PREVENTION OF SCUBA DIVING MISHAPS BY USING A PRE-DIVE CHECKLIST: A GROUPED RANDOMIZED TRAIL

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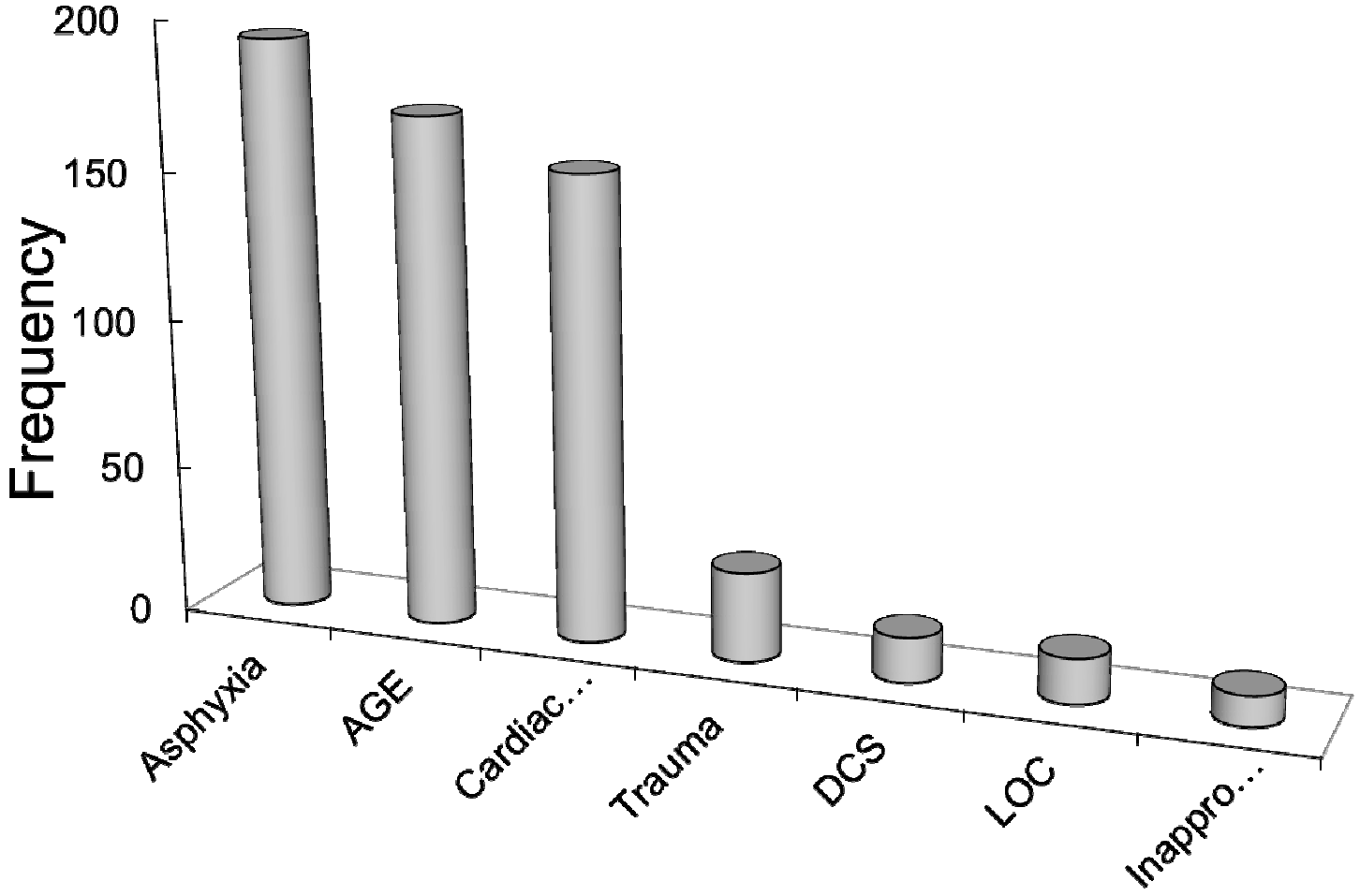
1. Turn the laptop on √
2. Turn the microphone on √
3. Look at the audience √
4. Say “Hello” √
5. Lauder! √

Most Common Causes of Scuba Fatalities



Denoble PJ, Caruso JL, Dear GdL, Pieper CF, Vann RD. Common causes of open-circuit recreational diving fatalities. Undersea Hyperb Med. 2008; 35(6):393-406.

