

Clarification and Categorization of Non-fatal Drowning

A draft Position Statement for review and input by the global drowning community

Prepared by the Working Group on Non-fatal Drowning:

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Background

Improved and more comprehensive reporting is a priority in understanding the drowning problem and developing effective prevention interventions. Since its adoption at the 2002 World Congress on Drowning and subsequent publication in the *Bulletin of the World Health Organization* (Volume 83, Number 11, November 2005, 808-880), the accepted definition of drowning has provided clarity for academic researchers, database administrators, and medical and public health professionals. However, the lack of a uniform understanding and consistent use of the term “non-fatal drowning” results in a lack of precision in data collection hindering research efforts and masking a full understanding of this global public health problem.

Working Group on Non-fatal Drowning

A number of interested people have been discussing this issue in email correspondence for some time. A working group subset of these was established and met informally at the ILS World Conference on Drowning Prevention in Vancouver (October 2017). Subsequently, the working group accepted the Drowning Prevention Research Centre Canada’s offer to host a working group meeting on the topic. The two-day meeting in August 2018 was a facilitated workshop of structured group discussion and consensus. This draft position statement is a result of that consensus.

Working Group Objective

The working group objective was to develop a proposed **clarification statement** and practical **categorization framework** that provides coherence and uniformity for the term “non-fatal drowning”. The group also outlined a process for stakeholder review and ratification of the clarification statement and category descriptions, and a communication plan for dissemination.

The overarching rationale for these tasks was to improve the clarity, reliability and uniformity of scientific communication and the comparability of scientific investigations and data concerning non-fatal drowning. This will result in improved and more comprehensive reporting of the burden of drowning, which in turn will facilitate advancement of the community, national, and global drowning agenda.

Guiding Considerations

The working group identified five considerations which were felt important to guide the development of the clarification statement and categorization framework. These were that the clarification statement and categorization framework must:

1. Build upon the original accepted definition of drowning.
2. Be short, and easily understandable to the broad range of stakeholders and users.
3. Be coherent, precise and include mutually exclusive category descriptions.
4. Be well suited for use in survey development.
5. Be well suited for use in low resource settings as well as high resource settings.

Clarification Statement on Non-fatal Drowning

The working group adheres to the internationally accepted definition of drowning as “...*the process of experiencing respiratory impairment from submersion / immersion in liquid.*” and proposes the following clarification: “*Drowning outcomes are fatal or non-fatal. In non-fatal drowning, the process of respiratory impairment is stopped before death.*”

Non-fatal Drowning Categorization Framework

The Non-fatal Drowning Categorization Framework (NDCF) proposed here categorizes non-fatal drowning along two dimensions:

1. The **severity of respiratory impairment** immediately after the drowning process stopped. Based on the accepted definition of drowning and the clarification statement given above, there must be evidence of respiratory impairment to be classified as a non-fatal drowning. The proposed categorization framework incorporates mutually exclusive descriptive terms for breathing and level of alertness which allow for categorization of the severity of respiratory impairment.
2. The **morbidity category** at the time when non-fatal drowning information is gathered. For the purposes of this categorization framework, morbidity is defined as a decline from the individual’s functional capacity prior to the drowning. In a similar manner to the description of degree of respiratory impairment, the framework also incorporates mutually exclusive descriptions of the morbidity category.

A user’s guide is annexed to this Position Statement and has been designed to help practitioners in applying the NDCF. It provides more detail and additional instructions for the correct use of the categorization scheme. It has specifically been developed to provide guidance for any potentially ambiguous or “borderline” scenarios where different users might choose to categorize

either the severity of respiratory impairment or the morbidity category differently for the same scenario.

