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Crashes involving young drivers

Still waiting for government action despite their costs in lives and money

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Too late

A year after our call to the UK government to take urgent action to reduce deaths and injuries associated with young drivers[1] there has been no progress. In the two years since the government's promise of a green paper on young drivers' safety, it is estimated that we could have avoided almost 9000 people being injured in road crashes involving young drivers, with 866 seriously or fatally injured and at a cost of £400m (€530m; $600m).[2]

One of the suggested reasons for delay is enthusiasm for motor insurance policies based on telematics or black box technology. This technology could play an important part in reducing young driver crashes, but it is unlikely to be the whole solution; telematics does not assess the presence of passengers, their behaviour, or their alcohol consumption. It will take some years to show the effect of telematics on crashes and casualties. Current users are self selected and may be significantly different from non-users. In the meantime, deaths and injuries are still occurring, and one intervention has repeatedly been shown to be effective—graduated licensing.[3] What is lacking is the political will to act.

Graduated driver licensing adds an intermediate phase between the learner and full licence. During this phase, exposure to high risk conditions is minimised by restricting late night driving, carriage of similar aged passengers, and driving after having consumed alcohol. These high risk conditions have repeatedly been associated with young driver crashes.[4]

New Zealand, Australia, the United States, and Canada have all implemented graduated driver licensing, and despite variations between jurisdictions it has been shown to reduce casualties.[3] Since graduated driver licensing was introduced in New Zealand in 1987 the pace of implementation has increased rapidly, the contexts in which it has been applied have widened, and the evidence of effectiveness has become more compelling and robust. Calculating a single effect size and separating out the effects of the different elements of such schemes is difficult, but it is reasonable to suggest a 20-30% fall in crashes, casualties, and fatalities among young drivers.[5]

Northern Ireland has taken note, and a bill for a "graduated driver licensing lite" scheme is progressing through the legislature.[6] Hopefully, the bill will be passed early this year, with implementation in 2016. Although Northern Ireland's scheme is "lite," with a proposed six month passenger restriction and a reduced alcohol limit, most schemes began with few restrictions before becoming stricter. Of concern is the proposal that the learner age is reduced to 16.5 years. It is difficult to predict the effects of this; however, age is a key risk factor for young driver crashes, and even with the restrictions the age at full licence will stay the same as it is now, potentially negating any benefits of the restrictions.

There are legitimate concerns about the effects of graduated driver licensing on young people, most notably the potential for social exclusion. Current data suggest that around a quarter of 17-19 year olds hold a provisional or full driving licence. The government has said that it has not published the green paper because it is "wrestling with how to make things safer, while not unduly restricting the freedom of our young people."[7] However, the government has not undertaken research into the possible implications for access to work, training, education, or leisure activities.[8] Internationally, graduated driver licensing has been shown to affect the activities of young drivers minimally, with a minor effect on employment.[9 10]

Other concerns include that this universal approach is unfair to, for example, female or "model" teens; the evidence is clear that all new drivers are at high risk of crashing because of their inexperience.[4] Within this group, some are at higher risk of crashing than others, but the risk is increased for all.[5] A risk of increased unlicensed driving is also often cited as a concern, and research has produced conflicting results, showing no change[11] and an increase in unlicensed driving.[12] However, current insurance premiums for young drivers are likely to provide the greatest incentive to drive unlicensed.

The introduction of graduated driver licensing could be a catalyst for public transport improvements, especially in rural areas, and encourage more young people to use public transport for longer. Such a policy could be a key element of a safer, healthier, and more sustainable future, not just for young people but for the entire population.

In addition to the powerful safety case for graduated driver licensing, there is also public support; 68% of the British public support its introduction for newly qualified drivers, with only 15% opposed.[13] Unsurprisingly, young people are less keen to see graduated driver licensing implemented. However, even when people do not support graduated driver licensing they do not disobey it once it is implemented.[14] The general election campaigns are now under way, and many promises are being made about what the parties will deliver if elected.

With the next government will come, new transport ministers and the need to explain, once again, the importance of action to reduce the risk of crashes involving young drivers. We hope that come the 2020 election, no group will need to write to *The BMJ* to highlight the 30000 deaths and injuries and £1.4bn cost that could have been avoided if graduated driver licensing had been introduced in the coming parliament.

