



## Drowning is never dry

Andrew Schmidt, Seth Hawkins & Linda Quan

To cite this article: Andrew Schmidt, Seth Hawkins & Linda Quan (2019) Drowning is never dry, Expert Review of Respiratory Medicine, 13:4, 313-315, DOI: [10.1080/17476348.2019.1589373](https://doi.org/10.1080/17476348.2019.1589373)

To link to this article: <https://doi.org/10.1080/17476348.2019.1589373>



Published online: 05 Mar 2019.



Submit your article to this journal [↗](#)



Article views: 2536



View related articles [↗](#)



View Crossmark data [↗](#)

EDITORIAL



## Drowning is never dry

Andrew Schmidt<sup>a</sup>, Seth Hawkins<sup>b</sup> and Linda Quan<sup>c</sup>

<sup>a</sup>Department of Emergency Medicine, University of Florida-Jacksonville, Jacksonville, FL, USA; <sup>b</sup>Department of Emergency Medicine, Wake Forest University (Catawba Valley Medical Center ED), Hickory, NC, USA; <sup>c</sup>Department of Pediatrics, University of Washington School of Medicine, Seattle, WA, USA

**ARTICLE HISTORY** Received 19 December 2018; Accepted 27 February 2019

**KEYWORDS** Drowning; submersion

The goal of a definition for a disease, injury, or process is to efficiently and effectively contain the unique physiologic change and/or inciting event so that it may be clearly separated from other pathologic states. The goal of the Ciba Guest Symposium in 1959 was to standardize the definition of chronic obstructive pulmonary disease (COPD) to combat the multitude of overlapping definitions for the disease which, in the words of the participants, '...results in confusion and misunderstanding between investigators working in different centres and in different branches of medicine and thus retards advance in knowledge of a group of common and often disabling diseases' [1].

In 2002, international leaders in the science of drowning resuscitation and prevention met to begin the process of standardizing the discussion of drowning around the world. It was well known that the term drowning carried numerous different definitions in the scientific literature; this was later validated by a review of 60 years of literature which found 33 different definitions for drowning [2]. To address this, they defined drowning as: 'The process of experiencing respiratory impairment due to submersion or immersion in a liquid' [3]. For this definition, 'submersion' refers to the entire body under water and 'immersion' refers to a part of the body being covered in water, involving at least the face and airway. This definition has since been accepted by the World Health Organization, Centers for Disease Control and Prevention, American Heart Association, European Resuscitation Council, American Red Cross, and every other governing body associated with the treatment of drowning patients. Inherent in this definition are that a drowning event (1) must involve a liquid medium, (2) is a process that begins at time of submersion or immersion, and (3) requires respiratory distress immediately following the submersion/immersion. Respiratory impairment may include any involuntary derangement from sustained cough to respiratory arrest, not to include voluntary breath holding [4]. Moreover, the definition is not dependent on the outcome. Furthermore, recommendations were made to discontinue the use of modifiers such as near, dry, wet, secondary, and delayed. The term 'near drowning' had been used to describe a drowning event in which the patient survived but for varying periods of time. Instead, the event can result in a non-fatal drowning wherein 'there must be evidence of respiratory impairment to be classified as a non-fatal drowning' [4]. The modifiers 'dry' and 'wet' were originally used in forensic science to

describe the presence or absence of water in the airways following a fatal drowning. Pathologists described the 10% of drowning cases without evidence of water in the alveoli or airways on autopsy as 'dry drowning', which they attributed to laryngospasm leading to suffocation [5]. 'Secondary' and 'delayed' have been used to describe the development of symptoms or sudden death hours to days following a submersion in patients who were otherwise clinically normal [6]. Recently, the modifier 'dry' has also been used to describe these cases, referring to a patient who suddenly 'drowns' while on land.

