 25–30 years saw the birth of dozens of national lifesaving associations. As we all know, the Federation Internationale de Sauvetage Aquatique was launched in 1910. World Life Saving came later (1971), catering to the special needs of surf lifesaving, and in historic meetings in Leuven, Belgium, in 1993, these were merged into the International Life Saving Federation (ILS) of today.

Many of these national associations have flourished and achieved a high degree of professional competence and experience and have been able to reach a large portion of their citizens. Some have succeeded in the political arena, influencing their governments to establish certain safety standards.

In spite of increased international contact, the national agencies have maintained strong cultural traditions. A considerable variety of philosophies, methods, techniques, and programs still exists. Within the aquatic-research community,

The authors are with the Dept. of Physical Performance, Norwegian School of Sport Science, 0806 Oslo, Norway.

lifesaving research lags behind that for other aquatic activities. The exception is the medical profession, along with certain key physiologists, who have addressed problems of resuscitation, hospital treatment of drowning, and treatment of hypothermia, where consensus is the norm (Bierens, 2006). In the centers for aquatic research, the infrastructure, methodology, and expertise already exist. What remains is to integrate the needs and interests of lifesaving research into these programs. Especially in physiology and biomechanics, the tools are already in place. The ILS, with two world congresses under its belt, is the ideal agency to foster systematic lifesaving research. This article addresses that issue and recommends a framework for developing a plan for research in lifesaving and water safety.

A Plan for Research

A long-term plan for systematic research in lifesaving and water safety must address the following:

- Consolidation, consultation, and cooperation
- Realization of research
- Consolidation of new knowledge and dissemination
- Application of research to practice

Consolidation, Consultation, and Cooperation

An important starting point would be to consolidate or systematize existing research results and produce an overview both of the work and of the institutions, agencies, or people involved. An extremely useful project would be an ILS-sponsored international bibliography of lifesaving and water-safety research. Such a collaborative effort would not only provide the overview so dearly needed but also stimulate new thinking and provide a platform for continuing bibliographical work. We recommend an Internet-based system where new studies can be registered, thus making them available to virtually all.

Bringing existing milieus together in this way will promote consultation and cooperation. Some excellent research takes place in small units or isolated situations, and various centers are unaware of each other. Much research, on the other hand, takes place in universities, which have their own channels of communication. ILS could conceivably plug into these channels or even make direct contact with certain key academic or professional organizations. Some of our senior members are already part of the existing research milieu. An excellent example is the International Symposium for Biomechanics and Medicine in Swimming. Since 1970, this formalized organization has held 10 symposia (every 4 years), with number 11 scheduled for 2010. Research is presented in virtually every aquatic field, and articles reproduced in these published volumes are peer reviewed. Lifesaving has been less well represented than other areas.

Realization of Research

An important motivator for research is financial support. ILS and perhaps the National Swimming Pool Foundation should be the ideal international agencies

to create a fund for research in lifesaving and water safety. It is envisioned that such a fund could be launched with the assistance of international donor agencies and thereafter continue by income-generating activities (e.g., investments). Grants could be awarded by periodic competition in the normal way. A scientific committee could thus guide research toward priority areas, as well as maintain quality control. In addition, grants for short-term study or collaboration could be awarded to promote joint projects between existing research projects and environments or introducing young researchers to an existing research project or group of experienced researchers.

Consolidation and Dissemination

As a new generation of research is published and made available, innovative ways of assembling and organizing it are required. Dissemination along with rigorous peer review is, of course, critical if research is to have an impact. The ILS *International Bibliography of Life Saving and Water Safety Research* proposed above could be an annual or biannual publication. This could also be keyed to Internet-based scientific journals in such a way that the reference or even abstract are automatically transferred to the bibliographic database. Similarly, a publication of abstracts could be produced either separately or in conjunction with the bibliography. The possibility of an ILS international journal of lifesaving and water-safety research or a collaboration with the existing *International Journal of Aquatic Research and Education* should be discussed (preferably with the articles disseminated via an Internet-based or on-line format). Finally, we would hope that this conference would become a regular feature of the lifesaving calendar. The feasibility of somehow combining the conference with the "Rescue" International Championships could also be considered.

From Research to Practice

To accomplish the translation of research to practice, we largely depend on the national associations. Once certain research results are known and confirmed, they could be endorsed by ILS. Using the dissemination channels described herein and the direct political channels of ILS, one could strive for acceptance of new information and recommendations for program changes. The best example of this might be the growing agreement on questions pertaining to CPR (Bierens, 2006).

A Framework for Research in Lifesaving and Water Safety

A 3×5 matrix is presented in Table 1 as a possible framework for systematizing research efforts. The vertical axis is divided into the three traditional categories popularized in these past years by ILS: prevention, rescue, and treatment. The horizontal axis is divided into traditional disciplinary areas of research. It is emphasized that especially on the horizontal axis the matrix can and should be expanded. There are surely other ways to organize our efforts, but this particular one provides an excellent exercise in sorting hypotheses to be tested. In this matrix there are 15 cells, each of which pertains to a particular area of research.