A PRE-DIVE CHECK; AN EVALUATION OF A SAFETY PROCEDURE IN RECREATIONAL DIVING: PART 1.

Chris Acott
SPUMS 1994

TABLE 1

THE NINE FAULTS

The air was not turned on
The tank was empty
Masking tape had been left on the pillar valve
The regulator mouthpiece was partially bitten through
The tank was loose in the harness
The buoyancy jacket's emergency dump valve was loose
The power inflator was not connected
The oral inflator was torn and loose
The maximum depth indicator was not zeroed

What did we do during the last 20 years?

Pre-dive Safety Check (BWRAF)

Briefing

Performance Requirements

- Perform the buddy pre-dive safety check.

Value

To ensure that you and your buddy are ready for your dive and that you are familiar with each others equipment & that everything is functioning correctly.

Steps

1. B - Buoyancy/BCD (Check Inflation/Deflation)
2. W - Weight (Orientate To Quick Release System)
3. R - Releases (Orientate To Equipment Releases)
4. A - Air (Confirm Air Is Switched On & Sufficient Supply For The Dive)
5. F - Final Check

Objectives

To assess the effectiveness of a pre-dive **checklist** in the prevention of diving mishaps

- hard copy check-list (not mnemonics)
- handed out before dive

Methods

- Group-randomized field trial
- Location-days randomized in advance
  - intervention group (check-list + post-dive report)
  - control group (post-dive report only)
    - Not prevented to use their own checklist neither reminded to do so
  - each volunteer could participate only once

Outcomes

1. Near-misses

   Rapid ascent, entanglement/ entrapment, lost buddy contact, buddy breathing, 2nd stage regulator malfunction, low on air, out of air, free ascent, hose rupture

