Saturday 4 April 1998

BMJ

Cardiac arrests outside hospital

Survival could be improved by better public awareness of symptoms

General practice
pp 1060, 1065

Twenty five years after the original epidemiological studies[1 2] two thirds of all patients with coronary artery disease still die before reaching hospital (p 1065).[3] These patients have no opportunity to benefit from the advances in hospital treatment of acute myocardial infarction, such as thrombolysis, that have dramatically reduced mortality in hospital. It is particularly sobering to see in the study by Norris et al that among patients aged under 55 who die from cardiac arrest, 91% do so outside hospital, whereas the hospital mortality from acute myocardial infarction in this age group is only 3%.[3] The hospital mortality for older patients is proportionally higher, but two thirds of these patients also die before reaching hospital. Is it possible to save more of these patients who die outside hospital?

Several studies, including that by Norris et al,[3] show that half these patients who die outside hospital have an unwitnessed cardiac arrest and are therefore not amenable to resuscitation. Nevertheless, half the patients in Norris et al's study had already been diagnosed as suffering from coronary artery disease. We know from the ASPIRE study that many such patients are suboptimally treated in terms of risk factor modification and the use of prophylactic drugs.[4] Studies such as the 4S, CARE, and LIPID studies suggest that statins may reduce mortality by 25-30% over five years in such patients,[5] and impressive lowering of mortality, particularly in the first year after a myocardial infarction, may be achieved by the use of β blockers and angiotensin converting enzyme inhibitors. Yet many patients who have had a myocardial infarction or who have angina do not undergo even a simple exercise test to identify those at high risk who might benefit from angiography and intervention.

Prevention aside, nothing can be done for patients whose cardiac arrest is unwitnessed: only those whose arrests are witnessed stand any chance of survival. The presenting rhythm in about 85% of these patients is either ventricular fibrillation or pulseless ventricular tachycardia,[6] both potentially reversible by defibrillation. If the arrest is witnessed the main determinant of survival is the delay from onset of the arrhythmia to electrical defibrillation of the heart. The "chain of survival" concept of early access to emergency medical services, early basic life support by a bystander, early defibrillation, and early advanced life support is well tested.[7] In Norris et al's study, 40% of patients who arrested in the presence of a paramedic equipped with a defibrillator survived to leave hospital—a figure comparable to those reported from cities operating rapid response emergency medical services.

In another paper in this week's issue, Ruston et al clearly show that the lay public's perception of a heart attack is of a patient with severe pain and often sudden collapse (p 1060).[8] Yet this pattern occurs in only a minority of patients. They point out that the critical decision to be made by the patient and any companion is whether the symptoms might represent a heart attack. Their study suggests that those patients who are knowledgeable about the possible symptoms of a heart attack or have classic severe symptoms delay for the shortest time, those with less knowledge delay longer and try to rationalise their symptoms, and those with the least knowledge and atypical symptoms delay the longest. Other reports seem to support their conclusions and suggest that we need to educate the public, particularly patients with coronary artery disease and their companions, about the symptoms of a heart attack.[9–11]

Two thirds of all patients die at home, so widespread community training in basic life support should be encouraged, though it is sensible to target people most likely to have to practise these skills. These include the close relatives and friends of patients with known coronary artery disease. Every opportunity should be used to encourage such people to learn to recognise the symptoms of a heart attack and to perform basic life support.

Basic life support performed before the arrival of a defibrillator doubles the survival rate.[7] Calling for help activates the system, while basic life support "buys time" until the defibrillator arrives. In Britain the NHS plans to continue the single paramedic response system, prioritising emergency calls and reducing response times for life threatening emergencies from the present 14 minutes for 95% of calls in urban areas to 8 minutes for 90% of all calls in all areas.[12] The results of implementing these standards will need to be reviewed.

Some studies suggest that a two tier system involving a "first responder" with an automated external defibrillator—who can arrive within 4-5 minutes—may improve survival compared with a single tier system that aims to deliver a fully trained paramedic in 8 minutes.[13] Innovative approaches such as the use of "intelligent" defibrillators by policemen, firemen, and other lay first responders (security guards, airline cabin attendants, and uniformed volunteer first aiders) in a medically controlled system continue to be evaluated.[14] In the meantime the message seems clear: to reduce deaths outside hospital from coronary artery disease,

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better secondary prevention, increased public awareness of the symptoms of a heart attack, and improved activation and response times by the ambulance service are necessary.

