

# INTRODUCING KRADAL™ – A NEW ENERGY ABSORBING FLOORING TECHNOLOGY TO PREVENT FRACTURES IN ELDERLY PEOPLE

Clare Robertson<sup>1</sup>, Peter Milburn<sup>2</sup>, John Campbell<sup>1</sup> and John Bowmar<sup>3</sup>

<sup>1</sup>Otago Medical School, <sup>2</sup>School of Physiotherapy, University of Otago

<sup>3</sup>ACMA Industries Ltd, Upper Hutt, Wellington, New Zealand

Introduction: Kradal™ is a new technology to optimise energy absorption on impact with the floor or ground in order to reduce the likelihood of a fracture from a fall, while at the same time minimising deflection to avoid increasing the rate of falls. It consists of thin panels of gel to provide elasticity for impact absorption and attenuation, with semi-rigid polyurethane foam supports and polyurea elastomer spray coating which act to provide a stable surface to walk on. Options for use include crash mats, underlay for carpet or vinyl, and tiles for both inside and outside use.

Methods: We investigated the energy absorbing and deflection properties of Kradal™ used as an underlay compared with 8 mm commercial grade "waffle" type rubber underlay for wooden carpeted floors, the floor type with the lowest mean impact force and the lowest risk of hip fractures. We measured impact attenuation using a force transducer (standard drop test device) to simulate the impact on falling. We tested for hardness using an indenting testing machine and standard test protocols to simulate the indentation caused by a foot on walking.

Results: Preliminary results show that mean peak acceleration on impact with Kradal™ under carpet was 62% lower than on a wooden floor alone ( $p < 0.001$ ), and 33% lower than with a commercial grade rubber underlay under carpet ( $p < 0.001$ ). During hardness testing, Kradal™ under carpet on a wooden surface deflected 1.5 mm when a weight of 41.0 kg was applied, whereas carpet with standard rubber underlay on wood was deflected by 3.0 mm when only 6.0 kg was applied.

Discussion and Conclusions: Kradal™ when used under carpet absorbed at least 33% more energy on impact than carpeted flooring with a commercial rubber underlay, and provided a superior surface in terms of indentation. We suggest that the use of Kradal™ under carpet in long term care facilities and hospitals would be safe, practical and result in a reduction in the rate of hip fractures from falls.