

Project Shield Proposal

Primary Schools Key Stage 2 - Fall injury Prevention Training

Project Shield, is a proposal to provide specialised training, integrated in to the curriculum of primary school PE classes designed to train Key stage 2 students, years 4,5,6, how to fall safely. Programming automated fall responses that will dramatically reduce students risk of injury requiring medical treatment. There by protecting students while at the same time reducing the burden on the NHS of fall related injuries requiring emergency and follow up treatment.

This training is derived from Judo. Judo, was developed by Jigoro Kano in the 1890's. The moves used in Olympic Judo, are essentially a series of coordinated anatomical moves that cause your opponent to be forcibly thrown to the ground.

These techniques are taught in groups called: Waza

However for the purpose of this paper we are concerned with only one :-

Ukemi Waza - Break falls.

In a martial art that focuses on bodily throwing a training partner to the floor, learning how to land safely is critical not only for safety, but for repetitive practice. This is vital to developing Judo ability. These skills are called Ukemi Waza or in English break falling. If taught and practiced, they can be performed by anyone. They can massively reduce your chance of injury through almost any fall in everyday life. But to understand these benefits, we must first understand what happens when people fall.



While learning to walk, babies fall, so how do they do this successfully without injury. Babies legs represent roughly 30% of their height. Giving them a very low centre of gravity. Before babies can walk, they crawl, notice the classic head up, arms straight posture, this is important, because as babies move from crawling to walking they fall. As they lose balance they instinctively try to return to the more familiar crawling position. First their knees buckle, then the head moves back and away from the floor, then the arms extend in to the familiar crawl position.



This is universal, during the transition from crawling to walking children fall hundreds of times. This repetition creates a learned reflex or what some call muscle memory, because that's what it feels like, when your body reacts with out conscious thought. See the same reflex reaction in a older toddler falling below. Knees bend as balance is lost head moves back & arms extend. Now this strategy serves us well as babies and toddlers.

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By the time most children reach year 4,5,6, in school, or key stage 2, their legs now represent approx 50% of their height. This raises their centre of gravity, their arms are longer increasing leverage forces, as well as this every other affecting variable also increases, strength, speed, weight and height.

This combination now means children exhibiting the same reflex behaviour, start to expose themselves to higher levels of risk. Falls now more frequently will result in injuries to the face, spine, wrists, elbows, shoulders, neck & when you introduce forward velocity in to the equation, we see the classic scorpion. This fall is very dangerous, but all too common as we all instantly recognise it.



We all recognise the all too common scorpion fall, with the added factors of increased height, longer legs & arms, more weight, more speed = more force. Now this learned fall reflex, is a dangerous automatic reaction that we are powerless to control.

But this is just one common outcome, what about slips & slides, these usually result in falls backwards, so how do we react to a sudden loss of balance resulting in a falls backwards.

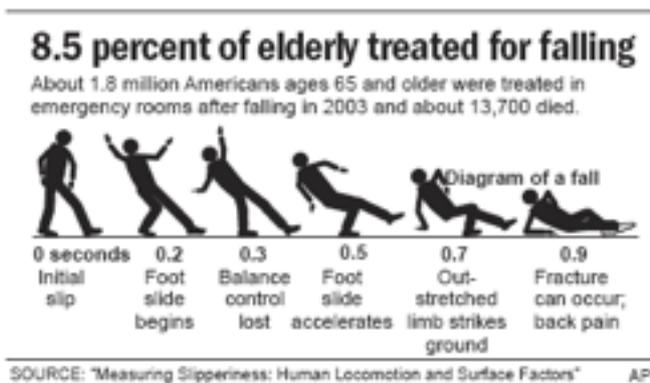


You can see the classic reaction in these pictures above, again these are instantly recognisable, as we have all seen them. This reaction is universal, men, women, young, old, everyone who has not received training will react in exactly the same way. Our natural reflex is to push our hips forward and our hands out behind us. This is a terrible strategy and initially exposes people to injuries to the wrist, elbow, shoulder and collar bone, if the velocity and mass is too high, the arms collapse the head snaps back. This exposing people to potential whip lash injuries and the back of the skull impacting on the floor.

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Possibly the most dangerous if less common falls are to the side, when people reach with just one arm, while moving the head away from the floor, this will almost always end in an injury that will require follow up care regardless of the age of the person involved.

It's just physics that much weight moving at that velocity being stopped by one arm. The outcomes are not good as you can see from the below dig. of data collected for Americans aged 65 and older in 2003.



This chart highlights the speed with which injuries are sustained. There is no thought peoples responses are reflex and dangerous. Notice the main impact points are the hip and the elbow, through training, we can reprogram these reactions with new reflexes that will dramatically reduce the chances of serious injury. Once re-trained, new reflexes will stay with students for life.

In the UK, fractures are a common complication of falls. About 5% of falls in older people who live in the community result in a fracture or hospitalisation. Between 10% and 25% of falls in nursing homes and hospitals result in a fracture. The incidence of hip fractures in the UK is 86,000 per year, and 95% of these are the result of a fall. The cost to the NHS is £1.7 billion a year. The human cost of falling includes distress, pain, injury, loss of confidence, loss of independence and mortality. Falls are estimated to cost the NHS more than £2.3 billion per year.

There is prevention work being done in Wales by NICE and by the Public Health Wales with the "Steady On Stay Safe" program targeting 50+ individuals. But if we are to affect these outcomes, we must address these fall reflexes & reprogram them earlier in the life cycle. The second biggest affected demographic, after the old is children, as seen from this study done in Swansea Neath & Portlbot in 1996.

