

## Rebecca Ivers: Transcript

### Introduction

Thanks for the introduction. I'm Rebecca Ivers. I work at the George Institute of International Health, which is a medical research institute affiliated with the University of Sydney. I'm the director of the injury division, so I run a group of research scientists doing research on injury prevention.

### What is an injury?

And what is injury? Now you can see here from these photos, what we call injury encompasses a whole range of different things from motorcycle injury; burn injury; car crash injury; injuries around alcohol use. Injury is a leading cause of death and disability worldwide, it's a growing public health concern. Over 1.2-1.3 million people worldwide die of road traffic injuries, which is just an astonishing figure. When you think about that about 1.2 million people every year die from car crashes; road traffic injury.

### Why study injury?

What I'm going to do is just go through some of the reasons why I work in injury, and some of the injury work that we do. I've got a research group, as I said, which has got 6 post-doctoral scientists, so 6 people who got their PhDs working as researchers in my group; and we have another 6 or so PhD students working with us, and they're conducting research as part of that program; and also another half a dozen or so people who are project staff working on the various projects that we're running. Now the George's Institute, as I said, is a medical research institute. We're based at the University of Sydney, but we also have offices in China; in Beijing; and in Hyderabad in India; we've also just opening an office in London. We also work extensively across south-east Asia, because injury is not just a problem in Australia; it's a major problem in the lower and middle income countries of the region. Well, in fact worldwide. Now, I'm just going to talk to you a little bit about that. Now, you can see here, this slide shows you the changes in rankings for the 15 leading causes of death from 2002 to 2030. So that's going to tell us, what are the leading causes of death now? And what are they're projected to be in 2030? And you can see there, I've circled *Road traffic accidents* and *Self-inflicted Injuries*. *Road Traffic Accidents* at the moment is number 10; in 2030 it'll be number 8. *Self-inflicted Injuries*, so that's suicide, 14 going down to number 12. Now, if we look at the leading causes of *Disability Adjusted Life Years*, and this is basically looking at the disability that's caused by injury, you can see that depression is very high up on the list – that's number 4 at the moment – that's going to be number 2. *Road Traffic Accidents* is number 8 now, but it will be number 4 in 2030. And *Violence*

is coming up the scale there as well. Now, when we start talking about injury, as I said, it's a big issue in Australia. It's a major issue. Worldwide, about 90% of this injury and disability is actually occurring in low and middle-income countries.

### Injuries worldwide

This is showing you the distribution of the injury deaths worldwide. And you can see about a quarter of it worldwide, is from *Road Traffic Accidents*, about another quarter is from *Interpersonal Violence* and *Self inflicted Violence*, so again another major issue. And then you see *War*, and then you see a range of other injuries – *Poisoning, Falls, Fires, and Drowning* – account for about another quarter. So it's a very diverse area.

### Injury prevention

Injuries are a major problem. We don't actually know enough about injuries, particularly in lower and middle income countries, about, What causes injuries? and What's the best way to prevent injuries? So, our research program's aimed to actually uncovering some of those things. We seek to understand the burden, so: How many people die from injuries, across the world?; What causes those injuries?; and What are the risk factors?; so What are the things associated with those injuries?. We also focus on developing programs to prevent injury; and testing them; evaluating them to see which ones work and which ones don't work. And then, also we do research to work on how to get those research programs into policy. So how to get governments understanding what kind of programs work best. Now, there is science behind all of this. It's a different type of science. We are not sitting in labs looking at cells and/ or working with small animals or genetic materials. But we are experimenting with people, and that's what my research program is about. Science, as associated with people.

### Public Health

We have a public health approach to injury prevention. That means we are looking into injury from a population level. So, I'm just going to go through this cycle here. We have studies that address the *Burden of Injury* – understanding injury, as I said, that would be the how much injury there actually is; the *Risk Factor for Injury*; the effectiveness of programs that we put in place; how efficient the programs are; how cost effective they are, can the governments afford them; monitoring them; and then reassessment, which is where we talk to the government about it how we then need to adjust policy to take into account our research.

