



Systematic Review of Non-Utstein Style Drowning Terms

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Disclosure

- Justin Sempsrott / Andrew Schmidt –
- Founders - Lifeguards Without Borders
 - Active Members – American Red Cross Volunteer Lifesaving Corps

Acknowledgements

- Wesley Forred, RN Research Analyst
- Las Vegas Emergency Medicine Residents



Background

- Third leading cause of death globally
- Fourth leading cause of death in the United States
- Leading cause of death for ages 1-4



Background

Data collection has been plagued by underreporting

- Data lacking from low and middle-income countries which account for >95% of reported drowning deaths
- 2002 WHO: data collected from 4 of 42 Sub-Saharan African countries
- 2007 ILSF: data collected from 16 of 67 member countries

“Drowning is the process by which air-breathing animals succumb on submersion in a liquid. In the evolutionary process, water-living species adapted to terrestrial life, lost their ability to breathe under water, and became susceptible to drowning.”¹

Drowning is defined as death by submersion in any liquid, typically water. *Near drowning* is defined as survival after submersion in a liquid.

Both of these terms are temporally based and depend on knowing the ultimate outcome. This outcome is typically unknown at the time the patient is under an emergency physician’s care. The American Heart Association, in 2000, recommended the terms be replaced with the term “submersion injury.”² The term submersion injury or incident is a neutral term without any implication of time, prognosis, or retrospective analysis. The use of the term *incident*

per year can only be estimated, and these estimates range from 7,000 to 80,000 per year in the United States.

What makes these numbers particularly tragic is that submersion incidents usually involve an otherwise healthy and typically young patient population. More than one in four fatal submersion incident victims are children 14 years old or younger, and in 2005, of all children 1 to 4 years old who died, almost one-third died from drowning.⁴ Fatal submersion incidents remain the second leading cause of unintentional injury deaths in children ages 1 to 14 years.³

Male victims predominate in all age groups and are four times more likely to die from submersion incidents than females.⁴ The use of intoxicants, particularly alcohol, is frequently associated with submersion incidents involving adolescents and adults. One study demonstrated that 64% of men who drowned had



Background

- Until 2002- No universal definition for drowning
 - Confounds data collection
- Papa L, Hoelle R, Idris A
Systematic review of definitions for drowning incidents. *Resuscitation*, 65(2005). 255-264.
 - Review of 43 articles from 1966 to 2002
 - Found 33 different definitions for “drowning” and “near-drowning”



Background

Drowning

- “If a patient dies within 24 h of being submersed in water”
- “Death certificate says drowning as cause of death”
- “Patients who died by submersion in water or of related complications”

Near Drowning

- “If a patient lives for at least 24 h after being submersed in water”
- “Patients admitted after asphyxiation due to submersion in water”
- “Survival beyond 24 h after cardiorespiratory arrest following submersion in water”



Background

2002 World Congress on Drowning

- Established universal definition
- Called for Utstein style of reporting
 - **Morbidity**
 - **No Morbidity**
 - **Mortality**
- Recommended discontinuation of terms like “silent”, “wet”, “dry”, and “near drowning”



Universal Definition

- **“The process of experiencing respiratory impairment as the result of submersion/immersion in a liquid medium.”**
- Adopted in 2005 by **WHO, AHA, ILCOR**



**Do non-Utstein style terms
persist in the medical literature
since the development of a
universal definition?**



Objective

This systematic review identifies the prevalence of *Non-Utstein Drowning Term Use (NDTU)*

- “wet”, “dry”, “near”, “active”, “passive”, and “secondary” drowning
- Peer-reviewed medical literature since the publication and dissemination of uniform reporting guidelines



Methods





Data Sources

- IRB approved systematic review following the Cochrane methodology
- Search using Medline/Pubmed® and Web of Science®
 - English language
 - Published January 1, 2003 - July 15, 2010
 - Search terms:

“drowning”,	“active drowning”
“dry drowning”	“silent drowning”
“drowned”	“secondary drowning”
“wet drowning”	

