# Van die Redaksie/Editorial

## Trauma — today and tomorrow

In developing countries progress normally brings about increased urbanisation, better health care and a progressive reduction in the ravages of diseases, such as malnutrition, infections and parasitic conditions. The reverse is, however, true of trauma, where exposure to urban lifestyles and technology increases the per capita trauma rates, thereby precipitating a disproportionate demand for trauma services.

The most conservative demographic projections indicate that the total population of the RSA will double between 1985 and 2015. Concurrently, the urbanisation rates wil escalate from around 50% to beyond 70%, with a consequent trebling of the urban population. Population pyramids of the 1980 and 1985 census data[1] indicate that more than 45% of our black population was under the age of 15 years. Current indications are that vast numbers of people under the age of 35 years will inhabit our urban complexes, and especially the metropoles, 25 years from now. At present the birth rate exceeds the economic growth rate, so that unemployment and overcrowding can be expected as additional complicating factors in large new settlements developing well beyond the current urban fringes. Together these factors predict an imminent increase in trauma incidence well in excess of the overall rise in population numbers.

If this is what looms ahead, what is the present situation and how well are we coping?

In the RSA trauma represents a major unproductive spillage in the internal economy, severely taxing hospital services, industry, commerce and society at large. The indications are that only AIDS will compete with it as the potential No. 1 community health hazard over the next few decades.

Some salient indicators define the problem further. Whereas the World Health Organisation has assessed that non-natural deaths (practically all due to trauma) represent 5,2% of overall global fatalities, in the RSA this figure runs at 16%. In the USA trauma ranks 4th as a cause of overall mortality; here it occupies a disturbing and close second position behind circulatory deaths, i.e. those due to cardiac conditions, arterial and venous diseases as well as strokes.

The real catastrophe unfolds when one considers premature deaths in subjects between their 1st and 65th birthdays in the RSA. In 1984 these accounted for the loss of 2,43 million potential years of life, of which 36% was due to non-natural causes. No other disease group accounted for more than 16% and circulatory diseases represented 9%. Trauma losses are highest in the 15-24-year-old and 25-34-year-old age groups, with male victims outnumbering females by 3:1. Contrary to general perceptions, these trauma manpower losses took a proportionally higher toll among those population groups at present supplying most of our managerial and skilled manpower.[2]

But the mortality data represent only part of the damage done. Permanent and temporary disability not only causes considerable suffering and hardship but also represents vast additional manpower losses.

The RSA is internationally recognised for its achievements in accident prevention in the workplace, largely due to the efforts of the National Occupational Safety Association. Unfortunately, these excellent results are undone the moment the worker leaves the factory gates: a Durban firm with 700 employees, for example, recorded only 1,2% of their workers annually losing shifts due to work trauma, while 12,0% did so following off-the-job injuries.

What is the size of the problem? In 1988 145 000 patients attended state hospital services in the Cape Peninsula with fresh injuries. Against an estimated population of 2,2 million, this represented an annual attendance rate of 1:15. It is also estimated that 1 trauma bed is required for every 2 000 people.

Analysis of the cause of these injuries shows 50% to be due to assault. Injuries at home, school or during informal recreation account for 25%, vehicular trauma for 17%, sport for 5% and occupational injuries for 3%. Alcohol plays a disturbingly important part not only in the causation of vehicular and assault trauma[3] but also in adult drownings, where 50% of the victims have blood alcohol levels of 0,1 g/100 ml or higher; in fact, 38% have levels of 0,2 g/100 ml and beyond.[4]

At most centres firearms account for a small, but increasing, proportion of all injuries. At Groote Schuur Hospital, Cape Town, such injuries represented 0,59% of the total during the 1980-1984 period. During 1985-1989 this rose to 0,97% with 1989 showing the highest figure of 1,36%. Most injuries are related to handguns and the impression is one of increasing and irresponsible use of illegally possessed firearms.

The undue carnage on our roads is well known. At the same time it is the area with excellent potential for significant reduction in trauma rates. Whereas existing traffic legislation is adequate, law enforcement is critically deficient. A notable advance was the Department of Transport's announcement of a Committee for the Investigation of the Efficiency of Traffic Law Enforcement in the RSA late in 1989. This can be seen as the single most important step taken towards road safety in this country.

The economic spillage in relation to trauma is massive. The composite cost of vehicular collisions and occupational injuries was assessed at almost R20 million/d during 1988.[3] The analogous costs of assault, domestic and sports injuries are undefined on a national scale. However, it is clear that even modest reductions in trauma rates can redirect considerable funding towards more productive and urgent issues, such as job creation, housing, and education.