### Prevention programs

What I will do now, is just go through some of the programs of research that I'm working with at the moment, just to give you some sense of the breadth and the depth of the programs that we're working with. Some of the things that we're doing at the moment to understand the nature of injury – we're looking at road injury in indigenous communities in Australia. Now, you might

think that we know that car crashes in indigenous people, in Australia is a major issue. We think we know that. We have got very, very unreliable in Australia. In NSW, for example, we don't actually collect indigenous status, in any of our crash or licensing databases. So, we actually don't know how many Aboriginal people in NSW die in car crashes year to year, except for what comes out of the hospital data, which is a really a major problem when you're a government department, and you are trying to decide what programs to put in place. So, at the moment we're doing a small study looking at actually identifying what the causes of injury are in Aboriginal people in a remote area of NSW, in Bourke. And actually seeking to understand some of those; some of the causes associated with that.

### Real data

We're working with various governments to establish linked databases between things like car crashes, and hospital data, and death data so we can look at data from, say the roads and traffic authorities in NSW where you look at the licences that people hold; their driver offences; and their crash record, and then you link that through to the hospital data; and death data to see who are the people who have been killed and having crashes the most. We're also doing population surveys in lower income countries in the region – in India, Vietnam and Sri Lanka. In India, we're just winding up a big survey at the moment, where we've been surveying people in rural India, in Andhra Pradesh, which is where we basically go round door to door and actually survey people in the household, and ask how many people in the household in the last 12 months have been affected by injury. And we look at injury deaths, and actually look to see what the main burden of injury is, and I will talk about that study in a minute. We're also doing very involved; I've got students involved in very large-scale mortality surveillance in India. One study in India – the Million Deaths study – one of my PhD students is working on that. We're basically, and we're doing this in Andhra Pradesh as well, where basically researchers go around and do a certain study called a verbal autopsy study which is... In Australia we're very used to having very good data, so we know that when people die their deaths will be recorded on a government database and the government will know who's died; when they died; and what the cause was, 'cause we'll have a doctor certifying the death, and that data is all collected. Now that doesn't happen in low income countries 'cause the administrative systems haven't been set up, and there isn't necessarily enough money at a governmental level to actually ask those kind of questions. When we do verbal autopsies, a person goes to the household talks to the family member of the person who's died, and ask them about the symptoms, what happened to the person leading up to the death. And basically then, that's coded by a doctor who goes through and says this death is likely caused by this factor. It might be cardio vascular disease. Might be something like a heart attack or a stroke. It might be due to an injury – a burn injury or a car crash. But then we have quite a reliable measure of death in that community which we didn't have before. And that's a very low

cost and very effective way of actually measuring death. So we've had several, we were doing several studies in India looking at those kind of collection of data in that way. I've also got researchers involved in a very large study, which is a Global Burden of Disease study, which is basically where there's a multitude of investigators and scientists around the world actually counting up deaths and cause of death, and actually putting it all together in one big study, so we understand, around the world, what people are dying from and why.