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- Clinical review: Opioids for low back pain (*BMJ* 2015;350:g6380)
- Clinical review: Management of low back pain (*BMJ* 2008;337:a2718)

Chronic low back pain is increasingly recognised as often being more than simply an anatomical or physiological problem

Biopsychosocial care for chronic back pain

Supporting evidence looks promising but far from complete

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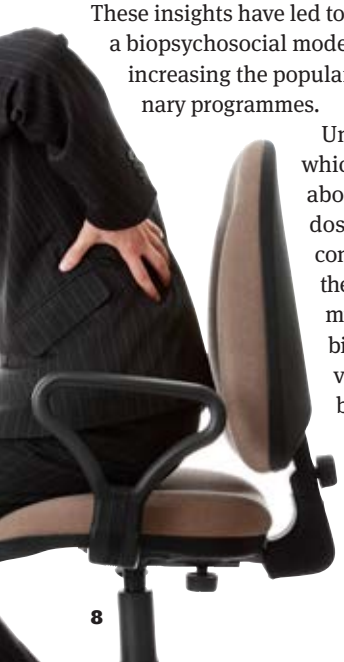
Despite growing use in some countries of spinal imaging, opioid analgesics, spinal injections, and spinal fusion surgery, disability from back pain has increased.[2]

Chronic low back pain is increasingly recognised as often being more than simply an anatomical or physiological problem related to intervertebral discs, facet joints, sacroiliac joints, paravertebral muscles, or other spinal structures.[3] Accordingly, multidisciplinary rehabilitation programmes have evolved to tackle multiple facets of the condition, but their optimal design, effectiveness, and costs have remained uncertain. Uncertainties have in turn spurred an expanding clinical trial literature on these programmes, and the linked paper by Kamper and colleagues provides a new systematic review of the evidence on their effectiveness.[4]

Multidisciplinary rehabilitation programmes acknowledge that although deranged anatomy or physiology contributes to back pain, psychological factors such as anxiety, depression, and a tendency to catastrophise may amplify or prolong pain.[5] Similarly, social factors such as demands of work, the work environment, or legal action related to back pain affect the nature of pain and responses to therapy.[6] These insights have led to wide acceptance of a biopsychosocial model of low back pain,[3] increasing the popularity of multidisciplinary programmes.



Unlike drug trials, in which we are confident about the content and dose of a drug and its comparison treatment, the content and dose of multidisciplinary rehabilitation programmes vary widely. Although based on biopsychosocial models, these programmes have not evolved from a standardised template. Instead, they incorporate individualised features based on the strengths, interests, and theories of local champions. Even defining multidisciplinary rehabilitation can be a challenge. Here, Kamper and colleagues offer a reasonable definition: some sort of physical component (most often exercise with supervision by a physical therapist) combined with a psychological component (most often cognitive-behavioural therapy), a work related intervention, or both. Most of the programmes used small group sessions for much of the intervention. Some programmes are very intensive; 15 of the 41 trials in this systematic review involved programmes with greater than 100 hours and daily patient contact.

More robust support

This systematic review provides more robust support for the efficacy of multidisciplinary biopsychosocial rehabilitation than do previous reviews. The authors included more randomised trials with better long term (at least one year) follow-up. Combining exercise intervention with cognitive-behavioural therapy (or similar counselling) seems to be more effective than exercise alone. Multidisciplinary rehabilitation may even have benefits comparable to surgery for back pain caused by degenerative disc disease. This is reinforced by a recent 11 year follow-up of surgical trials.[7] Another important finding was a lack of evidence that more intensive multidisciplinary programmes had greater benefit than less intensive ones.

Despite benefits, some caveats are in order. Advantages of the multidisciplinary programmes over comparison treatments were, on average, relatively small. The pooled benefit over comparison treatments from meta-analysis of pain scores was just a half point on a 0-10 pain scale, and the pooled effect on functional status was about 1.5 points on the 24 point Roland-Morris Disability Questionnaire. These average effects are smaller than estimates of the minimal clinically important differences.[8] Most studies did not report the proportion of patients who improved more than such minimal thresholds.

