Methodology for ınvestigating the use of the arms in fall recovery

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OBJECTIVE Despite extensive preventive efforts, falls continue to be a major source of morbidity and mortality. Most studies of falling mechanics have focused on response time, lower limb muscle strength, and leg muscle activation. Less attention has been given to rotational arm movements that express angular momentum that would otherwise be associated with destabilization of the trunk. The purpose of this ongoing study was to determine how arm rotation is modulated during a fall recovery in response to varied balance perturbations.
METHODS Twelve volunteer participants were initially held in a static forward-inclined position using a horizontal tether attached to a waist belt. The subjects were then unexpectedly released from initial lean angles of 5.5° and 6.5°. They were instructed avoid taking a step during the fall recovery. Six Eagle motion analysis cameras were used to track 54 markers placed on the subjects' bodies and a Kistler force platform was used to record ground reaction force. Full-body kinematics and kinetics were computed from marker and force data using Visual3D software. Custom written MATLAB code was used to compute the three dimensional angular momentum of the arms. At this writing, however, we have completed analysis of only one subject's fall recoveries.
RESULTS The results for a single subject showed similar angular momentum patterns for all trials. First, the arms were rapidly raised away from the body in the frontal plane. This movement was followed by a rapid rotation of both arms in the clockwise direction (viewed from the right). The angular momentum of the arms during this phase appeared to be graded in response to the magnitude of the perturbation. Peak angular momentum in sagittal plane was found to be approximately 50% greater for and initial body lean of 6.5° than for 5.5°.
DISCUSSION & CONCLUSION We have developed a methodology for applying a balance perturbation and measuring the use of the arms during fall recovery. Analysis of one subject's recoveries showed that the subject seemed to generate more angular momentum with the arms when a greater perturbation was applied. Processing all trials would permit statistical tests to confirm if this apparent modulation of the response of the arms is consistent across the subject population. Such findings would suggest that arm rotations are calibrated rather than being a maximal response. This same methodology may be used to study the maintenance of balance during sporting activities such as the volleyball spike.
KEY WORDS fall, recovery, arm rotation, tether release, angular momentum

Characterization of temporal patterns of behavior of the crawl technique

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OBJECTIVE With this work we want to check the standards of the crawl technique from an observational methodology appropriated.The instrument of observation (Nilton, 2008) was developed Ad Hoc, using the references of biomechanical models, based on a mixed system of categories and formats of fields, with particular reference to four criteria that add in the form of alpha-numeric codes. The results of the quality of the instrument revealed indices of reliability and high precision.
METHODS We use a sample of six swimmers from Portuguese and international level as part of the Portuguese national team in swimming. Each element was subject to the overall swimming crawl technique at a distance of 25m to achieve maximum speed without a breath. The units of observation are natural (events and behaviors) and analytical (of behavior). The detection of temporal patterns by binomial analysis (Magnusson, 2000) was made by the software 5.0 Theme created by Magnusson (1996, 2000). The instrument is intended to identify patterns which are within the critical intervals, allowing examination of the inter-relationship of temporal events (movement), using the record of occurrences in the collection of patterns found in data.
RESULTS The patterns found in each swimmer is different and each pattern is adjusted to the particular individual techniques.
DISCUSSION & CONCLUSION The same swimmer can present similar structures for implementation, representing a behavior pattern. In all the swimmers were identified more than one standard. However, it is noteworthy that no swimmer of the sample made the same overall behavior at any stage observed in the five cycles analyzed.
KEY WORDS Temporal Patterns, Behaviour, Crawl Technique