### **Injuries in India**

Now, this is just giving you a little bit more detail about this study in rural India, as I said, we are looking at the burden of injury in villages. And this study; the result of this study told us that actually injury was the second leading cause of death in this small village. And the primary cause of death was suicide, falls – falls in young women and in older women. Now we here in Australia, we're used to older women having fall related injuries because they're old and they're frail, and they tend to trip over when they're walking. And so we have a very large burden, in Australia, of fall related injury with old people having hip fractures and fall related injury. Now, we didn't necessarily expect that in rural villages in India: a. because many people don't grow so old to actually have age-related injuries. So, we're doing a second study at the moment to try and uncover what are the causes of these falls. It's likely; it seems likely that what it's actually due to its young women walking barefoot, carrying very heavy loads on their heads and actually tripping, and having injuries from those. And that's also probably a proxy, quite possibly a proxy for domestic violence, which is so people say, well they've been injured – they fell over, but in fact what happened was that they were pushed and it was actually assault. This is an incredibly difficult and sensitive area to investigate though, because that's there's a lot of stigma associated with domestic violence, and it's not something that can be discussed openly. So, we may never get to the bottom of that, at least from this study. There are different techniques that we'll need to use to actually get into understanding more about the causes of those types of injuries, in those kinds of communities, where we need to have a lot of cultural sensitivity. What we tend to do though, is work with local investigators. We don't come in as Australian researchers, into these communities. Part of the, a really important part of the, work that we do is about building research capacity in these settings. So, when we're working in these countries –in India, and in China, and Vietnam – actually what we're really doing is working with local investigators; training them; bringing students over to Australia and training them in research methods; and then sending them back out, they go back into the field and go back into their own country and conduct the research with us, as colleagues and collaborators. And at the end the project, we come away knowing that there are really strong, sound researchers in these settings who are able to go forwards, and actually build their own research program. And that to me, is a really incredibly important and very motivating part of the work that I do because it's actually about

building a really important research capacity. It's not just about me. It's actually about building capacity in other people.

### **Risk factors**

Some of the other work that we're doing is looking at risk factors for injury; so trying to understand what causes injury, what's associated with injury. And then, that will help us decide what programs are best, and 'What is the best way to prevent injury?'. So we've got studies looking at in car drivers. I'm going to talk about Drive, which is our really large study of young drivers in NSW. We've done work on driver distraction. Some of my colleagues published a few years ago, a major study which is looking at the associations between use of mobile phone and car crashes, showing us that if you used a mobile phone while you were driving, had four times increase risk of crash. And that wasn't just with the hand held phone; that was with hands free kits as well. So, actually there's a four fold increased risk of crash even if you are using a hands free phone. And that's largely because of the distraction. Your mind's not focusing on the driving task, you're focusing on the conversation that you are having. So, that was an incredible important piece of research that came out of our group, and that's actually moved very quickly through into government policy. We're doing a really large study at the moment. We're doing one in Australia, looking at risk factors for heavy vehicle crashes. Now, the kind of fieldwork that we do for these kind of studies, is that what we need to do is to work very closely with the police to identify all the truck drivers in a certain period of time and a certain area. And at the moment, that's NSW. If you're heavy vehicle driver in NSW at the moment, and you have a crash, you will be eligible for our study and you will be getting a phone call from us. We take these drivers, we ask them to join the study. And if they do, we give them a really detail questionnaire, and we also send them a device to measure their breathing over night because we're looking at sleep apnoea. What we're doing, is looking at risk factors for crashes in heavy vehicle drivers. So we take a group of drivers who have crashed, and then we compare them to a group of drivers that haven't crashed, and see what are the actual differences. So, we work with the police to identify the drivers that have crashed; contact them; ask them to join the study; do all the surveys; but to get the control drivers, it's a much, it's a very different process. At the moment we've got researchers out on the field at various truck stops around NSW, flagging down truck drivers. They've got fluorescent vests on, and clipboards, and going around interviewing truck drivers and asking them about their driving habits, their fatigue, their sleep. So, all the truck drivers go away with a sleep device. We give them a device and they plug it into their nose with these little nasal cannulas. And then it records whether they've got sleep apnoea – so whether they've got interrupted sleep – and whether that's likely to affect their wakefulness which is obviously very important when you are a truck driver, because we'd like to think that they were actually awake when they were driving. And then, they send the devices back and we monitor them. So, that

study is going on in Australia. We're also doing similar studies to go along with that, in India. And also, I'm supporting a group of collaborators in Iran, to do a similar work. So that's very exciting.