The existing geographical distribution of hospital facilities in burgeoning metropoles presents a major problem. The main trauma facilities are often situated centrally and quite distant from the sprawling suburbs where most of the trauma occurs. Rapid urbanisation is progressively aggravating this problem, with the result that costly and sophisticated ambulance services have to cover longer distances. Whereas current emphasis is on primary health care, it is important to note that centres providing such services are suffering two major shortcomings: firstly, their facilities are such that they can only address the most basic trauma problems; and furthermore, most of them operate only during office hours. Generally, some 80% of trauma occurs after hours, when the broad base of the service pyramid has shut down and a massive load of trauma consequently hits the larger hospitals.

The avalanche of trauma has reached crisis proportions, especially in tertiary hospitals. Some surgical disciplines have 83% of their beds occupied by trauma victims, with serious disruption of their other commitments. Unacceptable delays occur in the management of patients owing to sheer overloading of trauma unit facilities. At the same time, staff shortages have forced the non-commissioning, closing down or under-utilisation of key services that were established at considerable cost to the fiscus.[5] It is of the utmost importance that health planners address this.

The inherent realities of the trauma situation in the RSA indicate that an increasingly heavy load will be placed on curative services in this field. Within trauma service designs due cognisance should be taken of the fact that the mere increase in processing facilities, such as bigger casualty departments and trauma unit receiving areas, will not solve the problem. A patient with a femoral fracture can, for instance, not be managed in domiciliary fashion and the bed requirements are increasing significantly. No amount of primary health care will change this.

The present content and emphasis in trauma management courses in most undergraduate curricula and examinations are in need of careful review if the training of doctors and paramedical personnel is to have practical relevance to the pertinent needs of the present decade and those to follow.[6]

The main brunt of trauma management in the RSA will continue to fall on the State. Experience in the USA, where trauma management was significantly privatised, reveals that litigation, overcrowding of hospitals and intensive care units, as well as inadequate refunding from Treasury have thrown the process into reverse. This holds true not only among private practitioners, but also at hospitals, many of which have deregistered as trauma centres. Our own potential for the privatisation of trauma care is considerably more complex and the process is likely to remain both limited and selective.

In terms of injury prevention the gap between what can be achieved and what has been accomplished remains wider than for any other disease group.[7]

While a greater commitment towards injury prevention is perceptible, the dire straits in which clinical trauma management finds itself will have to be addressed urgently. It is simply no longer possible to maintain acceptable standards of care with the available infrastructure. Elsewhere in this issue (p. 93), Muckart describes the problems encountered at teaching-hospital level in Natal. It serves to emphasise the urgent need for rational planning on a regional basis.

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# Neutron therapy — clinical considerations

In 1932, Chadwick,[1] working at Cambridge, identified the neutron, an uncharged nuclear particle that had been postulated some 12 years previously by the brilliant physicist Rutherford. Four years later, in the USA, Ernest Lawrence[2] constructed a series of cyclotrons capable of producing high-energy neutrons. He recognised the potential use of neutrons in medical therapy and stimulated his brother John Lawrence, a Harvard Medical School graduate, to study the biological effects of the neutron beam;[3] he concluded that these particles would be useful for cancer treatment.

Patient therapy was initiated by Stone[4] at the University of California in 1938. These early clinical results were marred by excessive chronic morbidity primarily due to inadequate initial radiobiological insight and investigation.

The radiobiological rationale for neutron therapy was investigated by Gray[5] in the 1950s. He concluded that tumour tissue hypoxia confers protection against conventional X-rays, but that this is less pronounced with neutrons. Furthermore, tumours are resistant to X-rays for much of their cell cycle, while neutrons exert their effect throughout the cycle. This factor is of major concern in the treatment of slowly proliferating tumours.

The British Medical Research Council's cyclotron unit at Hammersmith Hospital commenced clinical trials in 1966. Catterall and Bewley[6] reported highly promising results for the control of some tumours considered to be radioresistant to conventional treatment. Subsequent clinical reports from other cyclotron centres in Europe and the USA added to the body of knowledge regarding neutron effects on normal tissue and tumour. However, inconsistencies in some of the results caused much controversy regarding the appropriate role of neutron therapy in the anticancer armamentarium.

Notwithstanding, Cohen *et al.*[7] evaluated neutron beam therapy in the mid 1980s, and concluded that adenocarcinomas of the gastro-intestinal tract, particularly tumours of the salivary glands, and also tumours of the pancreas, stomach and bowel, appeared to be responsive to neutron therapy, as were some selected non-epidermoid radioresistant tumours (sarcomas of soft tissue and melanoma). Control rates equivalent to that of photon therapy were demonstrated in epidermoid carcinomas of the head and neck region and the cervix uteri, while inferior control rates were achieved in bladder carcinoma and brain gliomas.