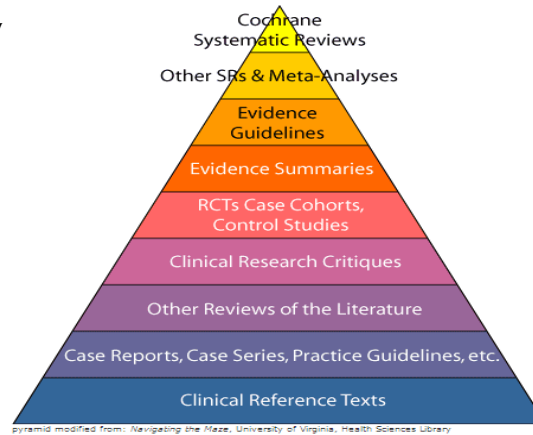


Cochrane Methodology

- Systematic Review:
 - Collates all evidence that fits pre-specified eligibility criteria in order to address a specific research question
- Cochrane Collaboration
 - Prepares, maintains, and promotes systematic reviews to inform healthcare decisions
 - Based on Cochrane Handbook for Systematic Reviews of Interventions

Cochrane Reviews are now the “**gold standard**” for systematic reviews in such key publications:

- The Lancet
- New England Journal of Medicine
- British Medical Journal
- Journal of the American Medical Association



Routinely appear in these as well as in specialized medical journals.



Cochrane Methodology

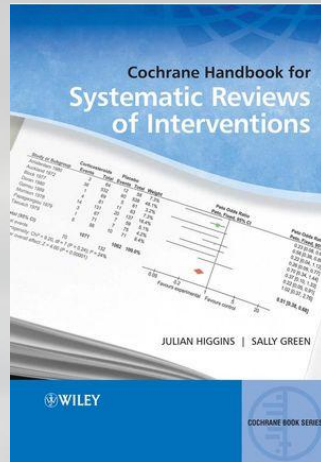
The Cochrane Review Process:

1. **Defining the review question** and developing criteria for including studies.
2. **Searching** for studies
3. **Selecting** studies and collecting data
4. **Assessing risk of bias** in included studies
5. **Analyzing** data and undertaking meta-analysis
6. Addressing and **reporting bias**
7. Presenting and **interpreting** results



Cochrane Methodology

<http://www.cochrane-handbook.org>



Data Selection

- Titles and abstracts searched with Endnote Web®
- **Inclusion criteria:**

Articles relevant to:

- Public health
- Impact
- Surveillance
- Treatment
- Pathophysiology
- Prevention

Title contained:

- “Drowning”
- “Immersion”
- “Submersion”
- Any term related to:
 - Water injury, mortality, or safety



Data Selection

Exclusion criteria

- Purely forensic or microbiologic articles
- Opinion/editorial pieces
- Non-peer reviewed publications
- Non-human studies
- Inability to obtain full text reference



Data Extraction

Demographic

- Date of publication
- Name of journal
- Primary medical specialty of journal
- Impact factor

Outcome

- Presence of non-Utstein drowning terms (NDTU)
- Presence of *any* drowning definition
- Conflicting use of any drowning terminology



Data Extraction

- Non-Utstein drowning terms considered “not present” if:
 - Used in a historical context
 - Used to describe that the terms are no longer recommended
- For articles that were found to have NDTU, the cited half-life was recorded



Outcomes

Primary Measure

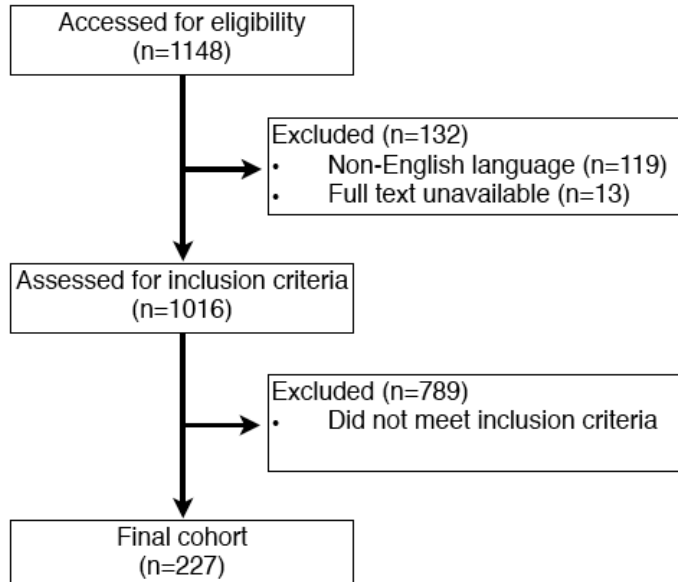
- Prevalence of **Non-Utstein Drowning Term Use (NDTU)**