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Shifts in opportunities for doctors in training

Revise the training as well as the hours

The health of an individual represents a continuum of events. Therefore health care requires continuity of assessment, planning, and treatment. Is it necessary to have most of the medical care provided by one doctor, or can adequate care be provided by a variety of doctors for each health event? Can continuity of care in hospitals be met by trainee doctors working shifts, and can shift work and reduced hours meet training requirements?

These are important questions for teaching hospitals. In most countries where early postgraduate medical training takes place in general hospitals three needs are evident: to define appropriate training requirements for progression to higher levels of practice; to provide the maximum effectiveness of care for the lowest possible cost; and to provide reasonable hours of work for staff in training.[1-4]

In medicine skills and knowledge are traditionally gained by apprenticeship and experience.[4 5] In the past this has meant long hours of continuous duty, justified by the belief that continuity of care is achieved and individual responsibility for treatment decisions developed. However, the effects of fatigue, interrupted sleep, and accumulating demands during long hours on duty have now been recognised.[6] Limitations on continuous duty and total work hours for junior medical staff are now part of employment contracts in many hospitals. Such limitations result in better performance and safer care, but, on the face of it, fewer opportunities for teaching and learning.[7-9]

For hospital administrators doctors are expensive. A reduction in hours worked and in overtime payments has financial implications for hospital budgets. Changes in work practices become even more attractive if productivity gains can be achieved. Many areas of health care find that productivity and financial needs are met by using shift rosters and limited hours of duty: examples are nursing, laboratory, emergency, and intensive care services and 24 hour medical centres. An effective answer to requirements for reasonable hours of duty and financial efficiencies for junior medical staff in acute care is therefore to introduce shifts. But can training continue to be defined within a framework of hours of service, and can necessary competencies be defined in ways that are more appropriate than simply recording time spent in service provision?[5 9]

Hours of duty should be constructed so that continuity of care is possible, while still ensuring provision for acute service requirements throughout 24 hours. Partial shift systems are an appropriate compromise[1 10]: rosters provide most of the service and training time with a "parent" unit, but short periods of one or two weeks on night rosters or emergency and housekeeping rosters provide the necessary 24 hours a day care.

In response, training programmes must define more rigorously the specific objectives and competencies needed for adequate professional advancement.[4 11] These will vary between specialties but must become independent of the number of hours or weeks spent in particular posts—currently the usual basis of assessment.[4] Specialties where long term continuous care is not a major objective may be able to provide effective training using full shifts, examples being anaesthesia and emergency care. Those concerned with long term care outcomes—such as disability and rehabilitation, psychiatry, and neonatal high dependency care—need different approaches. Training programmes need to place greater emphasis on evaluating the experiences of trainees, their competencies, and the use of their training for their future practice.[5 9]

Continuity of planning for patient care management, effective communication with others in the care teams, integration of care plans with other health professionals, and determination of the outcomes of care are training objectives that deserve greater emphasis.[12] Some disciplines may need longer training

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programmes. Furthermore, not all employment in teaching hospitals may be able to be counted as training: examples are relieving and night shift rosters.

A further solution is to provide more effective methods to reduce the time that junior medical staff spend on non-clinical duties.[1 3 11] This means improved medical record keeping systems, rapid electronic reporting of results from laboratory and imaging services, improved communications with community services and practitioners, voice activated typing facilities, patient care assistants to coordinate the administrative aspects of patient care, and other innovations.

Introducing shift rosters merely to reduce hours and costs without enhancing training is inappropriate. Real opportunities exist for improving learning for doctors in training. These should become the objectives which lead to changes in working hours.

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Protecting the public from risk of harm

Ontario's forthcoming regulatory law protects doctors, public, and the patient

In autumn 1997 an expert panel representing five medical colleges and associations in Canada recommended unprecedented changes to the Ontario Medicine Act. These changes, now being implemented, will give the province's 20 000 doctors a mandatory duty to inform the authorities when a patient threatens serious harm to others and the doctor believes that violence is likely.[1] This new duty clears up previous contradictions in the law and will benefit doctors, their patients, and potential victims of violence.

The recommendations stem from the panel's conclusion that protecting the public from serious risk of harm should override a patient's right to confidentiality. They are intended to *(a)* protect the public from serious harm, *(b)* prevent patients from harming themselves by carrying out a serious threat, and *(c)* protect doctors from legal and professional liability when they disclose information in good faith in line with the newly defined professional standards. Doctors are protected if they take every practical precaution to avoid inaccuracy and unfairness and assess the potential for violence using the criteria established for clear and imminent danger or, in less clear cases, use a method for assessing the risk that meets the new standard of practice.