### **Protective clothing**

We've also got students doing studies on motorcycle protective clothing – How effective is motorcycle clothing? So, we're actually taking motorcycle riders who have had crashes. This study is going on at Canberra hospital at the moment. So, again if you are a motorcycle rider, and you have a crash, and you end up in Canberra hospital, you will be eligible for this study. And then we actually go back, and we actually go to their houses, and we look at the clothing that they were wearing at the time they had a crash. We get their hospital records and we see the motorcycle, are the clothes that they were wearing associated with the level of injury. So, at the end of that study, we'll have a much better idea of what's the best type of motorcycle protective clothing to wear – jackets with impact protectors around the elbows and arms; boots; and gloves. We all know that motorcycle helmets are incredibly effective but less is known about the other types.

### **DRIVE study**

The DRIVE study though, is a very large study. We've got 20,000 red P-plates in NSW who are linked in to this study. You may very well have a sibling or a friend who has been involved in this study. It's about 20% of the NSW population of red P-plates that was invited to join this study. We've collected all the data now. And what we did was, we got these 20,000 young drivers to fill in a really long and detailed questionnaire, and then give us consent to actually link to their crash records; and their licensing records; and their hospital records. So, what we've got now is information on all the risk factors that might cause these crashes, in these young people. Now why young drivers? Well... you know, you're mostly... are any of you drivers at the moment, or on your L's? And, I probably understand that some of you may well already be driving off road, and some of you may well already have had driving experience, which is something that our very large cohort study told us was actually happening with young people. What we're doing though, is looking at young drivers because, although they're only 15% of the licence population, they have 30 to 40% of the crashes and the fatalities. So it's clearly a major issue. Now, this slide will tell you; this will show you a little bit more. You can see here... this is what the crash... this is a number of crashes that people have. This is during the learner phase. So when you are learning to drive you're very safe; you're very unlikely to have significant crashes. This is when you get your P-licence. So, when you become a solo driver; when you get out in the car on your own... look how this goes up to this high. The number of crashes just goes absolutely astronomically. And you can see that, as you get more and more driving experience over time, the number of

crashes goes down. What we're seeking to do though, is address this incredibly high number of crashes that happen in that first period. Now, there are various things that we know worked to reduce crashes in that period. One is, not to carry passengers, because we know that passengers increase distraction. And there's very good evidence that tells us that passenger... having passenger restrictions during the first 6 months of licensing, actually stops people from having as many crashes. We know driving at night's incredibly dangerous for young people. And we know driving very fast, and drinking and driving is very dangerous, for all drivers, but particularly so for young people when they're inexperienced. But there's a whole range of other questions that we don't know the answer to.

### **The risk of crash**

What we're doing is looking at a range of associations for young drivers. So, we're looking at associations between risky driving. So, if you are actually a risky driver and if you are doing lots of silly things when you're driving – tailgating; speeding; overtaking on the inside; driving aggressively, is that associated with an increase risk of crash. Is where you live, does that determine your risk of crash; your ethnicity; your mental health; the amount of sleep that you have; your test performance – if you do really badly on your driving test – it looks as if you're actually more likely to have crashes. So, if you have to do your driving test 5 times, that means you are at increased risk of crashes later on. So that does tell us that there's messages for government they're about what we could do. And we're also looking at offences: if you're the sort of person that gets lots of driving offences; if the police pick you up and give you lots of speeding fines, are you more likely to have a crash than others? We're looking at all of these questions in this study. And we're just about to publish a whole lot of papers out of that. So, look out for that because there will be significant media interest in this and significant government interest in it as well, because it clearly has many implications for government policy.

