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CSA Z325:20
National Standard of Canada

Hip protectors

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Hip protectors

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Preface

This is the first edition of CSA Z325, *Hip protectors*. It supersedes CSA Express Document EXP08 published in 2017.

This Standard was prepared by the Technical Committee on Hip Protectors, under the jurisdiction of the Strategic Steering Committee on Health Care Technology & Systems, and has been formally approved by the Technical Committee.

This Standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

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   d) *rationale for the change.*

CSA Z325:20
Hip protectors

0 Introduction

0.1 General

Wearable hip protectors are used to reduce the risk of hip fracture in the event of a fall. They use a variety of techniques to achieve this objective, but they generally rely on the following two elements:

a) an impact protector; and
b) a delivery system, such as a garment, which is intended to hold the protector in the correct position.

Most hip protectors are designed to provide protection in the event of multiple falls, although some might be intended to provide protection for a single fall and then be replaced.

This Standard addresses the need for a test method to measure the protective value of hip protectors in the laboratory setting. It reviews practical issues related to the use of hip protectors and describes a test method for measuring the reduction in force applied to the bone provided by hip protectors during a simulated fall. The recommended test method is based on a previous consensus statement on recommended approaches to biomechanical testing of hip protectors.

0.2 Purpose of hip protectors

Hip fractures, or fractures of the proximal femur, are a serious and common consequence of falls in older adults. In Canada alone, there are over 28,000 hip fractures annually, and associated medical treatment costs of over $1 billion. The average age of the hip fracture patient is 82. Over 25% of individuals will die within one year after the fracture.

Hip protectors act to reduce the force applied to the proximal femur during a fall on the hip, and the corresponding risk for hip fracture. About 90% of hip fractures are due to impact of the body during a fall and approximately 20 – 30% of older adults fall every year. Impact on the lateral aspect of the pelvis during the fall increases the risk for hip fracture by 30-fold. Accordingly, most hip protectors are designed to cover the lateral aspect of the pelvis in the vicinity of the greater trochanter. Hip protectors reduce the force to the bone by absorbing energy and/or shunting force into areas adjacent to the proximal femur. It is important to understand that the purpose of hip protectors is not to reduce the risk of falling but rather to reduce the risk of hip fracture in the event of a fall.

0.3 Target populations for hip protectors

Hip protectors can be worn by anyone at risk for falls and hip fracture, with the aim of enhancing safe mobility. The risk factors for fall-related hip fractures are multi-dimensional, and older adults often have multiple coexisting risk factors, which include orthopaedic conditions such as osteoporosis, use of psychoactive medications, muscle weakness, stroke, Parkinson's disease, cardiovascular disease, impaired vision, vestibular problems, sensory loss secondary to diabetes, and cognitive impairment. Individuals with a previous fragility fracture, such as a fracture of the wrist or spine, are at higher risk for hip fracture. Hip protectors can also be of benefit to individuals who are at high risk for falls due to declines in mobility and balance. Over one-third of older adults (over age 65) living in the community and about 60% of individuals in long-term care will fall at least once per year.

Clinical trials have shown that specific types of hip protectors reduce the risk for hip fracture by up to 80% if worn at the time of a fall. However, an essential determinant of effectiveness is the willingness and ability of the target population to wear hip protectors. User compliance can be influenced by factors such as style, comfort, availability, and commitment among care providers to facilitate use.

There is considerable evidence of the public health benefits of hip protectors as a cost-effective approach to reducing hip fractures for older adults in long-term care. Many health authorities in Canada regard all individuals who reside in long-term care to be at risk for hip fracture, and Osteoporosis Canada recommends use of hip protectors for all residents of long-term care.

0.4 Need for this Standard

In order to be effective, hip protectors must provide adequate protection against hip fracture during a fall. There is a wide range of hip protectors on the market, and many have not undergone clinical trials. Biomechanical testing is an essential complement to clinical trials for evaluating the effectiveness of hip protectors.

A challenge in the design of hip protectors is to select parameters, such as the thickness and stiffness of the impact protector, to satisfy both biomechanical performance and user acceptance. Hip protectors should provide a meaningful reduction in impact force and risk for hip fracture during a fall. At the same time, a hip protector should not be so bulky or uncomfortable that it impacts user compliance. The hip protector should not be an obstacle for proper mobility and gait. This trade-off highlights the need for biomechanical testing to guide manufacturers in the design of hip protectors, and consumers in the selection of hip protectors. Biomechanical testing can also address the need to assess the effect on hip protector performance of laundering, or of repeated impacts in the case of hip protectors that are intended to be effective for multiple falls.

0.5 Limitations of existing standards

Existing standards are not appropriate for measuring the biomechanical performance of hip protectors. Standards currently exist for testing the protective value of helmets (e.g., ASTM F2220) and motorcycle protective clothing (EN 1621-2). However, these standards are inappropriate for testing hip protectors for the following reasons:

a) they do not accurately represent the relevant anatomy of the proximal femur and pelvis;
b) they do not include direct measures of the force delivered to the proximal femur, which is the site of hip fracture;
c) they do not simulate the impact energies of falls from standing, which cause 95% of hip fractures; and
d) they do not accurately simulate the effective mass and stiffness of the body during impact to the hip.

1 Scope

1.1 General

This standard specifies testing and labelling requirements for hip protectors used to reduce the risk of hip fracture in the event of a fall.

Annex A provides a test method for measuring the effect of a hip protector in reducing the force to the proximal femur during a simulated fall. The test method is applicable both to hip protectors that are designed to withstand a single impact and be replaced, and to hip protectors that are designed to