Non-fatal Drowning Categorization Framework (NDCF)

Severity of respiratory impairment after the drowning process stopped.		
(1) Mild impairment	(2) Moderate impairment	(3) Severe impairment
<ul style="list-style-type: none"> Breathing Involuntary distressed coughing¹ AND Fully alert 	<ul style="list-style-type: none"> Difficulty breathing AND/OR Disoriented but conscious 	<ul style="list-style-type: none"> Not breathing AND/OR Unconscious
Morbidity category (based upon any decline from previous functional capacity ²) at the time of measurement.		
(A) No morbidity	(B) Some morbidity	(C) Severe morbidity
<ul style="list-style-type: none"> No decline 	<ul style="list-style-type: none"> Some decline 	<ul style="list-style-type: none"> Severe decline

¹ It should be noted that the phrase “involuntary distressed coughing” followed much discussion within the Working Group. The consensus was that “involuntary distressed coughing” offered observers across all settings the most reliable and appropriate way to establish that the process of drowning had started. The following descriptors serve to better characterize the meaning of “involuntary distressed coughing”: coughing up liquid / moving liquid out of the airway; sustained coughing.

² The phrase “previous functional capacity” includes the person’s cognitive, motor, and psychological capacity.

The NDCF has two overarching limitations for end-users to be aware of:

Firstly, it relies on reported description of respiratory impairment immediately after the drowning incident, as well as whether and to what extent there has been a change in the affected person’s functional capacity. The above six cells have deliberately been formulated to create categorical descriptions that are as non-ambiguous as possible and prone to as little recall bias as possible.

Secondly, while the description of the respiratory impairment dimension is fixed at a point in time (immediately following the drowning incident), the dimension of functional capacity is made at the time the information is gathered. This latter aspect means the categorization framework is cross-sectional in nature – a person might be correctly categorized as a non-fatal drowning at one point in time and later die. For example, a person who experienced severe respiratory impairment at the time of their drowning and had severe morbidity at the time they

were categorized by this framework (i.e., a non-fatal drowning categorized as 3C) might die at some point after their categorization and pass from a non-fatal drowning to a fatal drowning.

The NDCF is best suited to community surveys. In some instances, more detailed clinical data may permit the use of other scoring systems in addition to the NDCF. The user's guide provides additional detail on these complementary systems.

Conclusion

The proposed NDCF offers clarity, reliability and uniformity for discussion, evaluation and communication about nonfatal drownings. This is a substantial improvement over the status quo. By using the severity of respiratory impairment and morbidity category, the NDCF also offers the possibility to trigger assessments of the quality of either pre-hospital or in-facility care. For example, a certain proportion of non-fatal drownings that involved a severe respiratory impairment would be expected to result in severe morbidity. Over time in a given setting, improvements to either pre-hospital care (e.g., better trained first responders and improved transport) or in-facility care may result in the proportion of people left with severe morbidity declining, with an attendant increase in either the some morbidity or no morbidity categories.

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Annex

Non-fatal Drowning Categorization Framework User's Guide

Overview

This user's guide provides additional detail and instructions for the correct use of the NDCF. The guide assists those working with non-fatal drowning data to:

1. Determine whether a given case should, or should not, be considered a non-fatal drowning.
2. Correctly categorize non-fatal drowning cases using the NDCF.
3. Determine the appropriate category for ambiguous or "borderline" scenarios where different users might categorize cases differently for the same scenario.
4. Identify complementary systems that can be used along with the NDCF.

Key Terminology

Definition of drowning: "Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid."²

Clarification statement for non-fatal drowning: "Drowning outcomes are fatal or non-fatal. In non-fatal drowning, the process of respiratory impairment is stopped before death."

Non-fatal Drowning Categorization Framework: The NDCF has two dimensions:

1. The severity of respiratory impairment immediately after the drowning process stopped.
2. The severity of morbidity at the time when non-fatal drowning information is gathered, based on decline in functional capacity.

In the NDCF, **immediately after the drowning process stopped** refers to the period immediately following the person no longer being submersed/immersed in liquid. The categorization of severity of respiratory impairment is made based on the signs and symptoms of the individual at that point in time.

² *Bulletin of the World Health Organization* (Volume 83, Number 11, November 2005, 808-880)

Categorization of morbidity in the NDCF is made **when non-fatal drowning information is gathered**. This refers to the moment in time when the non-fatal drowning data is being gathered, and may be days, months or years after the drowning process stopped (e.g. on the date a survey is being administered, or a data source is otherwise being used to categorize non-fatal drownings).

Mild respiratory impairment: Respiration was impaired due to submersion/immersion in liquid, and immediately after the drowning process stopped the person was breathing, experiencing involuntary distressed coughing, and was fully alert.