### **Effective programs**

We're also looking at doing giant experiments with the population, as well. And this is where we take a group of people, and give them a type of program or a type of intervention, we call it, to see if that actually changes their behaviour. We're just, at the moment, about to recruit 30 pre-schools in south-western Sydney to see if putting a program in place in pre-schools actually increases the use of restraint use for children, and decrease misuse of booster seats and restraints. Now this is a giant experiment. It's called a randomised control trial. We take 30 centres. And we basically have to get all the directors of these centres to agree to participate in the study. Once they've agreed, we randomly allocate them to one group or the other. Now, if you're in the program group you get this program. We go into the centres and we put the program in place. If you're in the control group you don't get anything for the first period you get

nothing. You just go along as usual, at the end of the study we go back to have a look to see if it has made a difference to the use of booster seats. Now this is the best type of study design that we can use to measure whether a program works but as you can understand it's actually quite difficult, it's very expensive. Studies like this cost between 800 000 and a million dollars to do. So to do them we have to have a very, very long detailed protocol, we've got to get funding from the government for it. This one has been funded by the national health and medical research council of Australia and it's just getting under way. We're also doing a large trial of driver training in China with young drivers in China we're actually giving new drivers in Beijing a special driver training program to see if that has any impact on their crash rate. We've done work in this area again on interventions to prevent falls in older people as well.

### **Injury prevention in China**

We're also at the looking the efficiency of interventions where we look to see are these effective can governments afford them. Now one really major study that we've done is the China seatbelt study, which is where we actually take it's like a giant experiment but at a city level. So in China this is about increasing the use of seatbelts in people particularly taxi drivers in a large city in Southern China. So, the police are involved, government- the central government - is involved, the police are trained, the taxi drivers are trained. And then we have a whole lot of social marketing and public education, with media campaigns and posters up on the wall. Everywhere in fact, on buses... and this study... we actually found that seatbelt use did increase significantly throughout the study; and it was a very effective intervention. And we're now working with the Chinese government to see where else that can be rolled out. And in fact, in about a month's time I'm going to be going to Shanghai to actually talk further about that study, and see how far the results then can be translated. So that's some examples of some of the, again the fieldwork that we do in studies like this.

### **Intervention**

We also do a lot of work, work very closely with government. I have got a job where I work with the Northern Territory government as an expert advisor on road safety and talk to them about research that we can do to improve road safety in the Northern Territory. And that's in indigenous and non-indigenous communities. We do a lot of advocacy work with the media. So, as part of my role as a researcher, I have to talk and to disseminate the results of the findings to the government to other researchers. So, as Kathy said, we spend a lot of time travelling to conferences talking to government and also talking to the media. So I've done work... I've appeared on 60 Minutes and a range of other TV, done news bulletins with many different news programs, and done multiple radio interviews. I've had interviews in Dolly magazine and Woman's Day, which weren't probably the highlight of my research career, but that's the

population to whom we want to get the message out to. So, if we're talking to young female drivers... well Dolly magazine may well be a really good avenue to reach them. We also work... I also work very closely with the world health organisation and other agencies. We've been... done contract work for them, and also written chapters in manuals that have been disseminated by the world health organisation, which is aimed at governments ;at helping them roll out road safety programs in their countries.

### **Motocycle**

So that's the kind of research that I do. We also work on motorcycle helmets. We've done a lot of work in that region. You can see there... that there's major issues in lower and middle income countries in the region with use of helmets. You can see dad's there sitting at the front with his helmet on. And mum and the kids are on the back. That's a way of life for many people. It's also the most effective and cost effective means of transport for many people, in the countries in our regions. So you can't just come in and say, 'Well, can't do that - one person on a motorbike!' because, you know, that's not the way that the whole community; the whole economics of the community, is set up. So we need to actually work with governments and communities there, to look at how best we can address those kind of issues.

### **My career**

But how did I get here? Now I've had a very long and varied... well, I haven't had that long and varied a career I guess, because I'm not that old yet. I started out at St George Girls High. I actually did a Bachelor of Optometry first. So I was driven very much when I was in year 10, year 11 and year 12. I was really wavering thinking, 'What will I do... What will I do!' I was going to be a journalist and then I decided that... actually I sat down very cynically... and my parents actually sat down and said, 'You know as a woman you need to think about what you want to do... 'You need to make sure you are able to support yourself; that you have an interesting career, because you spend a lot of time at work... 'So you need to make sure that you are really interested; and that you do something that really drives you because you're there at work a long time for many years'. I decided that optometry would be a good career move for me because I was good at science, and I decided that I wanted to travel. I was also really driven by the need... I really wanted to do something for other people. So I thought that would be good. I could go out and actually see people and help them and look after their eyes. And I also

