

Presenter Bios:

Warwick Marlin grew up in Durban, Kwa-Zulu Natal, South Africa. He has been in the Emergency Medical Services for the last eight years, starting in 2010 as a Basic Ambulance Assistant and working his way up to Emergency Care Practitioner, Graduation from the Durban University of Technology in 2017. He is currently working as an Emergency Care Practitioner with a national company in South Africa. His passion for rescue began when he started his Bachelor's Degree in Emergency Medical Care. During his 4-year degree program, he completed a number of the technical rescue modules, ranging from fire and extrication to rope rescue. To complete his degree at university he had to undertake a research project. The research project specifically addressed rope rescue by looking at the different ways of tying a prusik knot and how the knot being tested compared to the traditional prusik.

Dagmar Muhlbauer grew up in Johannesburg, Gauteng, South Africa. She has been in the Emergency Medical Services since 1996 and has worked as an operational Advanced Life Support paramedic for both ground and aeromedical services. Dagmar also has operational experience as a firefighter in a busy urban area. She became more involved with rescues once she began her academic career in 2001 as a lecturer at the Department of Emergency Medical Care and Research, Durban University of Technology. She has completed her Masters and is currently busy with her PhD in Emergency Medical Care. Dagmar has presented at a number of national and international conferences, and her key focus areas for research are medical rescue, operational related physical preparedness, and aviation medicine.

Abstract:

Background: In rope rescue a prusik knot can be utilized for redundancy, ascending, belaying and tensioning of high-lines. Examples of prusik knots include: Bachmann Knot, French Prusik, and the Traditional Prusik. The focus of this research was on the traditional triple wrap with a double fisherman's knot on the hitch prusik.

Aim: The aim of this study was to compare the traditional triple wrap prusik to the triple wrap prusik with the double fisherman's knot on the hitch and their use within the rope rescue environment with a specific focus on the breaking strength and slippage of the knots.

Methods: A testing system was rigged, using a load cell, chains, electronic winch and a snatch block pulley. A total of 60 prusik knots were pulled (30 traditional triple wrap prusiks and 30 triple wrap, with a fisherman's knot on the hitch, prusiks). The researchers alternated between the traditional and the triple wrap, with a double fisherman's knot on the hitch, prusik. Data was recorded utilizing a data collection template, which recorded breaking strength (kg/kN), slippage (mm/cm), and location where, specifically, the knots broke. Results were also captured on a specialized program designed to record the data directly from the load cell, which was captured in kilograms (kg).

Results: The prusiks with the fisherman's knot on the hitch broke at a similar breakage (kg/kN) average to the traditional prusiks. In total, 86% of these prusiks broke at the wraps under the knot. Slippage was more consistent and the lengths (cm) were more noticeable in the prusik with the fisherman's knot in comparison to the traditional prusik.

Conclusion: Prusiks with the fisherman's knot broke at a similar weight as the traditional prusiks and slipped more consistently in weight and length in comparison to the traditional prusiks. The use of this knot is suggested for lowering and raising, and to be used as redundancy in a rope

rescue system. However, further research should be done in the form of a tandem triple wrap prusik to determine slippage and breakages for the use in highlines.