Table 1 Matrix for Framework for Lifesaving and Water-Safety Research

	Physiology	Biomechanics	Psychology	Sociology	Pedagogy	Areas to be determined
Prevention	1	2	3	4	5	
Rescue	6	7	8	9	10	
Treatment	11	12	13	14	15	

For example, research in Cell 1 would describe physiologically oriented studies pertaining to prevention. In subsequent sections, we suggest possible studies that might fit into each of these cells.

The primary concept here is that such a balanced approach would provide spillover from one area to another and encourage more creative thinking. The various studies would complement each other and raise new issues to be studied. At the same time, the family of researchers would become more interdisciplinary, allowing a more holistic approach to problem solving. We often overlook the fact that what on the surface appears to be a rather cut and dried physiological study has its biomechanical, psychological, sociological, and pedagogical sides. Collaborative efforts with an interdisciplinary team of researchers have a far better chance of attacking a problem comprehensively as it exists in real life.

Examples From Each Cell of the Matrix

Physiology and Prevention. Self-rescue and survival skills should be given priority in any water-safety education program. Which should be selected and why? Have we answered all the questions regarding heat loss and efforts to reduce it? Although this has recently been addressed in the excellent research and writings of several prominent medical and physiological specialists, do we have all the answers? Both the term and the technique *drown proofing* (survival floating) have fallen into disrepute. We are more aware of the dramatic heat loss through the head when it is submerged than before. If at all possible, the head should be kept out of the water. But what if no floating object is available to assist? Treading water, itself a critical survival skill, might be preferable to floating with the head submerged. But at what level does the energy requirement to keep the head above the water outweigh the loss in submerging the head? Where do these curves cross, and what factors influence this? A similar line of thought could be applied to the issue of swimming with clothes. At what point might the retention of body heat be less than the added effort of overcoming the added resistance?

Biomechanics and Prevention. Less experienced teachers often fall prey to the idea that technique is not important at the early stages of learning to swim. After all, these children will not become competitive swimmers! Here one has ignored the survival value of mechanically efficient movement. The same methods of analysis used on competitive swimmers need to be applied to children at the learn-to-swim level. An overview is needed (e.g., of the velocity, stroke length, stroke–frequency relationship) of children who are still in the process of learning to swim. Are there techniques that more easily allow children *before* they have mastered a stroke to

adopt a more efficient body position? How does body composition affect this? Can we quantify "feel" for the water?

Psychology and Prevention. One of the crucial elements in drowning is a lack of respect for the powers of nature, an underestimation of danger, an overestimation of one's capabilities, or even the choice of danger. Attitude is identified as an integral part of water safety. Conscious or unconscious risk behavior often leads to disaster regardless of skill level. An Olympic champion remains helpless to Neptune when his ire is piqued. Possible hypotheses to be tested here are, for example, (a) whether certain personality types choose risky behavior, (b) why some appear to be "accident prone" and fall victim to unconscious risk behavior, and (c) how best to reduce or eliminate risk behavior—how to change attitudes toward the aquatic environment. In the face of the failure of many "safety campaigns," how should we proceed?

Sociology and Prevention. It is well known that societies and cultures differ dramatically. What is accepted as risk or what is safe varies also according to culture. There are cultural differences in the allocation of responsibility to the person versus to the state. Where are lifeguards needed and where is the attitude that one swims or bathes at one's own risk justifiable? To what extent do people respect regulation when it is present? How does the "crowd effect" influence group behavior? Any attempt to internationalize safety regulation in aquatic environments must take these cross-cultural differences into account. If it is desirable to standardize procedures across national borders, how do we align these differences to narrow the margin of difference? How do these cultural differences correlate with drowning statistics? Cross-cultural studies of these phenomena could raise interesting issues affecting program content and educational practice.

Pedagogy and Prevention. As mentioned in the introduction, the practices of the various national agencies vary dramatically. Practices in the schools of different cultures also differ dramatically regarding swimming, lifesaving, and water-safety education. How do we impart attitudes and knowledge in a comprehensive water-safety program? In addition, what skills must be learned? Is the claim of many experts that the schools do not teach the skills that prevent drowning true? Can we improve the methodology of teaching swimming? Is there a universal definition of the ability to swim, and, if so, what is it? (see Stallman, Junge, & Blixt, 2007). In resource-constrained milieus, how do we arrange priorities in the content of the teaching of swimming? The dramatic differences in the way we teach swimming and water safety suggest that we do not yet have all the answers.

Physiology and Rescue. The popularity of certain techniques seems to follow a geographical pattern. A certain tow is widely used in Culture A, which has historical ties with Culture B, who practiced that tow earlier. A borrowed from B and passed it on to C. In the interim (often decades), B moved on to better techniques without A and C realizing it. The selection of the skills to be given priority (e.g., tows) can be determined by a variety of methods such as direct energy-cost analysis. Which are most effective? To what extent do individual preferences; water and weather conditions; rescuer versus victim body size, shape, or composition; or skill level influence the physiological economy of these demanding and perilous rescue techniques?

