Letters to the Editor

In Response to Flush Drowning as a Cause of Whitewater Deaths: Targeting Prevention with Uniform Definitions

To the Editor:

We read with great interest “Flush Drowning as a Cause of Whitewater Deaths.”¹ We applaud efforts to better define drowning and reduce its burden across diverse environments. The authors use the colloquial descriptor “flush drowning,” although they note it to be an obscure term without consensus definition. They describe it as an alternate cause of death during whitewater activity in which there was no prolonged underwater entrapment. We offer a more concise definition: simply that these patients are drowning.

A working group at the 2002 World Congress on Drowning proposed a uniform definition of drowning: “the process of experiencing respiratory impairment as a result of submersion or immersion in a liquid medium.”² Explicit in this definition is the exclusion of such modifiers as “wet,” “dry,” “active,” “passive,” “silent,” and “secondary,” which we would expand to include “flush” drowning. This definition was further reinforced in 2003 and has been adopted globally by many organizations, including the World Health Organization, American Heart Association, European Resuscitation Council, Australia New Zealand Committee on Resuscitation, International Liaison Committee on Resuscitation, Wilderness Medical Society, International Lifesaving Federation, American Red Cross, Centers for Disease Control and Prevention, and American College of Emergency Physicians.^{3–5} We suggest that the uniform definition would identify many of these events as “drowning” without additional modifiers.

There are only 3 outcomes of the drowning process: fatal, or nonfatal with or without morbidity. We recognize that identification of environmental circumstances is critical to whitewater safety education and incident prevention. We suggest that it would be more appropriate to describe these events as “fatal drowning caused by” or “nonfatal drowning associated with” and then use the whitewater-specific term as needed.

The authors correctly note that some people die in a whitewater setting while wearing appropriate flotation devices and without fixed, prolonged underwater submersion. The uniform definition of drowning describes respiratory impairment to be caused by immersion, which can be caused by intermittent airway obstruction and aspiration while wearing a personal flotation device in whitewater (eg, after an unplanned swim in rapids or recirculation in hydraulics).

More pointedly, there may be a subset of these drowning patients for whom airway compromise was secondary to loss of consciousness due to some other etiology. Emerging research into autonomic conflict, cold water shock, cardiac arrest, and other medical etiologies that precipitate drowning in otherwise healthy persons may provide future insight.

The authors address 2 important aspects of the drowning chain of survival in the whitewater setting: prevention and treatment.^{1,4,6} Uniform terminology can improve classification of the events leading up to drowning. Identifying whether the cause of drowning is entrapment in a strainer, short flush entrapment, entrapment in boats or sieves, or loss of consciousness due to head trauma can identify opportunities for prevention, education, treatment, and the development of safety equipment. Classifying these incidents according to the uniform definition of drowning may allow for further multi-sectorial research, particularly in the ocean rescue, search and rescue, offshore, and aquatics industries.

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In Reply to Dr Sempsrott et al

To the Editor:

We appreciate the comments of Sempsrott et al¹ regarding the article “Flush Drowning as a Cause of Whitewater Deaths”² and find their observations terminologically insightful. We agree that adding qualifiers to the term drowning, such as “dry, secondary, or near” sometimes adds more confusion than clarity. Our use of “flush drowning” deviates from the current definition of “drowning” in several respects; for instance, flush drowning in our definition is always fatal, whereas most uses of the word “drowning” involve variable outcomes. Human death most often is influenced by preexisting comorbidities that may interact with various triggering or enhancing environmental precipitants, any of which may or may not be anticipated or recognized by a medical examiner. Diagnostic uncertainty exists in many deaths, and in the case of lethal drowning, pathologists recognize the inherent risk of missing important confounders, such as seizures, intoxicants, trauma, or hypothermia.^{3–5}

Although we agree with most of the statements of Sempsrott et al, we would like to make several other comments regarding the letter. First, our usage of the term “flush drowning” was driven primarily by its long-standing prior establishment and name recognition within the whitewater community, which is our target audience. As for the general suitability of the phrase in the medical literature, not only does use of “drowning” rightly raise questions, but the qualifier “flush” is even more problematic because it implies that flush drownings only occur in “flushing” flows, which is incorrect. In fact, it is our opinion that water temperature has a profound effect on flush drowning.

Second, because drowning definitions variably refer to immersion or submersion in a liquid medium with

respiratory impairment as required substrates, most lack further specificity as to the antecedents leading to respiratory compromise. In fatal drownings, many current definitions, taken literally, could suggest any “in water” death is a drowning, considering that all death involves respiratory impairment. Although this may or may not be the intention of the epidemiologists, such an application does little to differentiate the primary or sequential physiologic events leading to respiratory compromise. In regard to cold water immersion, we have suggested lethal arrhythmias may be an important cause of death. As such, if the head is never submersed and there is no head-above-water aspiration, the respiratory compromise could be a secondary effect of immersion-produced arrhythmia. Other similar potentially lethal effects of cold-water immersion that do not necessarily require aspiration or head submersion may include hypothermia, hypertension-induced vascular catastrophe, and post-rescue collapse. Although such events may still be considered a drowning in the strictest sense, preventing adverse outcomes may require varied approaches.

Lastly, the suggestion by Sempsrott et al that flush drownings be called “fatal drowning due to X,” where “X” presumably represents the antecedent cause of the drowning, may be attractive in certain applications, but such phrasing would be largely a semantic gesture as applied to flush drowning. Until we can differentiate which deaths in this cohort directly result from cold water immersion versus other causes, X will remain elusive. This confusion is further compounded because secondary submersion or aspiration events can follow any cause of death. These constructs have always presented problems for physicians signing death certificates.^{3,5} For instance, does the fisherman who is standing in knee-deep water and is fatally struck by lightning represent a fatal drowning secondary to lightning strike? Does this hold true even if the victim’s head never becomes submersed and no aspiration occurs? Likewise, does the deceased jogger found face up in 10 cm (4 in) of water with an intoxicant in the bloodstream represent drowning or something else? With respect to flush drowning, because of the inability to reliably define X, we arrive back at “fatal drowning due to flush drowning,” or whatever phrase one decides to call this amorphous group. Although we agree new terminology is required, until we can reliably differentiate X, this effort may offer little enlightenment, although it may appease the semasiologists.

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