

A PROPOSED FRAMEWORK FOR DEVELOPING A PLAN FOR RESEARCH IN LIFE SAVING AND WATER SAFETY

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1.0 Introduction

Life saving has come a long way since 1878 in Marseille, when the first world life saving congress was held. The last half of the 19th century and up to the 1st World War, saw a dramatic and world wide 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. An escalation in armed conflict fanned the fire. Drowning statistics were at an all time high. A tiny but significant sea faring 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.

Little wonder that both governments and private persons 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, life saving programs and sea rescue. Several major cities of the world had already formalised ambitious programs (The Society for Rescue of Drowning Persons, Amsterdam, 1767). The seeds of national consolidation were sown and the first national life saving associations were in their foetal stage. The Marseille conference gathered like-minded persons and organisations and institutionalised 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 nationalisation of life saving, accelerated this development in other countries. The next 25-30 years saw the birth of dozens of national life saving associations. As we all know, FIS was launched in 1910, WLS came later (1971), catering for the special needs of surf life saving and in historic meetings in Leuven, Belgium, in 1993, these were merged into the ILS of today.

Many of these national associations have flourished and have 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.

However, in spite of increased international contact, the national agencies have maintained strong cultural traditions. A considerable variety of philosophies, methods, techniques and programs still exist. Within the aquatic research community, life saving 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.

Yet in the centres for aquatic research the infrastructure, methodology and expertise already exist. What remains is to integrate the needs and interests of life saving 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 life saving research. This paper addresses that issue and recommends a framework for developing a plan for research in life saving and water safety.

2.0 A Plan For Research

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

2.1 Consolidation, consultation, cooperation

2.2 Realisation of research

2.3 Consolidation of new knowledge and dissemination

2.4 Application of research to practice

2.1 *Consolidation, consultation and cooperation*

An important starting point is to consolidate or systematise existing research results and produce an overview of both the work and the institutions, agencies or persons involved. An extremely useful project would be an ILS sponsored “International Bibliography of Life Saving and Water Safety Research”. This would not only provide the overview so dearly needed but would stimulate new thinking and also 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 milieu together in this way will promote consultation and cooperation. Some excellent research takes place in small units or isolated situations and various centres are unaware of each other. Much research on the other hand, takes place in universities and these have their own channels of communication. ILS could conceivably plug into these channels or even take direct contact with certain key academic or professional organisations. Some of our senior members are already part of these research milieu. An excellent example is the “International Symposium for Biomechanics and Medicine in Swimming”. Since 1970, this formalised organisation has held ten symposia (every 4 yrs) with Nr.11 coming in 2010. Research is presented in virtually every aquatic field and articles reproduced in the proceedings are peer reviewed. Life saving has been less well represented than other areas.

2.2 *Realisation of research*

An important motivator for research is the availability of financial support. ILS should be the ideal international agency to create a fund for research in life saving 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. investment). Grants could be awarded by periodic competition in the normal way. A scientific committee could thus guide research toward priority areas as well as to hold quality control. In addition grants for short term study or collaboration could be awarded to promote joint projects between existing research milieu or introducing young researchers to an existing milieu.

2.3 *Consolidation and dissemination*

As a new generation of research is published and made available, innovative ways of assembling and organising it are required. Dissemination is of course critical if research is to have an impact. The “ILS International Bibliography of Life Saving and Water Safety Research” described in Pt. 2.1 could be an annual or bi-annual 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 data base. Similarly, a publication of abstracts could be produced either separately or in conjunction with the bibliography. The possibility of an ILS Int. Journal of Life Saving and Water Safety Research should be discussed (preferably internet based). Lastly, it is hoped that this conference will become a regular feature of the life saving calendar. The feasibility of somehow combining it with the “Rescue....” International Championships could also be discussed.

2.4 *From research to practice*

Here we are dependent on the national associations. Once certain research results are known and confirmed, they could be endorsed by ILS. Using the dissemination channels described above, 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.

3.0 A Framework

A 3 X 5 matrix is presented as a possible framework for systematizing research efforts. As seen in the figure below, the vertical axis is divided into the three traditional categories popularised in these past years by ILS; Prevention, Rescue and Treatment. The horizontal axis is divided into traditional disciplinary forms of research. It is emphasized that especially on the horizontal axis the matrix can be easily expanded. There are surely other ways to organize our efforts but this particular one provides an excellent exercise in sorting hypotheses to be tested. According to this matrix there are 15 cells each of which pertains to a particular area of research. Nr. 1 for example would describe a physiologically oriented study pertaining to Prevention. In section 4.0 we will suggest possible studies that might fit into each of these cells.

