**Joint injuries: sampling and statistics**

**Levels:** 5-6  
**NoS achievement aims:** Investigating in science   
**Contextual strands:** Living world   
**Topic:** Sports studies

**Rationale**

The over extension of movable joints can cause injury.

Joints can be damaged in a variety of ways. To determine whether some injuries are more common than others, a large sample must be surveyed to gather enough data for patterns to be identified. In this activity students begin to develop awareness of factors to consider when designing robust investigations.

**What you need**

* Sample of physiotherapist’s appointment book for one morning’s work (see p2)

**Focus**

* Imagine you have been asked to work out what a typical day’s work for a physiotherapist looks like. Where would you start?
* What sorts of injuries and conditions do physiotherapists treat?
* Are sports physiotherapists more likely than others to treat joint injuries rather than other conditions?
* What do you need to know about the way physiotherapists work in order to know who to sample?
* How many physiotherapists would you need to talk to before you could begin to make any sort of general statement about this?

**Exploration**

1. In groups, get students to use the information on the table to answer the questions that follow:
   * Create a tally chart to record the numbers of each type of injury treated during the morning.
   * Which injuries are most common?
2. In your group, discuss how likely it is that the injuries treated were caused by sporting mishaps.
   * What else would you need to know before you could actually decide this?
   * What other knowledge did you use when discussing this?
3. Discuss how many times you think you would need to count samples before you could begin to answer each of the questions below.
   * Is this a typical Monday morning?
   * Would a typical Friday morning look the same?
   * Would a summer morning look the same as a winter one?
4. Get the students to practise their sampling strategies by designing and carrying out an injury survey of their own, and justifying why they think their sample is representative:
   * What types of fractures are most common in school age students?
   * Are ankle sprains more frequent when the netball courts are wet?

**Reflection**

* Why do scientists take samples instead of counting everything?
* How can scientists tell when they have done enough sampling to give an adequate picture?
* What sort of things did you need to know about a particular kind of sports injury before you could decide on a sampling strategy?
* What steps did you take to design a sampling strategy that answered your question adequately?
* What statement can you make about the injury that you investigated?
* How would you convince other people that your statement is true?

**Activity resources**

The source of this activity is: Hipkins, Rosemary & Connor, Lindsay. (1999). *Alive & well – A systems approach*. Auckland: Pearson Education New Zealand Limited (ISBN 0 582 86195 0.)

### Sample of physiotherapist’s appointment book for one morning’s work:

This is a Monday morning, in the winter sports season. The clinic specialises in sports medicine.

|  |  |  |  |
| --- | --- | --- | --- |
| 8:00 | Ankle sprain | 11:00 | Sore lower back |
| 8:30 | Sore lower back | 11:15 | Wrist sprain |
| 8:45 | Ankle sprain | 11:30 | Hamstring strain |
| 9:00 | Twisted knee | 11:45 | Twisted knee |
| 9:15 | Whiplash injury to neck | 12:00 | Occupational overuse pain in wrists |
| 9:30 | Shoulder strain | 12:15 | Ankle strain |
| 9:45 | Ankle sprain | 12:30 | Sore lower back |
| 10:00 | Groin strain |  |  |
| 10:15 | Neck injury |  |  |
| 10:30 | Twisted knee |  |  |