Moderate respiratory impairment: Respiration was impaired due to submersion/immersion in liquid, and immediately after the drowning process stopped the person was having difficulty breathing and/or was disoriented but conscious.

Severe respiratory impairment: Respiration was impaired due to submersion/immersion in liquid, and immediately after the drowning process stopped the person was not breathing and/or had become unconscious.

No morbidity: at the time of measurement, the person who experienced a non-fatal drowning had no decline from their previous functional capacity.

Some morbidity: at the time of measurement, the person who experienced a non-fatal drowning had some decline from their previous functional capacity. The person has more difficulty completing day-to-day activities than previously. For example, taking care of household responsibilities, learning a new task, walking, getting dressed, participating in school/work.

Severe morbidity: at the time of measurement, the person who experienced a non-fatal drowning had severe decline from previous functional capacity. The person cannot complete day-to-day activities that could previously be completed or can only do so with extreme difficulty. For example, taking care of household responsibilities, learning a new task, walking, getting dressed, and participating in school/work.

Clarification Statement for Non-Fatal Drowning

The clarification statement for non-fatal drowning builds on the internationally agreed upon definition of drowning by adding the statement: “Drowning outcomes are fatal or non-fatal. In non-fatal drowning, the process of respiratory impairment is stopped before death.”

What should be considered a non-fatal drowning?

Implicit in the above clarification statement is that a case should be categorized as a non-fatal drowning case if the person experienced respiratory impairment from submersion/immersion in

liquid but did not die. If a person was drowning and can be ascertained to have been experiencing either mild, moderate, or severe respiratory impairment immediately after the drowning process ended, the case should be categorized as a non-fatal drowning case regardless of morbidity. For example, if a survey respondent indicates that their child was drowning, was rescued by a bystander, and had difficulty breathing after the incident, this would be categorized as a non-fatal drowning.

What should not be categorized as a non-fatal drowning?

Cases should not be categorized as a non-fatal drowning case if the person did not experience respiratory impairment from submersion/immersion in liquid. For example, if a respondent indicates that they were swimming, and accidentally inhaled some water and as a result voluntarily coughed to clear their airway, this would not be categorized as a non-fatal drowning. Similarly, if a rescue intervention occurs to assist an apparently distressed person in the water, but there was no sign of respiratory impairment (i.e. an absence of either involuntary distressed coughing, or difficulty breathing), this would not be categorized as a non-fatal drowning. Respiratory impairment from scuba diving equipment malfunction that does not result in obstruction of the airway with water is not covered by the NDCF.

Further examples of non-fatal drowning cases are included in subsequent sections of this guide.

Non-fatal Drowning Categorization Framework

Why use the categorization framework?

The NDCF is easy to use and applicable in different groups and settings. It enables users to:

1. Ensure cases meet the minimum requirement to be categorized as a non-fatal drowning (e.g. if, at a minimum, mild respiratory impairment as outlined in the framework was not experienced, the case should not be categorized as a non-fatal drowning according to the NDCF).
2. Compare non-fatal drowning data across different studies and locations by using the same inclusion criteria and categorizations.
3. Provide useful information about the severity of non-fatal drowning cases and examine associated implications (e.g. if a study finds a large proportion of cases where respiratory impairment after the drowning process stopped was mild, yet there was a severe decline in functional capacity at the time of measurement, this would indicate the need for further investigation into factors affecting functional outcome in non-fatal drowning cases).

Categorization of Non-fatal Drowning Cases Using the NDCF

A simple alphanumeric categorization scheme has been developed to enable consistent use of the NDCF. The three categories of severity of respiratory impairment after the drowning process stopped are numbered: (1) Mild impairment; (2) Moderate impairment; and (3) Severe impairment. The three categories of morbidity at the time of measurement are lettered: (A) No morbidity; (B) Some morbidity; and (C) Severe morbidity.