The effect on return to work was inconclusive. Multidisciplinary rehabilitation was more effective than purely physical comparison treatments but not more effective than "usual care," consisting of drugs, referrals, or other interventions recommended by the patient's primary physician. The modest benefits over comparison treatments in some trials may have resulted from "control" groups that offered important benefits.

Other caveats are that a single study by Monticone et al,[9] with dramatic benefits, influenced the average effect and that the effects of treatment seemed to wane over time. That is, effects were smaller after one year than in earlier assessments. The durability of participants' return to work was unclear. Unlike drug trials, blinding patients to their treatment assignments was largely impossible, and more time and attention from healthcare professionals alone may have been beneficial for some intervention groups.

These programmes are labour intensive, and their availability, time demands, and costs are important barriers. Thus, many important uncertainties about multidisciplinary rehabilitation remain. We do not yet know, for example, how well the reported benefits generalise beyond highly motivated participants in clinical trials; how to identify people who need the full multidisciplinary rehabilitation, rather than something simpler; how to motivate patients to seek intensive exercise and overcome the stigma sometimes associated with psychological counselling; whether "booster" treatments could help to maintain the benefits for longer; which disciplines are essential to rehabilitation programmes; and whether the high cost of these programmes is partly offset by reduced use of other expensive health services.

Finally, can less intensive interventions work as well as the more intensive ones? Kamper and colleagues' systematic review suggests that this may be possible. Perhaps cognitive-behavioural therapy could be delivered effectively and more efficiently by telephone or online.[10 11]

Future research to investigate all these uncertainties would benefit from greater standardisation, along with better reporting of the detail of interventions and their comparison treatments. Future researchers should also strive for greater consistency in describing the patients who enter these programmes. New research standards for back pain may help in this regard.[12] Clear and reliable answers to these questions could make a theoretically attractive strategy more practical, affordable, and available, as well as even more effective.

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The authors question the therapeutic value of resuscitation beyond 30 minutes in children with cardiac arrest and hypothermia, but it is important to remember that the parents are also victims

Resuscitating drowned children

Outcomes are poor; we must focus on prevention

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The World Health Organization recently reported a staggering 372 000 deaths a year from all types of water immersion. Worldwide, drowning is in the top 10 causes of death in children and young people, particularly in males and those aged under 5.[1] Other public health matters have had disproportionately greater attention, despite the numbers of deaths from drowning being equivalent to two thirds of global deaths from malnutrition and over one half of deaths from malaria.

The linked paper by Kieboom and colleagues looked at the outcomes of 160 Dutch children after cardiac arrest from drowning who were hypothermic at presentation to the emergency department.[2] The authors analysed records from 1993 to 2012. Children who had been involved in traffic or boating incidents were excluded as injuries could have contributed to their arrest independently of drowning and also because air pockets could not be excluded. The duration of bystander cardiopulmonary resuscitation was not included in this study as emergency medical services reached patients within 15 minutes of being dispatched.

Of the children receiving prolonged resuscitation (>30 minutes), most (n=87, 89%) died and 11 survived but with severe neurological impairment, whereas 17 children who required briefer resuscitation survived with Paediatric Cerebral Perfusion Category scores of ≤3—that is, from normal to moderate disability status. The authors question whether we should continue resuscitating children beyond 30 minutes. This was a relatively small study, however, and included just 17 children who drowned in the colder winter months. The results should therefore be interpreted with caution.

The total duration of submersion was unclear in most children as only three episodes were witnessed. The duration of submersion, however, is an important factor influencing outcome. Although survival is unlikely after 30 minutes of submersion, proposed recommendations by the joint emergency services UK that rescue attempts in these children should continue for 60 minutes are still appropriate. Survival has been documented in children submerged for close to 30 minutes, and we still have no clear idea of the absolute limits of survival.

