International Journal of Aquatic Research and Education

Volume 14 | Number 3 Article 7

3-29-2024

A Research Framework to Improve Evidence-Based Practice Surrounding the Resuscitation Response to Drowning in Surf Lifesaving

Elissa Hooper
Central Queensland University, Australia, elissa.hooper@cqumail.com

Aaron T. Scanlan
Central Queensland University, a.scanlan@cqu.edu.au

Shayne D. Baker
University of Southern Queensland, shayne.d.baker@gmail.com

Samantha Fien
Central Queensland University, Mackay, s.fien@cqu.edu.au

Recommended Citation

Hooper, Elissa; Scanlan, Aaron T.; Baker, Shayne D.; and Fien, Samantha (2024) "A Research Framework to Improve Evidence-Based Practice Surrounding the Resuscitation Response to Drowning in Surf Lifesaving," *International Journal of Aquatic Research and Education*: Vol. 14: No. 3, Article 7.
DOI: https://doi.org/10.25035/ijare.14.03.07
Available at: https://scholarworks.bgsu.edu/ijare/vol14/iss3/7

A Research Framework to Improve Evidence-Based Practice Surrounding the Resuscitation Response to Drowning in Surf Lifesaving

Cover Page Footnote

Acknowledgements to both Surf Life Saving Queensland and Central Queensland University who jointly funded this research.

Abstract

Surf lifesaving members are essential first responders who patrol public waterways, performing rescues and resuscitation to individuals in the community when needed. In this way, surf lifesaving members experience arduous physical requirements alongside extensive psychological stress during resuscitation. Surf Life Saving Queensland (SLSQ) represents the predominant, frontline lifesaving service in Queensland, Australia; however, little research has explored key aspects of drowning resuscitations involving this organisation, as well as in the broader lifesaving industry, limiting current understanding on this vital topic. We sought to explore key aspects of drowning resuscitations within SLSQ and create a framework to generate evidence-based practice. In guiding future lines of inquiry addressing this deficiency, a six-step research framework has been proposed to aid in holistically understanding the resuscitation process from a surf lifesaving perspective. Evidence generated from applying this framework will create a much- needed knowledge base for surf lifesaving organisations to use in the development of practical, strategic, and effective decisions to enhance their practices and ultimately better prevent drowning fatalities.

Keywords: Cardiopulmonary resuscitation (CPR), drowning, research framework, lifeguard, lifesaver, out-of-hospital cardiac arrest, evidence-based practice, rescue work

Drowning is one of the main causes of unintentional injury death worldwide, with approximately 42 drowning deaths occurring every hour (Barcala-Furelos et al., 2016). Specifically within Australian waterways, between 1 July 2021 and 30 June 2022, a total of 1,025 drowning events were reported including 339 deaths, of which 141 were coastal fatal drownings (Royal Life Saving Society Australia, 2022; Surf Life Saving Australia, 2022). This increased coastal drowning statistic represented a 15% increase compared to the previous 12 months (Royal Life Saving Society Australia, 2022). In turn, approximately a quarter of these drowning deaths in Australia occurred within the state of Queensland – a 27% increase compared to the 10-year state average (Royal Life Saving Society Australia, 2022). Consequently, drowning appears an increasingly pertinent issue that will persist within Queensland given the tropical climate and many public waterways that create high exposure to drowning risk across a wide geographical region.

The progressive process of drowning involves diminishing oxygenation of the body as a person becomes submerged or immersed in a liquid (Australian Resuscitation Council, 2021). The resultant respiratory impairment evolves from hypoxia to anoxia, with cardiac arrest subsequently occurring within minutes (Australian Resuscitation Council, 2021; Barcala-Furelos et al., 2016). Moreover, the extent to which oxygen is deprived to the brain dictates the severity of brain injury and subsequent neurological disability that may occur in

non-fatal drownings (Australian Resuscitation Council, 2021). In this way, debilitating conditions can result despite survival in some drowning cases (Australian Resuscitation Council, 2021). Drowning outcomes are therefore classified as 'non-fatal, no morbidity', 'non-fatal with morbidity', and 'fatal, death'. Accordingly, prompt rescue and resuscitation are required to impede the drowning process and provide adequate oxygenation to the person who is drowning as quickly as possible for their best chance of survival (Australian Resuscitation Council, 2021).

The Drowning Chain of Survival (Figure 1), endorsed by the Australian and New Zealand Committee on Resuscitation, summarises the management of drowning across five steps including prevent drowning, recognise distress, provide flotation, remove from the water, and provide care as needed (Australian Resuscitation Council, 2021; Szpilman et al., 2014). If the person drowning is rescued and unresponsive with abnormal (or absent) breathing, the immediate commencement of cardiopulmonary resuscitation (CPR) in accordance with the Australian Resuscitation Council (ARC) guidelines is necessary (Australian Resuscitation Council, 2021). Debatably, chest compression-only CPR (omitting rescue breaths) has been proposed, but this approach is strongly discouraged given that lack of oxygen is the primary cause of cardiac arrest in a person who has drowned (Australian Resuscitation Council, 2021). The omission of rescue breaths fails to address the immediate need for oxygenated ventilation in the person drowning, resulting in CPR that provides temporary circulation of blood around the body that is depleted of oxygen and likely leading to a negative outcome. It is therefore essential that high-quality CPR inclusive of rescue breaths is administered as soon as possible to a drowning person by trained first responders or first aiders to preserve brain function until specialist help can be administered.