The physical limitations of the equipment used were becoming glaringly evident and were blamed for many of inconsistent results and excessive complications. These deficiencies have been overcome in the neutron facility at the National Accelerator Centre (NAC) at Faure, CP, and in the other present generation of machines situated in Seattle, Los Angeles, Houston, Liverpool, and Seoul. With the quality of neutron therapy possible at the NAC as well as the optimum patient care at the 30-bed Faure Hospital, the facility is uniquely placed to offer sophisticated neutron therapy comparable to the most modern treatment centres.

Clinical studies, which are funded by the South African Medical Research Council, are directed primarily at tumours resistant to conventional treatment. For example, neutrons are considered the treatment of choice for irresectable salivary gland tumours and selected soft-tissue sarcomas. Clinical studies are also in progress on head and neck carcinoma, breast and bronchial cancer and uterine sarcomas.

More than 100 patients were treated in the year after the facility was commissioned in September 1988. Preliminary results have been promising, with some exciting initial tumour responses.

Final evaluation, however, will only become possible over the next 3-5 years.

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# Don Craib's legacy

The recent publication of a book on Professor W.H. (Don) Craib by Professor E.B. (Barry) Adams,[1] which is reviewed elsewhere in this issue (p. 115), provides not only a vivid portrait of a remarkable man but also important insights into the development of academic medicine in South Africa. At a time when academic medicine is threatened on several fronts, it is salutary to be reminded of how recently the traditions we accept as normal were introduced into South Africa and how much we owe to those who helped establish them.

While departments of medicine were set up at the University of Cape Town in 1920[2] and at the University of the Witwatersrand in 1922,[3] the initial emphasis was on clinical service and undergraduate teaching, with most of the duties being performed by honorary members of the part-time staff, some of whom obtained small university stipends for their teaching commitments. However, from the outset there were important differences between the two medical schools. At Cape Town the heads of the clinical departments, including medicine, were full-time professors, with the right to some limited private practice, while in Johannesburg they were appointed on a part-time basis. The differences between the departments of medicine at the two schools became even more marked in 1938 when two full-time professors, J.F. (Jack) Brock and Frank Forman were appointed in Cape Town. Brock returned to his alma mater after a number of years at Cambridge, where he had been the assistant-director of clinical research under the eminent Professor John Ryle. Forman, on the other hand, had already been full-time assistant to the previous professor (Arthur Falconer) for a number of years, having first joined the department in 1923. Over the decades that followed it was to prove a felicitous partnership. Forman, a superb clinician, held the chair of clinical medicine, while Brock was the administrative head and directed the research programme. In this latter capacity he played a dominant role in the establishment of academic medicine in South Africa. His own research programme capitalised on the effects of dietary habits on disease patterns in the different ethnic groups in South Africa and his department rapidly achieved an international reputation for excellence, which it has maintained ever since.

The road was a much rockier one for the department of medicine at the University of the Witwatersrand during its early days. When Craib took over the department from Professor O.K. Williamson in 1932 he found that he was expected to care for patients, teach the students, perhaps undertake some research, and maintain a private practice as the university salary was only £750 per annum. To fulfil these duties proved virtually impossible and after some pressure one full-time assistant was appointed. He was Dr J.H. (Jock) Gear, who was to spend the rest of his professional life making a major and selfless contribution to the building up of standards in the department. Craib felt, with justification, that the medical school was the Cinderella of the university and throughout the 14 stormy years he spent there he exerted intense and unrelenting pressure on the authorities to institute full-time clinical chairs. When, however, such chairs were finally introduced in 1946 he and the other clinical professors (I.W. (Breb) Brebner and James Black) were told that they would have to reapply for their posts and none of them was prepared to do so.

Set down in stark outline, the story of Craib's time at the University of the Witwatersrand seems unremarkable and it is certainly true that little or no research was done in the department during his tenure. However, the bare facts give no flavour of the Craib era nor of the man himself. Craib emerges from Barry Adams' portrait as the complete Renaissance man — soldier, scientist, clinician, teacher, administrator, philosopher and wit.