Community and policy recommendations from WHO report on drowning, November 2014[1]

Community based action
- Install barriers controlling access to water
- Provide safe places (for example, a crèche) away from water for preschool children, with capable child care
- Teach school age children basic swimming, water safety, and safe rescue skills
- Train bystanders in safe rescue and resuscitation
- Strengthen public awareness of drowning and highlight the vulnerability of children

Effective policies and legislation
- Set and enforce safe boating, shipping, and ferry regulations
- Build resilience and manage flood risks and other hazards locally and nationally
- Coordinate drowning prevention efforts with those of other sectors and agendas
- Develop a national water safety plan

The physiological mechanisms for drowning begin with the person initially breath holding, progressing to involuntary gasping, which is associated with swallowing large quantities of water. Concomitant aspiration of water, together with varying degrees of laryngospasm, results in progressive hypoxia and hypercapnia. Aspiration of fresh water results in breakdown of pulmonary surfactant and subsequent atelectasis, whereas salt water causes an intrapulmonary osmotic gradient that causes intravascular and interstitial water to be drawn into the alveoli. Both mechanisms act to worsen hypoxia. Initial tachycardia progresses to bradycardia (more marked in icy cold water) then asystole.

The study by Kieboom and colleagues identifies cooling as an important protective mechanism.[2] As the authors discuss, hypothermia might be no more than a marker of prolonged submersion, but children were more likely to have a better outcome if the event occurred in winter, when water temperatures were 0-8°C. This is contrary to studies in adults in which no association has been found, perhaps because of the differences in surface area:volume ratio that enhances cold water cooling in children.[3] Paradoxically, icy cold water clearly does have neuroprotective effects in adults.[4]

Resuscitation attempts: how long?

These authors have shown that the chances of neurologically intact survival diminish as the duration of resuscitation lengthens; a feature common to all cardiac arrests. Cardiac arrest from drowning, however, occurs as a consequence of hypoxia, and rapid correction of hypoxaemia during resuscitation is critical to successful return of spontaneous circulation. Correction of hypoxaemia cannot wait for the arrival of trained staff, and bystander resuscitation involving rescue breaths and oxygen, when available, is perhaps the biggest single determinant of survival in these unfortunate children once they are rescued. The authors appropriately question the therapeutic value of resuscitation beyond 30 minutes in drowned children with cardiac arrest and hypothermia, but it is important to remember that the parents are also victims. Parents need the reassurance that every effort has been made to resuscitate their child, particularly if a few more minutes of resuscitation might allow the parents to sit with their child before he or she is declared dead.

As outcomes from these hypoxic cardiac arrests are so poor, and most incidents occur well away from trained medical help, the most effective way to reduce mortality is through prevention programmes. Recent recommendations from WHO[1] include teaching school aged children swimming and safe rescue skills, increasing public awareness, developing national safety water plans, and training bystanders in resuscitation.

National registries of cardiac arrests could and should be used more productively for further research in adults and children, including comparative studies to evaluate interventions and compare outcomes. The Utstein templates, comprising a core set of standardised variables for recording resuscitation, could be used for cardiac arrests in and outside hospital. Results from these studies will shape development of guidelines at national and international levels.

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About 90% of deaths occurred in people with tonic-clonic seizures that had increased in frequency in the previous three to six months

Avoiding premature death in epilepsy

General practice is the place to start, and much can be done

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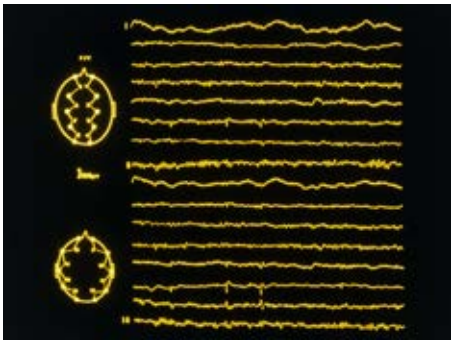
An estimated 1.16 per 1000 people with epilepsy die suddenly each year.[1] In 2013 there were 680 deaths from epilepsy among people aged under 75 (973 deaths at all ages) in England and Wales.[2] Sudden death in epilepsy peaks in young adults, particularly men, so a 20 year old with epilepsy has a greater than 1% risk of dying before he reaches 30, before adding other known risks for sudden death. Comparing years of potential life lost from neurological disease, epilepsy is second only to stroke.[1] Research on this topic has focused on cohort studies[1] and whether risk should be explained to patients.[3] However, equally important and currently unanswered questions are: can group and individual risks for death be identified, perhaps using patients' routine electronic records? Are some identified risks amenable to better medical management? And will cash strapped governments pay for it?