Non-fatal Drowning Categorization Framework (NDCF)

Severity of respiratory impairment after the drowning process stopped.		
(1) Mild impairment	(2) Moderate impairment	(3) Severe impairment
<ul style="list-style-type: none">BreathingInvoluntary distressed coughing¹ AND <ul style="list-style-type: none">Fully alert	<ul style="list-style-type: none">Difficulty breathing AND/OR <ul style="list-style-type: none">Disoriented but conscious	<ul style="list-style-type: none">Not breathing AND/OR <ul style="list-style-type: none">Unconscious
Morbidity category (based upon any decline from previous functional capacity ²) at the time of measurement.		
(A) No morbidity	(B) Some morbidity	(C) Severe morbidity
<ul style="list-style-type: none">No decline	<ul style="list-style-type: none">Some decline	<ul style="list-style-type: none">Severe decline

Non-fatal drowning cases should be categorized using the alphanumeric value provided by:

1. The number (1, 2, or 3) corresponding to the severity of their respiratory impairment immediately after the drowning process had stopped.
2. The letter (A, B, or C) corresponding to their morbidity category.

No hyphens or spaces are used between the number and letter, thus valid values are 1C, 3B, 2C etc.

The following table sets out the NDCF categories corresponding to the full range of possible non-fatal drowning scenarios.

Categorization using the NDCF

Non-fatal drowning scenario	NDCF Category
Mild respiratory impairment with no morbidity <ul style="list-style-type: none"> Immediately after the drowning process stopped, the person was breathing with involuntary distressed coughing, and was fully alert. At the time of measurement, no decline from the person's previous functional capacity was reported/observed. 	1A
Mild respiratory impairment with some morbidity <ul style="list-style-type: none"> Immediately after the drowning process stopped, the person was breathing with involuntary distressed coughing, and was fully alert. At the time of measurement, some decline from the person's previous functional capacity was reported/observed. 	1B
Mild respiratory impairment with severe morbidity <ul style="list-style-type: none"> Immediately after the drowning process stopped, the person was breathing with involuntary distressed coughing, and was fully alert. At the time of measurement, severe decline from the person's previous functional capacity was reported/observed. 	1C
Moderate respiratory impairment with no morbidity <ul style="list-style-type: none"> Immediately after the drowning process stopped, the person experienced difficulty breathing and/or was disoriented but conscious. At the time of measurement, no decline from the person's previous functional capacity was reported/observed. 	2A
Moderate respiratory impairment with some morbidity <ul style="list-style-type: none"> Immediately after the drowning process stopped, the person experienced difficulty breathing and/or was disoriented but conscious. At the time of measurement, the person had some decline from previous functional capacity. 	2B
Moderate respiratory impairment with severe morbidity <ul style="list-style-type: none"> Immediately after the drowning process stopped, the person experienced difficulty breathing and/or was disoriented but conscious. At the time of measurement, severe decline from the person's previous functional capacity was reported/observed. 	2C
Severe respiratory impairment with no morbidity <ul style="list-style-type: none"> Immediately after the drowning process stopped, the person was not breathing and/or was unconscious. At the time of measurement, no decline from the person's previous functional capacity was reported/observed. 	3A
Severe respiratory impairment with some morbidity <ul style="list-style-type: none"> Immediately after the drowning process stopped, the person was not breathing and/or was unconscious. 	3B

<ul style="list-style-type: none"> At the time of measurement, some decline from previous functional capacity was reported/observed. 	
<p>Severe respiratory impairment with severe morbidity</p> <ul style="list-style-type: none"> Immediately after the drowning process stopped, the person was not breathing and/or was unconscious. At the time of measurement, severe decline from the person's previous functional capacity was reported/observed. 	3C

Examples

Case X: A survey respondent indicates that their child was in distress in the water and had difficulty breathing immediately after they were pulled out of the water. At the time when they were being interviewed, the respondent indicated that their child had more difficulty completing daily activities such as school work than prior to the drowning incident.

Case X is a non-fatal drowning. The correct categorization of case X is having had moderate respiratory impairment at the moment that the drowning process stopped, and some morbidity at the time of measurement.

Category: **2B**

Case Y: The respondent indicates that they experienced distress in the water and were told they were not breathing and were unconscious immediately after the drowning process stopped. At the time of measurement, the respondent indicated that their functional capacity was the same as prior to the incident.

Case Y is a non-fatal drowning. The correct categorization of Case Y is having had severe respiratory impairment at the time the drowning process stopped, and no morbidity at the time of measurement.