With a uniform definition in place, it should be clear that none of these modifiers or their associated conditions can exist. Drowning is a process that rapidly leads to hypoxia and cardiac arrest. From a pulmonary standpoint, processes which contribute to hypoxia include airway obstruction, surfactant washout, atelectasis, ventilation perfusion mismatch, and pulmonary edema. As this is a process, a person either drowns or does not; one cannot be nearly drowned. Additionally, as the process has already begun, it does not suddenly start hours to days after submersion; drowning cannot be secondary, delayed, or dry. Despite over 15 years since the development of this uniform definition, and its universal acceptance by all major governing health-care organizations, outdated and misleading terminology is still prevalent, not only in lay-publications, but also peer-reviewed literature [3]. A 2017 study by Schmidt et al. [7] found that 32% of peer-reviewed drowning-related literature published between 2010 and 2016 contained non-uniform terminology and definitions. While this study showed a slight improvement over a similar one conducted 5 years earlier [8], it still represents an alarmingly high rate of misinformation in the medical community.

Recently, an increasing number of professional media and social media stories, as well as articles in peer-reviewed literature, have described terrifying stories of children who have been healthy following swimming with or without a known short submersion period, only to die suddenly days later [9]. The authors of these articles and medical professionals have almost universally attached the terms dry, delayed or secondary drowning to these cases in an attempt to explain how such an abrupt change in condition could have occurred. In most of these cases, no event leading to respiratory distress was reported; instead, a coincidental exposure to water occurred in the hours to days preceding the

death and was considered causal due to a lack of an alternative explanation. While it is well known that a portion of initially asymptomatic or mildly symptomatic drowning patients go on to develop worsening symptoms, all studies involving medical evaluation at the scene or in an emergency department have found that clinical decompensation occurred within the first 8 hours following submersion [9,10].

The danger in tagging these patients as 'dry' or 'secondary' drowning is multifactorial. First, it runs the risk of anchoring on the easiest plausible cause and therefore missing other conditions. An example of this so-called 'fixation error' is the 2017 case of 4-year-old boy who died suddenly days after swimming, with no preceding symptoms, whose death was diagnosed as 'dry drowning' [9]; subsequent autopsy (written communication, October 2017) found the true cause of death to be recurrent myocarditis. As physicians in training, the adage 'True, true, and unrelated' has been a mantra to force us to look farther, rather than jump to hasty or poorly conceived conclusions. Second, stories such as these cause unwarranted fear in parents and medical providers when faced with a child who is experiencing mild respiratory symptoms days after swimming, which may lead to unnecessary emergency department visits and medical testing. Third, unwarranted fear published across the parenting world may cause a dampening effect on swimming and water-related activities that promote exercise and water safety. Disproportionately increased drowning rates occur in racial and ethnic groups that fear the water and swimming; exacerbating their fears counteracts ongoing widespread efforts of the swimming community to increase these families' water comfort and competency [11]. Fourth, as with any medical condition, continuing the use of outdated, non-uniform, and incorrect nomenclature hampers professional discussion as well as public health surveillance, awareness, and education.

With each new article or physician/patient communication that utilizes non-uniform terminology, we take another step backwards. In discussing the topic of the proper use of drowning terms and corresponding with authors and editors, we have been questioned about the need for focusing on such detail when it is easier to use terms familiar to the public, even if they are outdated and inaccurate. One respondent argued that since incorrect terminology continues to be used in peer-reviewed literature and by the public, then it should be accepted as correct [12]. As with any disease or injury, it is easy for researchers and educators dedicated to the topic to get lost in minute details of nomenclature and shame those who do not grasp the finer aspects of their science; this is not the intent of this editorial. Its purpose is to bring attention to a fixable problem that can help to simplify universal understanding of an important medical condition. As the public has access to medical literature, brings internet advice on arrival in the emergency department, and queries the medical consultant regarding diagnoses and treatment, it is ever more important that the medical community and the public speak the same language and get it right. Proper definitions improve diagnosis, treatment, and epidemiologic study of each disease or injury. We encourage readers to seek out updated material on current drowning terminology to help guide future publications and discussion with patients [13–15]. Similar to COPD, with a primary process as clearly defined as drowning, and

with public health education and data collection implications which hinge on the proper use of a simple definition and terminology, focusing on this issue is not a matter of looking too closely at the waves, but rather doing everything we can to not become completely lost at sea.