wanted to have a reasonable financial stability and I thought, 'Well optometry would be good for that!' because I'd always be able to make money, and I would be always able to travel. So I did my optometry degree and that was fantastic. I worked as an optometrist in the Northern Territory. In fact in private practise and was running a series of practises. But then I got interested in public health. I worked for the Trachoma program. So, I met Fred Hollows in 1990 when I first graduated and went out, and started working for the Trachoma program in Northern Territory... and actually went out flying with the area medical service in Northern Territory to remote communities. And that just puts such a different perspective on things to me... when you're actually there in 1990 doing eye tests for people in the community, in a little tin shed out in the middle of the desert with no power, and sort of an overhead fan. And that's health services. And no one had been there for 6 months before that. You start thinking about... well, actually treating one person one at a time is not going to make much difference. It'll help these people but it's not going to change things at a population level. So, I went back and I studied. I did a Masters of Public Health. And I specialised in the epidemiology and biostatistics - so all the maths and science parts of the public health degree. So I've got... I've done a lot of course work in mathematical modelling, and statistical analysis, and study designs. So when I started out... and then I went and did my PhD where I designed studies and I actually did all this data analysis. So I do use maths, it's hard to believe from what I described to you but we actually... I use maths and science on a day-to-day level. So I can actually sit down with the computer; take all the data that we've got; and do actually quite advanced analytical modelling of the data. And that's where the maths comes in. And it's actually something that I use every day. But then got a position as a post-doctoral research fellow. So I had a PhD scholarship from the national health and medical research council; a post-doctoral fellowship from the University of Sydney, so they paid me for 4 years to go off and do more research. And now, I'm funded again by the national health and medical research council of Australia as a researcher. So I'm a career researcher. I do a little bit of teaching. As I said, the careers find you; you sort of meander along; and sort of take things on that interest you. And that's what's really happened to me. So you might ask, 'How did I get from optometry into road safety?' That is a really, really bazaar pathway but it's actually quite logical. My PhD was looking at associations between vision and falls in older people. And then I looked at vision and driving in older people and then I just dropped the vision bit and kept on doing the

driving bit. And now I focus on road traffic injury and falls research in older people as my main sort of research areas.

### **Day to day**

What do I do on a day-to-day level? I do a lot of work on projects. So... and I actually find the most fun bit is where you sit down, we're doing that at the moment; we've got a really significant opportunity to do a really big project in Aboriginal health at the moment. That's the most exciting bit... where you talk to other colleagues and you think about what could we do here. What are the main issues and how can we design a research project that's going to address that. I do a lot of supervision of students and staff. I do reviews for journals. As part of a scientist you have to review other people's work as a peer reviewer, reviewing grants, sitting on committees. So I sit on a range of government and university committees. I do a little bit of teaching - not very much. We teach 3 injury courses, and I do lectures to some medical students and master students at the University of Sydney. I don't get much time to myself to sit down and actually write papers. That's the one thing that I wish I had more of. I do a lot of disseminations, say going to conferences, seminars doing media work, working with government, and then a lot of time doing this fund raising. It says 5% there... but it's actually often a lot more than that. So often I can spend up to 20-30% of my time trying to raise money for the work that we do.