Fig.1

	Physiology	Biomechanics	Psychology	Sociology	Pedagogy	Etc.....
Prevention	1	2	3	4	5
Rescue	6	7	8	9	10
Treatment	11	12	13	14	15

The primary concept here is that such a balanced approach would provide spill over from one area to another. The various studies would complement each other and provoke 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 psychological side. Collaborative efforts with an interdisciplinary team of researchers have a far better chance of attacking a problem as it exists in real life.

4.0 Examples from each cell of the matrix

4.1 *Physiology/Prevention*

Self rescue/survival skills should be given priority in any water safety education program. Which should be selected and why? Have we answered all of the questions regarding heat loss and efforts to reduce it? While 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 “drownproofing” (survival floating) have fallen into disrepute. One is 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 to 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?

4.2 *Biomechanics/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 which more easily allow children *before* they have mastered a stroke(s), to adopt a more efficient body position? How does body composition affect this? Can we quantify feeling for the water?

4.3 *Psychology/Prevention*

One of the crucial elements in drowning is a lack of respect for the powers of nature, an underestimation of danger, an over estimation of ones capabilities or even the choice of danger. Attitude is identified as an integral part of “Water Safety”. Conscious or unconscious risk behaviour often leads to disaster regardless of level of skill. An Olympic champion remains helpless to Neptune when his ire is piqued. Possible hypotheses to be tested here are e.g. (a) whether or not certain personality types choose risk behaviour, (b) why some are “accident prone”, fall victim to unconscious risk behaviour, (c) how best to reduce or eliminate risk behaviour, how to change attitudes toward the aquatic environment. In the face of the failure of many “safety campaigns”, how do we proceed?

4.4 *Sociology/Prevention*

It is well known that societies 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 vs to the state. Where are lifeguards needed and where is the attitude that one swims/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 behaviour? Any attempt to internationalise safety regulation in aquatic environments must take these cross-cultural differences into account. If it is desirable to standardize over 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 produce interesting issues affecting program content, education, etc.

4.5 *Pedagogy/Prevention*

As mentioned in the introduction, the practices of the various national agencies vary dramatically. Practices in the schools of different cultures differ also dramatically regarding swimming, life saving 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 and Blixt in these Proceedings). In resource constrained milieu, 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.

4.6 *Physiology/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 B who practiced that tow earlier. A borrowed from B and passed it on to C. In the interim(decades), B moved on to bigger and better things without A and C realising it. The selection of e.g. tows, those to be given priority, can be determined by among others, direct energy cost analysis. Which are most effective? To what extent do individual preferences, water and weather conditions, rescuer vs

victim body size/shape/composition, or skill level, influence the physiological economy of these demanding and perilous rescue skills?

4.7 Biomechanics/Rescue

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

4.8 Psychology/Rescue

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

4.9 Sociology/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 behaviour? 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 and/or coping with an emergency episode? How does the average person respond to these routines? How do the national organisations recruit members? What drawing cards do they have and how are they used?

4.10 Pedagogy/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 life saving 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 life saving associations which would reveal such information as which tows are most widely taught and why? Where is the line between (if there is one) a life saver and a life guard? Should certain skills be taught to the amateur or should they be reserved for the professional (e.g. release from the grip of a victim). How much attention is paid to equipped/assisted towing and how much to direct contact tows?

4.11 Physiology/Treatment

While ILS has accepted the definition of drowning published by the task force of Drowning 2002 and later published in the handbook, the matter is not closed for 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 data base should be developed with some form of automatic recording and registration.

4.12 Biomechanics/Treatment

Classic biomechanical tools can be used to analyse e.g. CPR techniques. How accurately do first aiders judge the depth/pressure of chest pressure? On youth, is one hand really better than two? How does technique degenerate with fatigue?

4.13 Psychology/Treatment

The long term effects of post trauma syndrome can be very destructive. While 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. Much is not known and treatment is not widely practiced. What do we know about the effects of a brush with death? To what extent can negative outcomes effect a person involved in what for the bystander appears to be a non-dramatic and successful rescue? What follow up is most effective?

4.14 Sociology/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 characterises their behaviour and how do we recognise it? What training do health personnel have in coping with this phenomenon? Should rescue personnel receive the same training?

4.15 Pedagogy/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 specialised schooling?

5.0 Summmary

A balanced approach to a plan for research can help to insure that critical issues, which have not received the attention they need, are addressed. This will also broaden the area of expertise covered by persons engaged in research in life saving and water safety, hopefully giving a more holistic approach to problem solving. A strategical plan will improve our ability to share both results and plans for further research. On-line brainstorming could be useful at some level. 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 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.

6.0 References

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