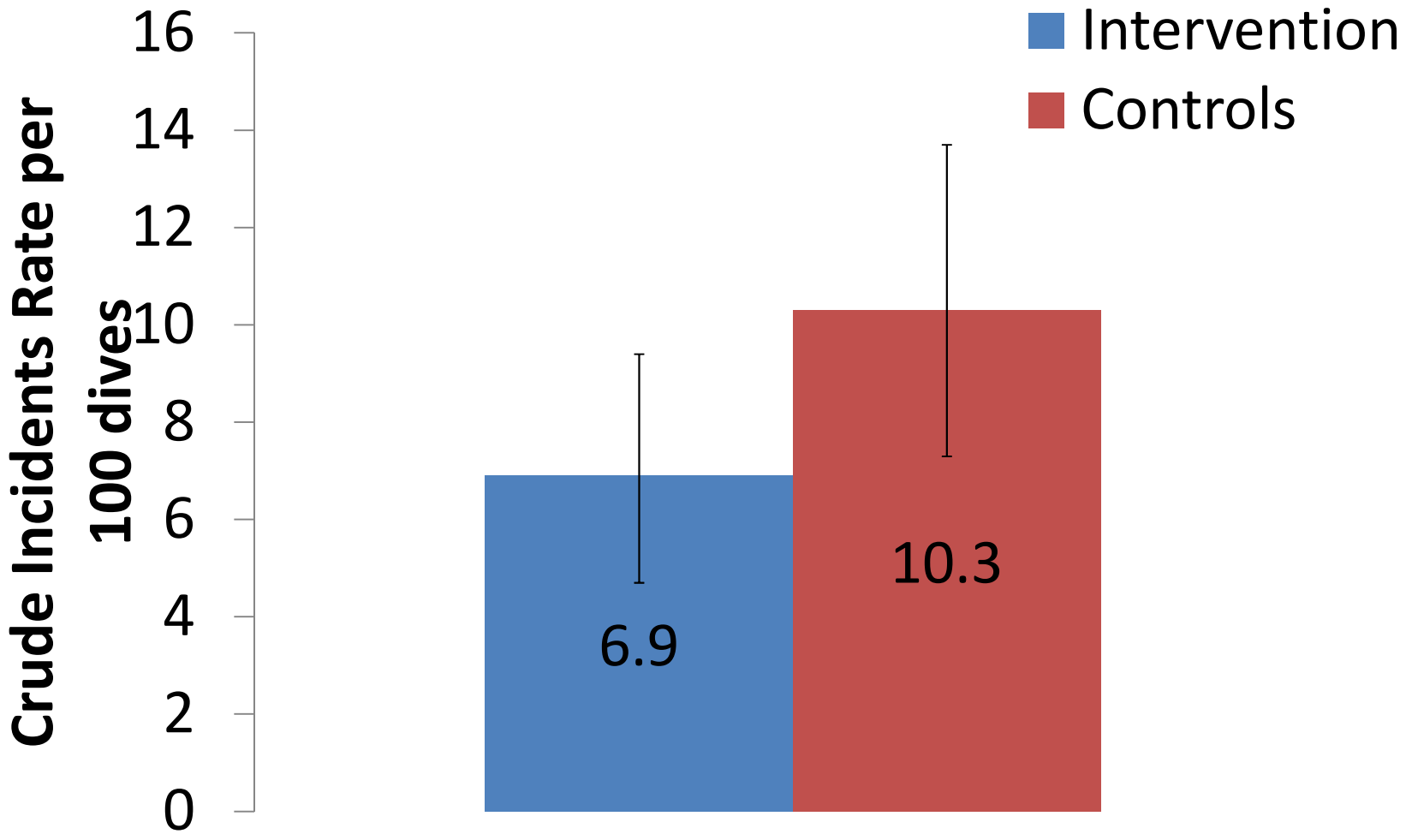
2. Injuries
3. Uneventful dive
4. Skipped dive

   - pre-dive check findings triggered decision not to dive

Statistical Analysis

- Rates of mishaps where compared using Poisson regression models.
- The correlation between divers who were randomized to a research arm on the same location-day was controlled by using generalized estimating equations (GEE).
- Distribution of potential confounders was compared among the intervention and control groups.
- Crude and adjusted intent-to-treat (ITT) analysis were conducted.

Crude Incidence of Major Mishaps in ITT analysis



Incidence Rate Ratios for Major Mishaps

	Intent-to-treat IRR* (95% CI)	Per protocol IRR* (95% CI)
Crude	0.67 (0.48, 0.93)	0.69 (0.49, 0.99)
Adjusted	0.61 (0.44, 0.83)	0.63 (0.46, 0.88)

*IRR = Incidence rate ratio comparing major mishaps for intervention group vs. control group. IRR is adjusted by environmental factors, average annual dives, and number of years of diving.

Conclusions

- The use of pre-dive checklists decreases the risk of mishaps.
- The effectiveness of a checklist may depend on the timely reminder to use it.