### **Benefits of a Science career**

What did I do to get here? Well in my... for my HSC I did 3 unit Maths, 3 unit English, bio and chemistry. So I had a bit of a mix between English and Maths. I was really good in Science but I couldn't do Physics to save myself. So I stuck to bio and biology and chemistry and, as I said, I've done lots of Science and Maths since then. I manipulate data and do all that kind of analysis. But in this kind of position you also have to be good at having ideas, designing studies, writing, editing, interpreting, and talking. So it really is an incredibly interesting job. It covers a whole gamut of things. Lastly I just want to talk to you about as young women going into a scientific career or being interested about going into a scientific career. Can you have a life as well? You don't have to sit in a box, or in a laboratory to be a scientist. You can go out. We do... do a lot of travel. This is myself and my two children in Mexico last year. The world injury conference was in Mexico so I took my husband and kids along. And we spent 3 weeks traipsing around Mexico

afterwards. I've worked part-time for the last from 1998 to about 2006. I've worked 3 days a week. My children are 8 and 10, and I've got a stepdaughter who's 18. And I think I've managed really successfully to actually juggle that. I've managed to get to this position in my career working part-time, having a husband and children, and actually having, you know, supporting my family and feeling like I've actually got a bit of a life. I am passionate about my work. I think you need to really think about what interests you and follow that. As I said, you're working for a long time but, as young women, your whole future lies ahead of you at this point. And you know you can actually do anything that you want to do. You just have to focus on it and follow it. But there's nothing to stop you doing that. Thanks very much for your time.

This resource is based on outcomes from the NSW Board of Studies 7-10 Science syllabus and the Preliminary and HSC Science Syllabuses.

### Syllabus links

- BOS Science 7 to 10 syllabus link.

Stage 4/5 - Prescribed Focus Areas

Students will develop knowledge and understanding of:

- \* the history of science
- \* the nature and practice of science
- \* applications and uses of science
- \* current issues, research and development.

Students learn about:

4/5.2 the nature and practice of science

Students learn to:

a) evaluate the role of creativity, curiosity, objectivity and logical reasoning in describing phenomena, carrying out investigations and in the devising and testing of hypotheses

c) apply scientific processes to test the validity of ideas and theories

e) use examples which show that scientists isolate a set of observations, identify trends and patterns and construct hypotheses or models to explain these

Students learn to:

d) give reasons why society should support scientific research

Students learn about:

4/5.5 current issues, research and developments in science

Students learn to:

a) describe some recent scientific contributions made by male and female scientists, including Australians, and discuss the effect of their contributions

d) identify possible career paths in science.

Stage 6 – Prescribed Focus Areas

Skills

P12 discusses the validity and reliability of data gathered from first-hand investigations and secondary sources

H12 evaluates ways in which accuracy and reliability could be improved in investigations

H14 assesses the validity of conclusions from gathered data and information

Extract from Science 7 to 10 syllabus, and Preliminary and HSC science syllabuses July 2009, © Board of Studies, NSW.

Quality teaching

This resource provides opportunities to incorporate the following elements of Quality teaching in NSW public schools by:

- \* giving students an opportunity to discover the nature and practice of research (Deep knowledge, Connectedness, Metalanguage, Knowledge integration)
- \* highlighting the dynamic nature of research in science (Problematic knowledge, Higher-order thinking)
- \* stimulating thought about what inspires people to become scientists (Connectedness, Problematic knowledge).

## Websites

Visit these websites for more information on the work of Dr Rebecca Ivers, and injury prevention in relation to vehicle accidents.

The George Institute

<http://www.thegeorgeinstitute.org/iih/research/injury-&-musculoskeletal/director---rebecca-ivers.cfm>

Australian College of Road Safety: High Risk Road Users 2008:

<http://www.acrs.org.au/acrsconferenceproceedings/highriskroadusers2008.html>

The 7:30 Report: Young drivers twice as likely to be in fatal car crash

<http://www.abc.net.au/7.30/content/2009/s2615466.htm>

60 MINUTES: Curfew

<http://sixtyminutes.ninemsn.com.au/article.aspx?id=259197>

Science Daily – Risky driving puts young drivers at high danger of crashing

<http://www.sciencedaily.com/releases/2009/07/090723113704.htm>

Injury Prevention: Systematic reviews of bicycle helmet research

<http://injuryprevention.bmj.com/cgi/content/full/13/3/190>

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