Figure 1 *Drowning Chain of Survival (Szpilman et al. 2014*)

The trained first responders crucial to administering the steps of the Drowning Chain of Survival along 8,000 km of the Queensland coastline are volunteer lifesavers and paid lifeguard professionals representing Surf Life Saving Queensland (SLSQ) (Surf Life Saving Queensland., 2022). SLSQ is one of the largest volunteer-based community organisations in Australia, consisting of 35, 386 volunteer members across 58 clubs (Surf Life Saving Queensland, 2022). Since formal establishment in 1930, SLSQ has safely rescued 152,751

people (Surf Life Saving Queensland., 2022) with a vision to have zero preventable deaths in Queensland public waterways. Patrolling and monitoring duties undertaken by SLSQ members are primarily preventative in nature, whereby verbal warnings and directions regarding aquatic hazards are frequently given (Koon et al., 2018). Despite the efforts of SLSQ members to mitigate drowning fatalities via preventative actions, Queensland waterways carry inherent, unavoidable risks of drowning that necessitate timely rescues and lifesaving resuscitation to those in distress (Surf Life Saving Queensland., 2022).

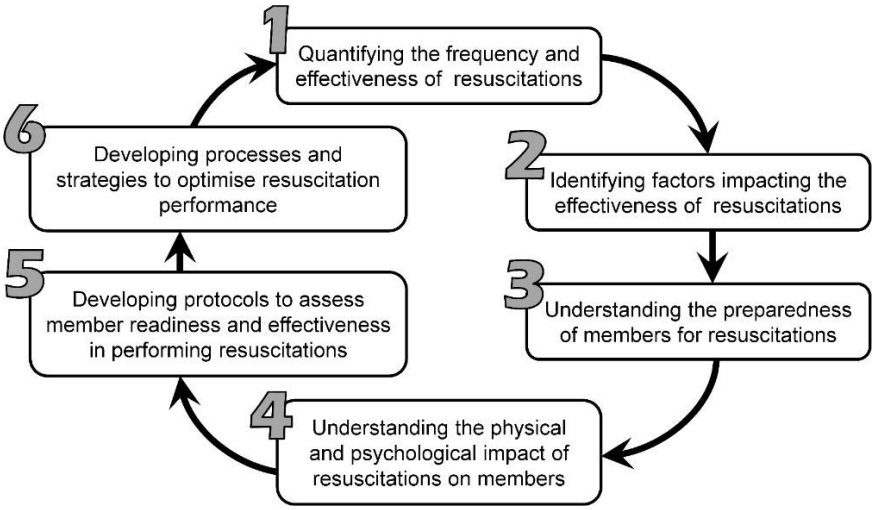
Although the services offered by SLSQ are essential in protecting communities within public Queensland waterways, limited research has explored surf lifesavers and lifeguards in the rescue and resuscitation process. For instance, only two studies have quantified the frequency and effectiveness of resuscitations performed by SLSQ members (Fenner et al., 1995; Wilks et al., 2005). Specifically, Fenner et al. (1995) demonstrated a 67% success rate across all resuscitations performed by SLSQ members from 1972 to 1993 while also identifying patient and situational factors that influenced resuscitation success (Fenner et al., 1995). Moreover, Wilks et al. (2005) presented statistics on the provision of lifesaving services (i.e., lives saved, resuscitations, first aid administration, marine stinger treatment, preventative actions) and stakeholder perspectives on priority areas within SLSQ during the 2001–2002 patrol season. These studies were conducted over two decades ago with no subsequent research exploring these fundamental resuscitation statistics regarding SLSQ. Likewise, the physical and psychological impact of rescues and resuscitations as well as the mental health of surf lifesavers and lifeguards has yet to be researched within the wider surf lifesaving industry, let alone within SLSQ (Fien et al., 2021). These areas are particularly important to consider given the arduous physical demands associated with rescues and resuscitation which emphasizes the need for adequate development of physical fitness attributes and implementation of safe practices to protect against physical injury. In turn, administration of CPR has been shown to induce negative psychological responses (e.g., anxiety, grief, regret, anger, futility, helplessness) when unsuccessful in medical settings (McMeekin et al., 2017) as well as emotional and social challenges regardless of patient outcome among lay rescuers (Mathiesen et al., 2016). These outcomes suggest a range of psychological implications are likely encountered among surf lifesaving members who perform CPR. Recognising the lack of research among surf lifesaving, SLSQ is the first state body in Australia to establish a research panel with a core focus on examining the complex, multifaceted aspects of resuscitation.

