Investigation of Emergency Breathing Apparatus Skill Set Knowledge Transfer Between Helicopter Underwater Escape Training Simulators

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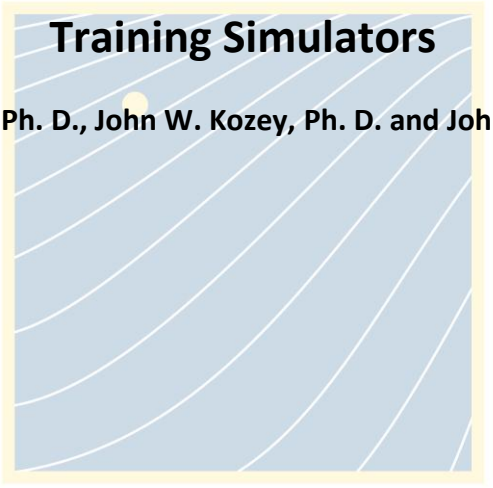

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Abstract

Introduction:

Flying in a helicopter over water is a potentially hazardous situation and supporting research indicates that during a ditching, ~ 66% of individuals survive (Clifford, 1996; Cunningham, 1978; Taber & McCabe, 2006, 2007). Research further indicates that at least 70% of helicopters will capsize shortly after landing (Taber & McCabe, 2006, 2007, 2009). Based on this information, many offshore oil and gas organizations require Helicopter Underwater Escape Training (HUET) for personnel who regularly travel over water. Recently, the oil and gas industry in Atlantic Canada introduced a compressed air breathing system that could be used by passengers to mitigate the possibility of drowning in the event of a capsize following a ditching; however, perceived operational risks have lead to safety limitations on its use during training.

Methods:

To measure the effectiveness of different training protocols on the capability to use the compressed breathing system in a realistic simulation, 111 (individuals completed initial ditching training and one egress retention test. The participants were randomly assigned to one of four group conditions: Group 1 (current training standard – $\mathbf{G_c}$); Group 2 (modified training standard 1 – $\mathbf{G_{P1}}$); Group 3 (modified training standard 2 – $\mathbf{G_{P2}}$); and, Group 4 (advanced training standard – $\mathbf{G_m}$). At a minimum, each group completed two HUET exercises while breath-holding in a full-scale helicopter simulator. Groups 2, 3, and 4 completed at least two HUET egress trials while breathing from the compressed air system. Egress performance was measured as the total time to complete all tasks, number of errors in sequence, assistance provided, and difficulty. Assistance provided scores were based on the ratings giving by an independent HUET subject matter expert (SME) and an observational video analysis of egress performance.

Results:

The participants completed a total of 697 HUET exercises during their initial trials and retention test. An examination of egress retention test performance shows that participants in $\mathbf{G_c}$ required significantly less time to complete tasks; however, it was noted that more individuals in this group escaped without using the compressed air system despite being explicitly instructed to do so. The observational video analysis results revealed that participants in $\mathbf{G_c}$ required significantly more assistance from the SME during their egress.

Discussion:

The individuals who had more opportunity to practice the skills (G_m) required to properly use the compressed air system in realistic conditions performed better than those with less practice (G_c). These findings lend support for whole-task performance requirements during HUET.

Recommendations:

Based on the findings from this study it is recommended that offshore personnel be trained to use the compressed air system inside the actual helicopter training simulator. Including this performance requirement will increase motor skill connections that might be needed in a real ditching.

Key Words: Underwater egress; compressed air breathing systems; training protocols; survivability