## Funding

This paper was not funded.

## Declaration of interest

The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

## Reviewers disclosure

Peer reviewers on this manuscript have no relevant financial relationships or otherwise to disclose.

## References

Papers of special note have been highlighted as either of interest (\*) or of considerable interest (\*\*\*) to readers.

1. Ciba Guest Symposium. Terminology, definitions, and classification of chronic pulmonary emphysema and related conditions: a report of the conclusions of a Ciba Guest Symposium. *Thorax*. 1959;14(4):286–299.
2. Papa L, Hoelle R, Idris A. Systematic review of definitions for drowning incidents. *Resuscitation*. 2005;65(3):255–264.
3. Van Beeck E, Branche C, Szpilman D, et al. A new definition of drowning: towards documentation and prevention of a global public health problem. *Bull World Health Organ*. 2005;83:853–856.
4. Clarification and Categorization of Non-fatal Drowning. A draft position statement for review and input by the global drowning community. Working group on Non-fatal Drowning: Beerman S, Bierena JLM, Clemens T, Meddings D, Rahman A, Szpilman D. [cited 2019 Feb 19]. Available from: [https://www.who.int/violence\\_injury\\_prevention/drowning/non-fatal-drowning/en/](https://www.who.int/violence_injury_prevention/drowning/non-fatal-drowning/en/)
5. Modell J, Bellefleur M, Davis J. Drowning without aspiration: is this an appropriate diagnosis? *J Forensic Sci*. 1999;44(6):1119–1123.
6. Pratt F, Haynes B. Incidence of "secondary drowning" after salt-water submersion. *Ann Emerg Med*. 1986;15(9):1084–1087.
7. Schmidt A, Sempsrott J, Szpilman D, et al. The use of non-uniform drowning terminology: a follow-up study. *Scand J Trauma Resusc Emerg Med*. 2017;25(1):72.
- **Recent evidence of high prevalence of incorrect nomenclature in peer review literature.**
8. Sempsrott J, Slattery D, Schmidt A, et al. Systematic review of non-Utstein style drowning terms. *Ann Emerg Med*. 2011;58:S321.
9. Buffington B. Texas boy dies from 'dry drowning' days after swimming. 2017 Jun 8. [cited 2018 Dec 1]. Available from: <http://www.usatoday.com/story/news/nation-now/2017/06/08/texas-boy-dies-dry-drowning-days-after-swimming/379944001>
10. Sheno R, Allahabadi S, Rubalcava D, et al. The pediatric submersion score predicts children at low risk for injury following submersions. *Acad Emerg Med*. 2017;24(12):1491–1500.
- **Emergency-department based study describing safe discharge strategies focused on expected time course of clinical decompensation following non-fatal drowning.**
11. Pharr J, Irwin C, Layne T, et al. Predictors of swimming ability among children and adolescents in the United States. *Sports (Basel)*. 2018;6(17):1–11.

12. Byard R. Drowning and near drowning – definitions and terminology. *Forensic Sci Med Pathol.* 2017;13:529–530.
13. Hawkins SC, Sempstrott J, Schmidt A. “Drowning” in a sea of misinformation. *Emergency Med News.* 2017;39(8):1,39–40.
14. Szpilman D, Sempstrott J, Webber J, et al. ‘Dry drowning’ and other myths. *Cleve Clin J Med.* 2018;85(7):529–535.
15. Lockamy E What every parent needs to know about “dry drowning”. [cited 2018 Nov 22]. Available from: <https://www.babble.com/parenting/what-parents-should-know-about-drowning>.

•• **Up to date, clinically-focused, review of correct drowning nomenclature.**