Consequently, structured guidance is needed to assist any concerted efforts to increase research evidence on resuscitation topics among surf lifesaving members. Accordingly, we developed a six-step research framework (Figure 2) to help guide future lines of inquiry in holistically understanding the

resuscitation process from a surf lifesaving perspective. Step one encompasses fundamental descriptive work quantifying the frequency and effectiveness of resuscitations. Step two extends these descriptive analyses further by identifying factors that impact the effectiveness of resuscitations. Once the status and effectiveness of resuscitations are described, step three takes a preliminary approach in exploring the preparedness of members to perform resuscitations, such as examining their physical and psychological attributes as well as the training practices they undertake. Step four then takes a retrospective approach in evaluating the physical and psychological impact that resuscitations have had on members. These initial four steps intend to establish an evidence base to inform assessment and intervention approaches in subsequent steps. In this way, step five focuses on developing protocols (e.g., policies, procedures, guidelines) to validly and reliably assess the readiness to perform, and effectiveness in performing resuscitations. Finally, step six targets developing processes (e.g., training, education strategies) to optimise resuscitation performance. These final two steps will encompass varied experimental designs to ultimately develop evidence-based approaches for implementation in practice.

This framework has been designed to operate as an iterative loop given the need to adapt to evolving environments and challenges faced in public waterways that contribute to drowning events. Research aligning with this proposed framework offers potential benefits beyond SLSQ to the wider surf lifesaving industry and local communities. Findings stemming from research following this framework will generate evidence that has been mostly neglected in the literature to date and in turn assist end-users in recognising opportunities and solving issues affecting resuscitation practices, developing impactful policies and protocols, assessing processes, and developing strategic plans to optimise best practice in managing the resuscitation process. Ultimately, the dissemination of evidence that is relevant, robust, and translatable to practice is essential for surf lifesaving members and organisations to prevent drowning deaths in public waterways now and into the future.

Figure 2 *Proposed research framework for resuscitation research in surf lifesaving*



References

Australian Resuscitation Council. (2021). *The ARC Guidelines.* https://resus.org.au/the-arc-guidelines/

Barcala-Furelos, R., Szpilman, D., Palacios-Aguilar, J., Costas-Veiga, J., Abelairas-Gomez, C., Bores-Cerezal, A., López-García, S., & Rodríguez-Nuñez, A. (2016). Assessing the efficacy of rescue equipment in lifeguard resuscitation efforts for drowning. *American Journal of Emergency Medicine*, *34*(3), 480-485. https://doi.org/10.1016/j.ajem.2015.12.006

Fenner, P. J., Harrison, S. L., Williamson, J. A., & Williamson, B. D. (1995). Success of Surf Lifesaving resuscitations in Queensland, 1973-1992. *Medical Journal of Australia*, *163*(11-12), 580-583.https://doi.org/10.5694/j.1326-5377.1995.tb124757.x

Fien, S., Lawes, J. C., Terte, I., Simon, P., Joseph, N., Daw, S., Drummond, M., Best, T., & Stanton, R. (2021). Forgotten first responders: Australian surf lifesavers and lifeguards. *Emergency Medicine Australasia*, *33*(3), 572-574. https://doi.org/10.1111/1742-6723.13754

Koon, W., Rowhani-Rahbar, A., & Quan, L. (2018). The ocean lifeguard drowning prevention paradigm: How and where do lifeguards intervene in the drowning process? *Injury Prevention : Journal of the International Society for Child and Adolescent Injury Prevention*, *24*(4), 296-299. https://doi.org/10.1136/injuryprev-2017-042468

Mathiesen, W. T., Bjorshol, C. A., Braut, G. S., & Soreide, E. (2016). Reactions and coping strategies in lay rescuers who have provided CPR to out-of-hospital cardiac arrest victims: a qualitative study]. *BMJ Open*, *6*(5), e010671. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4885284/pdf/bmjopen-2015-010671.pdf

McMeekin, D. E., Hickman, J. R. L., Douglas, S. L., & Kelley, C. G. (2017). Stress and coping of critical care nurses after unsuccessful cardiopulmonary resuscitation. *American Journal of Critical Care*, *26*(2), 128-135. https://doi.org/10.4037/ajcc2017916

Royal Life Saving Society Australia. (2022). *Royal Life Saving National Drowning Report 2022*. https://www.royallifesaving.com.au/research-and-policy/drowning-research/national-drowning-reports

Surf Life Saving Australia. (2022). *National Coastal Safety Report 2022*. https://issuu.com/surflifesavingaustralia/docs/ncsr_2022

Surf Life Saving Queensland. (2022). *Surf Life Saving Queensland*. Retrieved 17th July 2022 from https://lifesaving.com.au/

Szpilman, D., Webber, J., Quan, L., Bierens, J.J.L.M., Morizot-Leite, L., Langendorfer, S.J., Beerman, S., Lofgren, B. (2014). Creating a drowning chain of survival. *Resuscitation*, *85*(9): 1149-1152. https://doi.org/10.1016/j.resuscitation.2014.05.034

Wilks. J, Dawes. P, & Williamson. B. (2005). Patrol Smart 7/52: Queensland's Integrated Surf Life Saving Program. *The Australian Journal of Emergency Management*, *20*(1), 38 - 45. https://search.informit.org/doi/epdf/10.3316/informit.086009202541016