Doctors are accountable for using due care in assessing the risk, not for the accuracy of their predictions. If, after considering all the circumstances, a doctor remains in doubt the recommended new standard says that he or she should inform—because of the potential seriousness of the consequences of not informing. In addition, the panel has recommended that doctors should be able to consult their professional college or association, a solicitor, or their defence association when making the decision. The panel also recommended that medical school and postgraduate training programmes should teach about clinical assessments for risk of violence.

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In Canada patient confidentiality is protected by law. However, this protection is not absolute: doctors should not disclose information obtained from a patient unless they are specifically authorised by (or on behalf of) the patient or required or permitted to do so by law. For example, current Ontario law requires doctors to provide information about a patient without consent when reporting suspected child abuse, certain infectious diseases, and medical unfitness to drive; making reports related to aviation safety or to the Workplace Safety and Insurance Board; completing certificates under the Vital Statistics Act; and responding to a court subpoena. At present, however, no federal or provincial statute specifically requires or permits doctors to report patients who make plausible threats to harm others, although provincial mental health legislation provides for confining these patients to psychiatric facilities if appropriate.

As well as statutory requirements, there are common law duties. The legal definition of the duty to warn about potentially violent patients was first introduced in 1976 in a landmark decision by the California supreme court.[2] In Canada the common law duty to warn about potentially violent patients has been used in several cases: one case specifically mentioned that California case[3] and another used the British "neighbour principle," where a judge held that the rule to love your neighbour becomes in law: you must not injure your neighbour.[4]

Thus, in Canada there seems to be a common law duty that obliges doctors to inform the authorities, the threatened party, or both, if violence is threatened. However, the medical profession's regulations prohibit doctors from providing such information without the

consent of the patient—and no statutory law permits or requires disclosure in these circumstances either. Until now doctors who ignored this prohibition were subject to disciplinary action by their regulating college.

The new recommendations state explicitly what is expected of doctors and provide the necessary regulatory changes for them to meet this new standard of practice. Crucial to the recommendations is the principle of duty to inform rather than permissive reporting. All parties benefit under this principle. Potential victims benefit because they can take precautions and protect themselves; if the duty to inform were permissive, doctors would vary in their weighing of confidentiality versus public safety and, as a result, some potential victims would not be informed. Doctors benefit because if they meet the new standard of practice they will be held accountable only for not informing; a permissive duty would leave doctors open to litigation whether they informed or not. The patient benefits because a mandatory duty may make it easier to accept care from a doctor who informs to fulfil a regulatory requirement rather than at his or her discretion. Also, the mandatory duty protects patients from carrying out criminal acts that lead to police investigations, legal proceedings, and convictions.

By taking a proactive stance, defining the duty to inform explicitly, and making the duty mandatory, the Canadian medical profession has set an international precedent and, in the process, made a strong statement about preventing violence in our society.

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Cannabis as medicine: time for the phoenix to rise?

The evidence suggests so

Since 1971 British doctors have been barred from prescribing cannabis under the Misuse of Drugs Act. Many otherwise law abiding people have subsequently thought it worthwhile to expose themselves to the risk, inconvenience, and expense of obtaining illegally a drug they believe can ease symptoms inadequately controlled by conventional medicines. Patients have told me how effective cannabis can be in relieving aches and pains, numbing the symptoms of opiate withdrawal, improving sleep, reducing anxiety, and alleviating the vomiting, anorexia, and depression associated with AIDS related disorders. Anecdotes such as these are all very well, but is there any scientific evidence that cannabis has real therapeutic value?

The BMA has addressed this question with an excellent report, which begins by reviewing the pharmacology.[1] Only a few of the 60 or so chemicals unique to *Cannabis sativa* (cannabinoids) have so far been studied, the best known of which is the main psychoactive ingredient, δ-9-tetrahydrocannabinol (THC). Specific cannabinoid receptors in the brain and in spleen macrophages, and naturally occurring substances which bind to these (anandamides), have been identified in recent years. These findings open the door to developing novel agents for therapeutic use or exploring the physiological role of the anandamide system—which may be concerned with mood, memory and cognition, perception, movement, coordination, sleep, thermoregulation, appetite, and immune response.[2]

The report evaluates the scientific literature on cannabis and cannabinoids in relation to the strengths and shortcomings of existing medicines and proposes directions for research. The strongest evidence relates to the effectiveness of δ-9-tetrahydrocannabinol and the synthetic cannabinoid nabilone in relieving nausea and vomiting secondary to cancer chemotherapy. Nabilone is licensed for this use in Britain, but δ-9-tetrahydrocannabinol (as dronabinol) is not. A pilot study suggests that the non-psychotropic δ-8-tetrahydrocannabinol has promise as an antiemetic in children.[3] Proposals for research contained in this section are applicable to most of the others: exploration of optimal regimens and the relative usefulness of different cannabinoids; controlled comparisons with newer medicines alone and as adjunctive therapy; specification of patient categories; and a focus on other conditions producing similar symptoms.