Secondary Measures

- Prevalence of the exact Utstein-style drowning definition
- The median impact factor and cited half-life of journals with NDTU
- Type of Journal



Results





Results

Final Cohort

- 227 articles from 131 journals

Inter-rater reliability (IRR)

- Calculated for title/abstract screening and data extraction
- Kappa (95% CI) = 0.929 (0.88,0.98)



Results

Primary Measure

-Prevalence of non-Utstein drowning terms

- **42.7%** (35.6, 48.4) 95% CI
- **97%** attributable to use of “near-drowning”
- The following terms were not found in any articles
 - “active drowning”
 - “silent drowning”
 - “passive drowning”

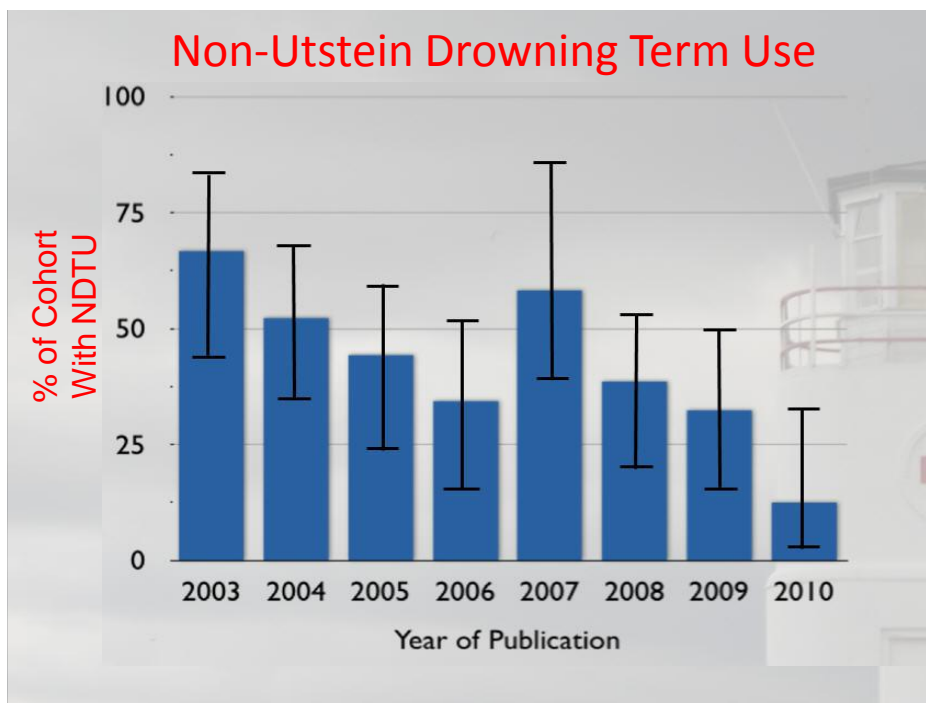


Results

Primary Measure

What about trend over time?

Year	N	NDTU (n)	NDTU (%)	95%CI
2003	27	18	66.7	(46.0,83.5)
2004	23	12	52.2	(30.6,73.2)
2005	27	12	44.4	(25.5,64.7)
2006	32	11	34.4	(18.6,53.2)
2007	24	14	58.3	(36.6,77.9)
2008	39	15	38.5	(23.4,55.4)
2009	31	10	32.3	(16.7,51.2)
2010	24	3	12.5	(2.7,31)





Results

Secondary Measures

- **Prevalence of the exact Utstein-style drowning definition**
 - 37/227 (**16%**) contained any drowning definition
 - Of those, 18/37 **48%** (95% CI=32,64) used the Utstein-style definition.



Results

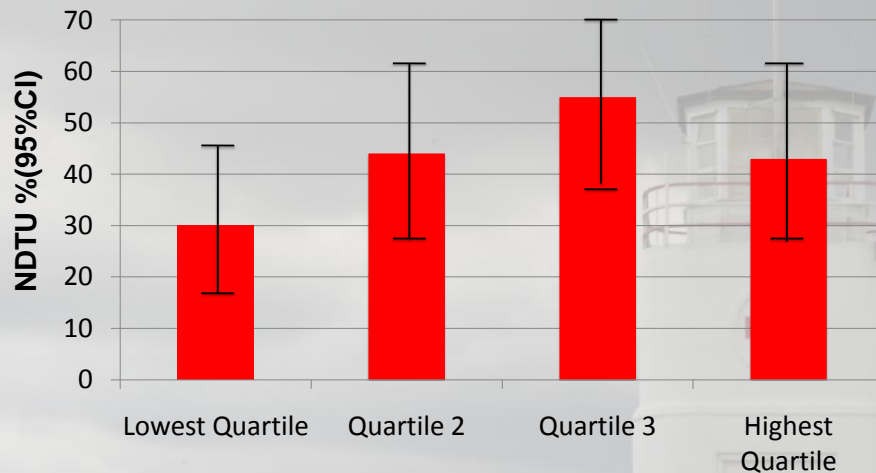
Secondary Measures

For articles with NDTU:

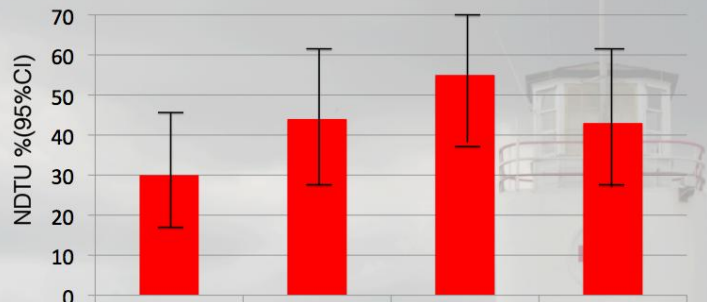
- **Impact factor**
 - A measure reflecting the average number of citations to articles published in science and social science journals
 - Measure of the # of times journals were cited in the previous two years
 - Median (IQR)= 1.53 (0.9- 2.7)
 - Range= (0.57 – 13.66)



Prevalence of NDTU by Journal Impact Factor



Prevalence of NDTU by Impact Factor



Q1 (0.5-0.9)	Q2 (1.0-1.5)	Q3 (1.6-2.7)	Q4 (2.8-13.6)
Israel Med Assoc	Emer Med J	Circulation	BMJ
Ann of Tropical Pediatrics	Injury and Prevention	ILCOR	Neurology
J of Laryngology and Otology	Mycosis	Arch Disease in Childhood	Int Epidemiology Assoc
Pediatrics in Review	Post Grad Med	Eur J of Clin Microbial Inf Dis	Critical Care
Aus J of Rural Health	Aus and NZ J of Pub Health	Arch of Pathology and Lab Medicine	Pediatrics



Conclusions



Summary

- 42% prevalence of NDTU, 97% Near Drowning
 - Gradual decline except 2007
- 16% contained ANY drowning definition
 - 48% used WCD 2002 definition
- Persists across high and low impact journals



Conclusions

- Common usage of “Near-drowning”
- Persists in high and low impact journals
- Steady decline with peak in 2007
- No known targeted efforts to decrease usage
- Targets for editorial intervention

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Letter to the Editor

DROWNING TERMINOLOGY

To the Editor:

We read with interest Math et al.'s study, "Infrared Ear Thermometry in Water-related Accidents—Not a Good Choice," and applaud their contribution to the literature

Western Carolina University
Cullowhee, North Carolina
The Appalachian Center for Wilderness Medicine
Morganton, North Carolina

Justin Sempertoff, MD
Department of Emergency Medicine

We would encourage *Journal of Emergency Medicine* authors and editors to adopt modern drowning terminology to promote uniformity and scientific rigor in this important topic.

Emergency Medical Care Program
Accessed May 21, 2010



Limitations

- English studies only
- Non-uniform definitions not extracted
- Relatively small sample size by year
 - 95% CI's crossed
 - Trend unknown before 2003

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In This Issue

Lesson 17 Submersion Incidents Page 2

Approximately 8,000 to 9,000 people drown each year in the United States. Victims of submersion incidents can present to emergency departments anywhere in the spectrum of illness from asymptomatic to comatose or in cardiac arrest. This lesson will explore the sometimes subtle signs and symptoms of submersion injury and the effective treatment of these patients.

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Questions?



- Justin@LifeguardsWithoutBorders.org -Justin
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Cited Half Life

- A measurement used to estimate the impact of a journal. The number of publication years from the current year which account for 50% of current citations received. This figure helps you evaluate the age of the majority of cited articles published in a journal. Each journal's cited half-life is shown in the Journal Rankings Window. Only those journals cited 100 times or more times have a cited half life. (Ladwig & Sommese, 2005)
- Median cited half-life = 6.1 years