Some deaths are unavoidable, but improved care might result in fewer unnecessary, untimely deaths. With others, I conducted a pilot study that showed it was feasible to identify specific risk factors for death in epilepsy, which had been derived from cohort studies, using routine data from GPs' electronic records.[5] We found that people with epilepsy and alcohol problems had an almost threefold increased risk of death. The risk in patients who had not collected their most recent anticonvulsant prescription in the past three to six months was nearly doubled. Having "a history of injury" during the previous year increased risk by 40%, and having had treatment for depression increased risk by about the same.[5]

A European collaboration, AMIEHS (Avoidable Mortality in the European Union: Towards Better Indicators for the Effectiveness of Health Systems), has set up criteria to identify causes of avoidable death and to compare outcomes across Europe.[6] Inclusion criteria for putative conditions are that death rates must be over 100 a year and must have declined somewhere by at least 30%.[6] Cervical cancer and Parkinson's disease have already been included. Death rates from Parkinson's disease have fallen by 30%, but because the onset of Parkinson's disease is usually at an older age, many fewer potential years of life are lost. The challenge is to develop and evaluate interventions that reduce epilepsy mortality by at least 30%.



Most risks are non-neurological

Identification of risk

Everyone with epilepsy has to be assessed in order to capture those most at risk. In some Nordic countries, specialists provide continuing care for people with epilepsy and have electronic records.[7] They can identify population, and potentially individual, risks. An English study found that 20% of people with epilepsy who died suddenly had been in contact with specialist services in the previous year.[8] About 90% of deaths occurred in people with tonic-clonic seizures that had increased in frequency in the previous three to six months. One half had a record of alcohol misuse, and a quarter had been taking drugs to treat depression or anxiety.[8]

Virtually every person in the United Kingdom is registered with a GP. From 2004-14 GPs were remunerated for keeping a register of people with epilepsy using their electronic records and for reporting if patients were seizure-free. GPs also stored more detailed information on the other risks that could affect outcomes. What could researchers do to help GPs identify those at higher risk of death in epilepsy? An in-depth analysis of electronic records from 2004-14 would produce more precise risk estimates. Risk assessment tools, which have already been developed for other conditions presenting in primary care,[4] could evaluate individual symptoms and signs and visually present combined risks, alerting GPs to "red flag" profiles. Such tools should be developed and piloted for people with epilepsy, with input from users.

What could GPs do as risk managers? As in other conditions, individual risks differ and require specifically tailored step-up care. GPs could monitor, manage, and, where necessary, refer patients to community or secondary care teams. Patients who do not collect their prescription could be automatically identified and contacted directly, with reminders in primary care. Patients with substance misuse can be referred to local addiction services. In a cohort study, 30% of deaths were unintentional, mostly from drowning and burns.[9] People with an injury linked to a seizure may present in primary care or in the emergency department. This could trigger referral to an epilepsy nurse specialist for advice on self management of risk.[10]

Death in epilepsy is associated with depression.[7] A community study found that people with epilepsy who report symptoms of depression subsequently report poorer seizure control and that this relation is bi-directional.[11] Depressed people with epilepsy are also less likely to adhere to their medications.[12] A vicious cyle of prior risks seems likely to accumulate, with seizures leading to depression, depression leading to less effective medication self managment, more frequent seizures, and a cumulative risk of death. A risk assessment tool which added the positive predictive values of each risk would alert GPs. Screening for depression is good practice in several long term conditions. This should include epilepsy. Antidepressants and cognitive behavioural therapy might reduce depression and improve self managment and could be tested in a trial.

This may seem a tall order. But up until 1988 GPs did not call and recall people to check for the risk of cervical cancer. Women who died had often never been checked.[13] Since monitoring began annual death rates have more than halved,[13] and there are now fewer deaths than the number for epilepsy.[2] The NHS estimates it spends £175m (€235m; $268m) a year on identifying people at risk from cervical cancer, referral for closer monitoring, and, if necessary, for surgical intervention.[13] General practice is not the only place that the risk of death in epilepsy can be identified in the UK, but since most of the risks are non-neurological it is the right place to start.

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