Category: **3A**

Categorizing cases where some information is unknown

If the severity of respiratory impairment immediately after the drowning process stopped is unknown and cannot be determined, 0 should be recorded. If the morbidity category at the time of measurement is unknown and cannot be determined, X should be recorded.

Example

Case Z: The respondent indicates that their child experienced a non-fatal drowning, but they do not know if they experienced any respiratory impairment immediately after the drowning process had stopped. At the time of measurement, the respondent indicated that since the incident their child requires a wheelchair and cannot feed himself (a severe decline from previous functional capacity).

The correct categorization of Case Y is that respiratory impairment at the time the drowning process stopped is unknown, and there was severe morbidity at the time of measurement.

Category: **0C**

Categorizing “borderline” cases

Select the option that best reflects the respondent’s description of the respiratory impairment immediately after the drowning process stopped and the option that best reflects the decline in functional capacity at the time of measurement. If unsure which category of respiratory impairment or morbidity to select, rely on the description from the respondent or data source, and use best judgement. For example, if the respondent reports ‘coughing’ after being rescued from the water, ask further questions to determine whether this was involuntarily distressed coughing. In case of doubt between two categories, choose the more severe category.

Complementary Scoring Systems

The proposed categorization framework was developed for use in all countries and settings, and with community surveys in mind. In some instances, more detailed clinical data may permit the use of other scoring systems in addition to this categorization framework. Clinical classification systems can help healthcare providers choose appropriate treatment in non-fatal drowning cases as well as contribute to standardized data collection and reporting on non-fatal drowning. When possible, practitioners should consider the use of the following complementary scoring systems as appropriate, based on available data and study objective.

- The **International Classification of Diseases** includes several drowning-related codes. At the three and four-character levels, these codes allow for the differentiation of location and etiology of drowning. Researchers studying non-fatal drowning using existing administrative databases that utilize ICD coding may be able to report additional detail by using this complimentary classification system. <http://www.who.int/classifications/icd/en/>

- The **WHO Disability Assessment Schedule (WHODAS 2.0)** is a generic assessment instrument for health and disability used across all diseases, including mental, neurological and addictive disorders that is applicable in both clinical and general population settings. It can be used in parallel with the non-fatal drowning categorization framework to provide more detail on functional capacity after a non-fatal drowning event. <http://www.who.int/classifications/icf/whodasii/en/>
- The **Utstein Style for Drowning guidelines (2014)** were developed to allow consistency in nomenclature and data reporting on drowning and should be used when possible to report additional details related to rescue, resuscitation, and outcome in non-fatal drowning studies. <https://www.ahajournals.org/doi/pdf/10.1161/HCQ.0000000000000024>
- The Berlin (2012) definition and severity classification system for **Acute Respiratory Distress Syndrome (ARDS)** categorizes respiratory impairment as being mild, moderate or severe using clinical variables PaO₂/FiO₂. <https://pulmccm.org/ards-review/consensus-panel-announces-new-definition-severity-classes-for-ards-jama/>
- **Szpilman (1997)**'s classification system provides a useful framework for making pre-hospital treatment decisions. <https://search.proquest.com/docview/200417729?pq-origsite=gscholar>

Finally, there are several existing categorization systems that can be used to assess neurological outcome in non-fatal drowning cases:

- The **Cerebral Performance Category Scale (CPC Scale)** <https://www.azdhs.gov/documents/preparedness/emergency-medical-services-trauma-system/save-hearts-az-registry-education/cerebral-performance-categories-scale.pdf> and **Overall Performance Category Scale (OPC Scale)** [https://www.resuscitationjournal.com/article/S0300-9572\(13\)00571-6/fulltext](https://www.resuscitationjournal.com/article/S0300-9572(13)00571-6/fulltext).
- In children, the **Pediatric Cerebral Performance Category (PCPC)** and **Pediatric Overall Performance Category (POPC)** <https://e-journal.gr/en/functional-outcome-following-pediatric-intensive-care-pediatric-cerebral-performance-category-pcpc-and-pediatric-overall-performance-category-popc-during-a-prospective-two-years-follow-up-period/>
- The **Modified Rankin Scale for Neurologic Disability** <https://manual.jointcommission.org/releases/TJC2016B/DataElem0569.html>