Many anecdotal accounts indicate that cannabis and some cannabinoids can relieve symptoms related to muscle spasticity, but the few controlled studies offer only modest support for this. Good evidence exists from basic research that several cannabinoids have analgesic and anti-inflammatory properties, but eight small scale human studies listed here give equivocal results. Again animal studies suggest that cannabidiol has possibilities as an anticonvulsant, but the human data are lacking. δ-9-Tetrahydrocannabinol definitely reduces intraocular pressure and produces bronchodilatation but its potential in glaucoma and asthma is not compelling on current evidence.

Relief of symptoms in AIDS related disorders is one of the most interesting possibilities. The appetite stimulating effect of oral dronabinol in patients with AIDS[4] was convincing enough to win approval from the American Food and Drug Administration for this indication. This attribute, combined with antiemetic and possible analgesic, anxiolytic,[5] hypnotic,[6] and antidepressant[7] properties, suggests a profile uniquely relevant to this condition and a compelling reason for research.

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Adverse effects relevant to clinical use are discussed. No deaths have been attributed to cannabis toxicity alone. Common acute effects include sedation; psychological symptoms (euphoria, anxiety, paranoia, impaired memory); and physical symptoms such as dry mouth, ataxia, blurred vision, weakness and incoordination, and tachycardia. Impaired psychomotor performance may persist as long as 24 hours after a single dose. Interactions with central nervous system depressants are possible, as is aggravation or precipitation of psychosis in vulnerable individuals. Physical and psychological dependence can occur, but withdrawal symptoms are usually mild. Inconsistent effects on sex hormones and immunosuppression in animals have been reported. Cannabis smoke is as rich in toxic gases and particulates as tobacco smoke, so regular heavy smokers probably face an increased risk of cardiovascular and respiratory diseases.

The report concludes that individual cannabinoids have a therapeutic potential in several conditions in which other treatments are not fully adequate and that they are safe drugs with a side effect profile better than that of many drugs used for the same indications. The BMA recommends that the government should amend the Misuse of Drugs Act to allow cannabinoids to be prescribed in a range of medical conditions, calls for the setting up of controlled clinical trials, and suggests that pharmaceutical companies should search for novel analogues to open up new therapeutic possibilities.

The BMA is not alone in arguing for enhanced access to cannabinoids in clinical practice. Others include the Royal Pharmaceutical Society,[8] the previous president of the Royal College of Physicians (L Turnberg, personal communication), and many British doctors.[9] The role of cannabinoids in modern therapeutics remains uncertain, but the evidence in this report shows that it would be irrational not to explore it. The active components of a plant which has been prized as a medicine for thousands of years should not be discarded lightly, and certainly not through political expediency or as a casualty of the war on drugs.

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Equity on both the scientific and the policy agendas

WHO report reminds us of the essentials

It is time to admit that we need a two pronged approach to equity in health: a scientific and a policy effort. These may not be synchronised and each has to be allowed to run its own course, but they need to happen simultaneously.

On the one hand we are confronted with a teasing scientific problem. Why are social inequalities in health so universal? They show a clear gradient for almost any health indicator by any measure of social position—be it education, income, professional class, or social class—in every country where data have been collected, irrespective of the country's position on income distribution, access to education, regulations on working conditions, social benefits, or social housing policies. Why do health inequalities appear to affect almost all diseases, both the diseases of poverty and the lifestyle related diseases of more affluent societies?

Through which more proximal risk factors do socioeconomic factors affect the occurrence and pathophysiology of individual diseases? And what do we know about the lag times between exposure and outcomes? We do not accept mere correlations of time series as sufficient evidence of causation in other areas of epidemiology, so why here? When we see the strength of the relation diminish with old age, is that an artefact of selective mortality or of misclassification of social position in older people, or is it part of the explanation? And, finally, with the limited evidence we have on interventions that seem to improve the health of deprived groups can we confidently recommend policies to governments eager to reduce inequities in health?