As students we knew nothing of his bravery as a trench mortar officer on the Western Front during World War I (twice mentioned in dispatches; Military Cross and Bar) nor of the controversy surrounding his seminal discoveries on the electrophysiology of heart muscle. It was work that had brought him into conflict with the major authorities of the day — Professor Willem Einthoven, Lord Adrian and Sir Thomas Lewis — and which had driven him out of scientific research. We were more concerned with his immediate impact as a challenging teacher and as a warm and vital person. He gave my class only two lectures but both remain vividly in the mind. In recalling the first of these, I wrote to him years later: 'You walked into the hospital lecture theatre, pointed a finger at one of the students and asked him to define death. An hour later the debate was still being vigorously pursued. In fact, when the furore surrounding heart donors broke out twenty-five years later I had a feeling of *déjà vu*. Much of what was said at that time had been anticipated by your teaching session a quarter of a century earlier ... . Why do I and my contemporaries remember a couple of lectures so vividly? It is because it was the first time that we had been invited to think for ourselves and question authority. It was heady stuff — stimulating and great fun, too.'

While there is no way of assessing Craib's impact in tangible terms, generations of his students believe that the attitudes he instilled in them have guided them throughout their professional lives. When Don Craib left the university, Guy Elliott replaced him as the first full-time professor of medicine and a proper departmental infrastructure was also created. Not long afterwards the calibre of the work being done in the department was recognised — in 1950 when the South African Council for Scientific and Industrial Research (CSIR) created a cardiopulmonary research unit. Prominent in its activities were four of

Craib's erstwhile students — Jock Gear, Bernard van Lingen, Maurice McGregor and Margot Becklake.

After Craib left the medical school he spent 15 years in specialist practice in Port Elizabeth. He was then asked by the president of the CSIR to serve initially as associate medical advisor and later as a vice-president. The very successful years he spent there (1963-1968) covered the crucial gestational period of the South African Medical Research Council, which held its inaugural meeting in 1969.

In addition, Craib had the satisfaction of receiving not only belated recognition but acclamation for his pioneering work in the 1920s in which he elucidated the electrophysiological basis for interpreting the ECG. Despite the rewards and relative tranquillity of his later life, some of his writings reflect self-doubt and a sense of failure. Indeed, he made two major decisions in his life that can be seriously questioned. The first was to abandon his research career at an early age and the second was not to apply for the full-time chair of medicine at the University of the Witwatersrand. However, given the circumstances of the times in which he lived it is difficult to make meaningful judgements on these decisions.

Perhaps the best answer to Craib's sense of failure was provided in a letter written to him by his sister Ismay, who was the wife of another distinguished South African, Sir Basil Schonland. She wrote: 'Your own life has been so noble and so full that it stands entirely justified in its own right. So do not regret your decisions in the past. You would, of course, have been a very great figure in the medical research world if you had stayed in research. But you were a very great figure anyway and have at any rate served South Africa very well — with the training of medicals, the organisation of research, and the actual patients to whom you gave life and courage.'

I believe that Craib's most lasting legacy to those he taught was embodied in the inscription on a bowl presented to him when he left the CSIR. It reads: *We heed your teaching: in rebus scientiarum auctoritatem dubitate* [in matters of science doubt authority].

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# Health informatics

Health informatics is a relatively new field. After 20 years, some are still undecided whether it warrants recognition as a medical discipline, a new science or an emerging field. Health informatics is defined as 'the study of the nature and principles of information and its applications within all aspects of health care delivery'.[1]

Medical information is extremely diverse, including aspects such as epidemiology, nursing, patient records, laboratory results, accounting and many others. Managing this information is fundamental to good decision-making whether it be in relation to an individual patient, a private practice, a hospital, a population or an entire country. Relevant information must be collected, classified, processed, stored, retrieved and distributed to decision makers in health care. Computers are often used to accomplish this.

The use of information technology in health care is becoming increasingly important as we find ourselves facing multifaceted problems and a rapidly diminishing time-frame in which to attempt to solve them. The volume of health care data is growing exponentially, making it more difficult to distinguish relevant information from background 'noise'. Fortunately, hardware prices are diminishing and software is becoming continuously more powerful. Digital communications and networks are one of the fastest growth areas in computing. This capacity must be harnessed and used for the benefit of health care in Southern Africa.

In order to promote the professional application of computer sciences and informatics in the field of health care, the South African Medical Informatics Group (SAMIG) arranges regular national conferences, the most recent of which is to be held at the end of January 1991 (for details see the announcement on p. XV).

Medicine is evolving. New disciplines emerge, others change and adapt as technological advances fundamentally remodel their way of working. The management of information and its application in health care is fundamental to medicine and should receive attention in our undergraduate and postgraduate curricula. The eventual recognition of health informatics as a full discipline is an important step towards ensuring that information technology is used to the patient's benefit.

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