Methods—Linkage of data from A&E departments with population data to produce fracture incidence rates by anatomical site and cause in children aged 0–14 years.

Results—During 1996, 2463 new fractures occurred in 2399 residents yielding a fracture rate of 36.1/1000 children. Fractures were more common in boys than girls and increased with age in both groups. Sports and leisure activities accounted for 36% of fractures, assaults for 3.5%, and road traffic accidents 1.4%. 59% being from accidental falls. Fractures of the radius/ulna were most frequent (36%).

Conclusions—The fracture rate in South Wales children is twice the rate reported in previous studies. Further research is required to elucidate the reasons behind this high rate.

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Below is some Data taken from page 73 of the 2012 NHS Wales Report that states: Both IP and EP rates have two peaks; in childhood and in old age. Accepting all of the limitations of the data sets their Conclusion - This suggests that there are opportunities to intervene with fallers at an earlier age than is currently recognised.

Supporting reason for targeting children in fall injury prevention?

Bones are the framework of a child's growing body. Bone is living tissue that changes constantly, with bits of old bone being removed and replaced by new bone. During childhood and adolescence, much more bone is deposited than withdrawn as the skeleton grows. Making Ukemi training an inclusive part of the PE curriculum for all Key stage 2 children in primary school will have a positive impact on bone density, in addition to dramatically reducing the chances of injury through falls.

As all of our lesson plans involve weight bearing postures and controlled impacts on special provided mats. The repetitive fall training, although "completely safe", expose the skeleton to carefully measured and repetitively Impact and G-forces stimulating, bone growth & density.

So how does this training work?

We deliver 12 classes to key stage 2 students. We have trialled these lessons in Cardiff based primary schools. Classes have been well received by students and teachers alike. These lessons have been observed by teachers and we have achieved over 90% learning objectives achieved. As we start to teach these movements, children will initially struggle with the unfamiliar co-ordination of limbs and movement. Finding it hard to over ride their existing fall reflexes. So what happens during the course of these classes?. As students complete the various developmental steps on the way to completing techniques, they are actual forming new synaptic connections that allow them to co-ordinate their limbs in new patterns of movement.

When these new connections are reinforced through repetition approx. 300/400 times during the course of the training, these connections become permanent. From this point forward when ever the students experience a sudden loss of balance they will react in the way they have been trained. Dramatically reducing their risk of injury.

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So how does the training work?

We have trailed these classes in two Primary schools in the Cardiff area with Key stage 2 year 4, 5 & 6 students being able to perform to a high standard. These year groups are selected as they are the best match of physical and mental development and training lesson plans to maximise, rates of successful learning objectives achieved.

In short, introducing this training as part of the Welsh curriculum for PE in all Primary Schools has many benefits to students and the wider community. These include but are not limited to :-

- Increased fitness levels
- Increased confidence.
- Increased bone density
- Reduced risk of injury from fall (For Life)
- Reduced Sick days due to accidental injuries
- Classes are fun and engaging for students
- Significant cost savings to NHS accident and emergency services across Wales.
- Classes are cost effective and delivered by experienced qualified & insured instructors
- Potential to make Wales a world leader in fall injury prevention management.

Suggested trial implementation plan and costs?

Instructors would visit, brief and sign up schools to the training plan. The training plan would consist of 12 lessons per term, per year group and would include instructors, all equipment necessary to deliver training sessions, three individual student assessments at 4, 8 & 12, weeks, followed by a certification process for all students completing the training successfully.

Each year group training module would cost £460.00 and all three target year groups (year 3, 4 & 5) would be covered during the first academic year of the trial at a total cost of £1,380.00 per school. Or Circa £1.27p per child per class.

In order for a Cardiff trial to be financially sustainable, statistically relevant and meet our current capability to deliver, we would suggest a trial of 30 primary schools approx 30% of the Cardiff sector. But ultimately the trial size would be subject to funding availability. Although we accept that this initiative would represent a significant investment in fall related injury prevention, we are confident that the implementation costs would be insignificant compared to the significant, life long potential cost savings to the NHS in reducing instances of fall injuries, not to mention the wider health benefits of this training.

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How do we measure the effectiveness of the trial?

Effectively measuring the trial would fall in to two categories, delivery and outcomes.

Delivery.

In addition to providing reportage on number of students trained and results of individual student assessments at 4, 8 & 12 weeks we would also collate feed back from PE co-ordinators and teachers in the schools via survey. This would include their feed back on quality of delivery & class management, effectiveness of lesson plans, impact on fitness levels & co-ordination & percentage of learning objectives achieved.

Outcomes

With regard the outcomes and understanding that the benefits are exponential year on year for life, we still need a statistical example to demonstrate the benefits of the program. To this end we would suggest that at the end of the first year trial, we would monitor fall injuries requiring a hospital visit and those requiring treatment over a fixed period of time (6 Months to 1 year). We can then compare these to the national average across students within the same age group. while the reportage from the first trial are being collated, we would look to continue with a stage 2 Trial of another circa 30 schools while the data is being collated from the 1st Trial.

If the evidence from this data shows that the training has had a significant impact on injury rates Vs the national average in the same age group. We would then move on to the 3rd stage trial of Circa 30 schools, while simultaneously producing reportage from the stage 2 trial, while the stage 3 trial is running. This would effectively cover all the primary schools within the cardiff area and provide compelling data for this approach across Wales.

At the end of the 3 years, if the assessment is that the training has had a significant impact, the cycle repeats with a totally new generation of year 4,5&6 students.

In conclusion, we would relish the opportunity to present and expand on our project, answer any questions and provide a live demonstration, of Ukemi skills with real students from primary schools across cardiff that have already completed the training this year.

Many thanks for your consideration.

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