Biomechanics and Rescue. Modern biomechanical analysis can also be applied to rescue skills. The selection of the optimal kick, body position, and arm action in rescue tows requires further study. Underwater video analysis would reveal the intricacies of negative and positive acceleration or the optimal relationship between stroke length and frequency. Which techniques provide optimal propulsion while not increasing resistance? Which techniques provide the best view of the destination while at the same time allowing constant monitoring of the victim's behavior? Finally, the combination of physiology and biomechanics might address the critical issue of physiological economy. How does changing or improving the mechanical work affect the energy cost?

Psychology and Rescue. The rescue of a drowning person, regardless of the circumstances, can lead to stress for rescuers during the rescue, which might reduce the effectiveness of their actions, as well as induce posttraumatic-stress syndrome. What kinds of stress-management training are relevant for rescue personnel? What effect might it have in reducing postrescue problems? How important is debriefing, who should conduct it, and how should it be conducted? What tools of stress and panic reduction are applicable to crowd management in a rescue operation?

Sociology and Rescue. When a rescue situation arises at an aquatic facility that is in active operation, how does one cope with bystanders? What mechanisms govern their behavior? Do clients of a facility behave differently in groups (gangs) than when on their own? Can these mechanisms be turned around and used to our advantage? What routines exist for reporting or coping with an emergency episode? How does the average person respond to these routines? How do the national organizations recruit members? What drawing cards do they have and how are they used?

Pedagogy and Rescue. Again, the program content, techniques, and methodology of the national associations differ widely. At what level (age or skill level) do we introduce certain lifesaving skills? What is the most common practice? What is desirable and defensible pedagogically? Do these questions require airing, or can they continue to be randomly or traditionally practiced. We envisage a broad cross-cultural study of the pedagogical practices of the national lifesaving associations that would reveal such information as which tows are most widely taught and why. If there is one, where is the line between a lifesaver and a lifeguard? Should certain skills be taught to amateurs, or should they be reserved for professionals (e.g., release from the grip of a victim). How much attention is paid to equipped/assisted towing and how much attention to direct-contact tows?

Physiology and Treatment. Although ILS has accepted the definition of drowning published by the Task Force of Drowning 2002 and later published it in its handbook, the matter is not closed to further improvement, particularly regarding implementation. Do we have an overview of its acceptance? Have we been successful in reaching the local level? What more needs to be done regarding the recording of episodes requiring hospital treatment? An international database should be developed with some form of automatic recording and registration.

Biomechanics and Treatment. Classic biomechanical tools can be used to analyze CPR or other resuscitation techniques. How accurately do first-aiders judge the depth or pressure of chest pressure? On youth victims, is one hand really better than two? How does technique degenerate with fatigue?

https://scholarworks.bgsu.edu/ijare/vol2/iss1/10
DOI: https://doi.org/10.25035/ijare.02.01.10

Psychology and Treatment. The long-term effects of posttraumatic stress disorder can be very destructive. Although considerable work has been done in this area in the past 20 years, most of it has been directed to surviving victims of natural and industrial or mass-transportation disaster or military experiences. There is still much to be learned, especially about optimal treatment practices. What do we know about the effects of a brush with death? To what extent can negative outcomes affect a bystander involved in what might appear to be an undramatic and successful rescue? What follow-up procedures are most effective?

Sociology and Treatment. The next of kin to a victim or even witnesses can suffer from stress reaction to an emergency episode. How should they best be treated? Is the mechanism the same as for the victim or the rescuer? What characterizes their behavior and how do we recognize it? What training do health personnel have in coping with this phenomenon? Should rescue personnel receive the same training?

Pedagogy and Treatment. Are emergency medical personnel trained specifically for the receipt of drowning victims? What routines are in place in the average emergency ward? Have we succeeded in getting the latest medical information out to the local level? Does implementation require specialized schooling?

Summary

A balanced approach to a plan for research can help ensure that critical issues, which have not received the attention they need, are addressed. This also will broaden the area of expertise covered by those engaged in research in lifesaving and water safety, hopefully giving them a more holistic approach to problem solving. A strategic plan will improve our ability to share both results and plans for further research. Online brainstorming could be useful at several levels. Fostering and disseminating research and its results might be ILS's most important project, addressing issues that in some cases have been dictated by tradition or solved in a random fashion. There is sufficient breadth to our collective activities, but is each of the national associations operating at the same level of sufficient breadth? And to what depth do we pursue knowledge? Whatever framework is selected, experts in each area will need to gather and share their experience and expertise in developing a priority of hypotheses to be tested.

References

Bierens, J. (Ed.). (2006). *Handbook on drowning*. Berlin, Germany: Springer.

Golden, F., & Tipton, M. (2002). *Essentials of sea survival.* Champaign, IL: Human Kinetics.

Solberg, E., & Nesheim, R. (2006). *Når det gjelder livet.* In E. Solberg & R. Nesheim (Eds.), *The commemorative book of the 100th anniversary of the Norwegian Life Saving Association*. Oslo, Norway: Snorre Press.

Stallman, R., Junge, M., & Blixt, T. (2007). *The teaching of swimming based on a model derived from the causes of drowning*. Paper presented at the 2007 World Water Safety Congress, Porto, Portugal, October 2007.