These and many other questions need to be answered by careful scientific research, teasing apart the elements that play a part in causing inequalities and trying to measure the potential for reducing them through interventions. This is a necessary and intellectually stimulating venture, but not one likely to yield substantial results in the near future.

That is why a second—policy—approach is also necessary. The World Health Organisation has known that all along, and its most recent publication gives all the ingredients necessary for a sound approach to governments wanting to reduce the social inequalities in health in their own societies.[1] For the first time this publication raises the question of equity in health policies in developing countries, using much of the experience gained in recent decades in Europe.

Reading the familiar concepts in a third world context is refreshing because it presents the basic policy

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proposals uncluttered by the more detailed scientific debates that are becoming more important in a European context. The basic preconditions for health are well known, and their equitable distribution an objective many societies are willing to consider. After all few societies are actively trying to achieve inequalities in health. It is only when measures that help ensure equality in health interfere with other policy goals that equality in health may be sacrificed—for instance, for economic growth. In choosing between policy options that concern such known preconditions for health as education, income, environmental safety, housing, and working conditions, policymakers should consider distributions as well as general average outcomes. But for that to happen equity in health needs to remain on the political agenda.

An important measure to prevent health inequalities—but even more so to redress them—is an equitable health service. Equitable here means that it guarantees equal access, priority of care in relation to medical need instead of ability to pay, equal quality of care (both effectiveness and patient satisfaction), and an equitable distribution of the financial burden. The generation of those who remember what it was like before we had universal healthcare systems has almost disappeared and with them the memories of the arguments used in those early policy debates. That is why it is useful for the WHO to re-emphasise these arguments. We should use them when western governments propose reforms to cope with aging populations and new technologies. It might well be that equity is the most powerful concept to help not only developing countries in their growth towards health for all but also western countries in trying to adapt health policies for the 21st century.

One important opportunity to achieve as much equity in health as possible, given our limited understanding, may be in the daily practice of health care itself. Institutions and individual practitioners need carefully and continuously to ask themselves if their efforts produce equal benefits for those entrusted to their care. Such smallscale efforts are unlikely to resolve the inequalities in health we measure at population level, but a continuing effort at least not to add to these inequalities may well be the best way to preserve equity as a central value in our healthcare services.

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1 World Health Organisation. *Equity in health and health care: a WHO/SIDA initiative*. Geneva: WHO, 1996.

Unscientific practice flourishes in science

Impact factors of journals should not be used in research assessment

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All around the world the scientific performance of individuals and research groups is being assessed using the impact factors of the journals in which they publish.[1] Unfortunately the indisputable evidence that this method is scientifically meaningless is being ignored. Those who assess the performance of researchers seem to be bewitched by the spurious precision of a number that is available to several decimal places.

Most researchers accept that research funds should be concentrated on those who perform well. Performance must therefore be assessed—which is not easy. Britain has developed a system that Gareth Williams, a professor of medicine, describes as gathering misleading data and assessing them unscientifically and unaccountably using an inefficient, expensive, and wasteful procedure (p 1079).[2] The result is that limited resources may be misapplied and research distorted by researchers playing games to score highly in the assessment exercise.

One part of the assessment is to score the researchers' performance by the impact factors of the journals in which they publish. The impact factor of a journal is in essence the number of times the articles it publishes are cited, divided by the number of articles that could be cited.[1 3] Impact factors are calculated annually by the Institute for Scientific Information in Philadelphia and published in the *Science Citation Index*. They are an imperfect measure even of the quality of a journal because they are biased towards American journals, strongly distorted by specialty, and vulnerable to technical problems.[1] Moroever, and crucially, impact factors are meaningless as a measure of the performance of individual scientists or research groups for the simple reason that there is little correlation between the number of times that individual articles may be cited and the impact factor of a journal.[1] This is because journal impact factors depend on a few articles that are highly cited.

Eugene Garfield, the inventor of impact factors, has for many years warned those who want to assess the research performance of individuals and groups not to use impact factors. For example, he wrote in the *BMJ* in 1996: "Using the journal's average citation impact instead of the actual article impact … while expedient … is dangerous."[3] Per Seglen, a Norwegian professor, comprehensively demolished the use of impact factors in research assessment in the *BMJ* last year.[1] Yet still the practice continues. It must stop.

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Conflict of interest—The *BMJ* has an impact factor lower than that of the other big general medical journals but higher than that of most specialist journals.

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