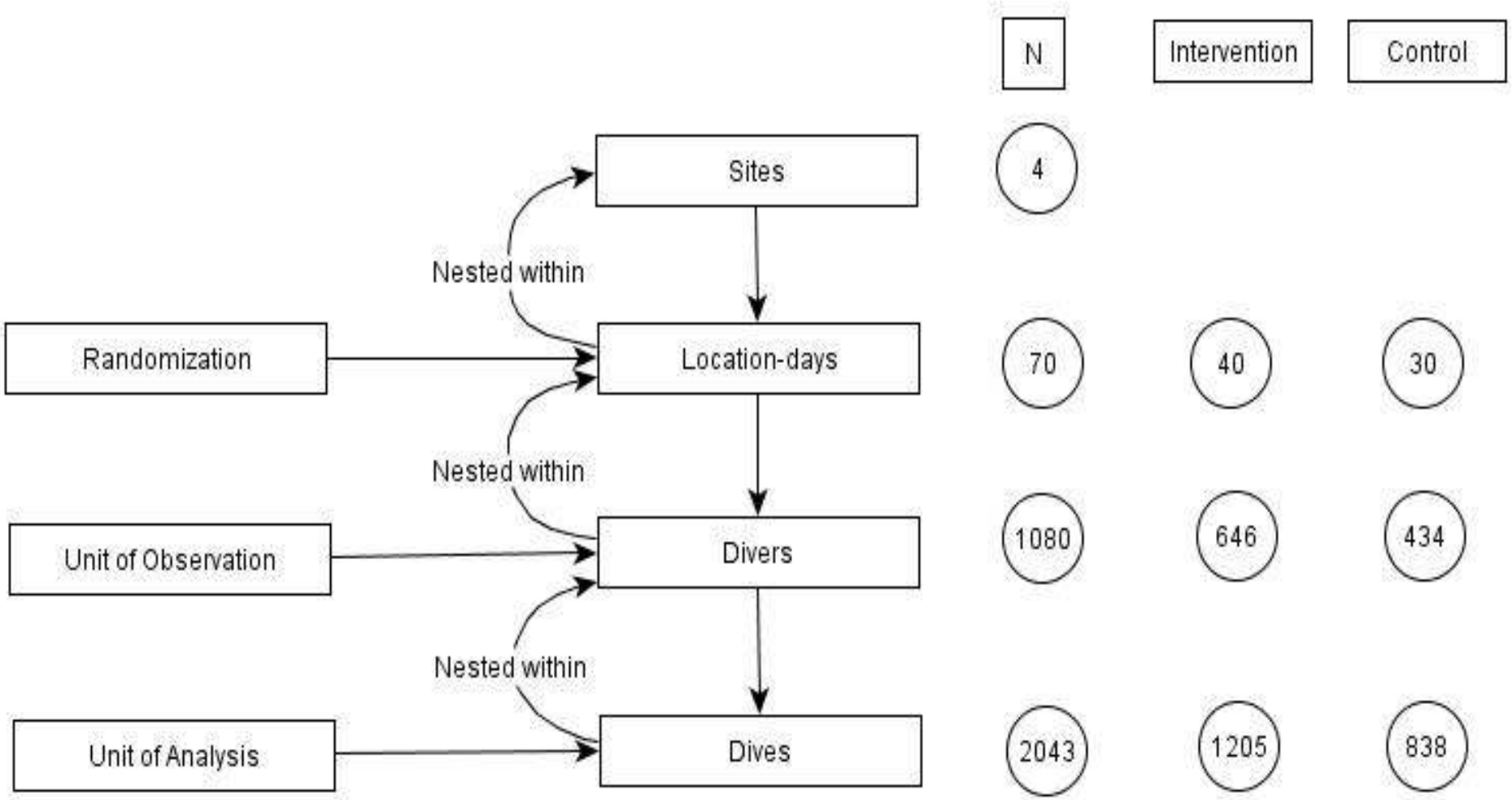
Suggested Interventions

- Make pre-dive checklists widely available
- Encourage use of checkklists
- Make the checklist a part of" safety culture"
- Dive leaders lead by example (use checklists)
- Do more effectiveness studies

Co-funded by Dan & Betty Orr Foundation


W TO GET

Clustering of Data



Potential Confounders in Per-protocol Analysis

	Total	Intervention	Control
N	879	445	434
	Percent	Percent	percent
Males	68	67	70
White	93	91	95
	Mean (median)	Mean (median)	Mean (median)
Average annual dives	30.8 (10)	24.5 (10)	37.07 (10)
Number of years diving	29.7 (8)	16.5 (8)	43.23 (8)
BMI	26.5 (26.2)	26.4 (26.3)	26.6 (26.2)
Age	42.2 (43)	42.1 (43	42.4 (44)

Incidence of Mishaps