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Promoting systems, space and designs for People
Editorial

Greetings to all at the start of a New Year that has begun well with an encouraging level of interest in offering papers for publication in Ergonomics Australia. This first edition for 2004 has a spread of material that it is hoped will be maintained in future editions. There is a carefully crafted and provocative article on the future of occupational injury research in Australia. The writer, Eric Wigglesworth, is one of the early pioneers of this society and has intimate knowledge of his subject. He speaks of matters that have been of considerable concern to a number of our members and should be a stimulus for all thinking members of the HFESA ... the new name for our society following 2003 Annual General Meeting in Brisbane. This is the type of intellectual discussion that is highly desirable in a professional journal.

There are two further papers; one addresses the ergonomics of children’s seating, a prominent issue in international discussions; and the other continues a series of papers reporting on musculo-skeletal complaints among various nursing populations and the pilot study is thought to be the first such Mainland China study appearing in an English language publication. It is to be hoped material from this series might form the basis of a more rigorous investigation of cross-cultural attitudes to workplace perceptions of pain and disability among disparate nursing populations; and perhaps examine the implications for determining a safer working environment. Ergonomics Australia needs to give voice to all levels of professional activity to encourage publication of both early and mature work and thus demonstrate the dynamic nature of ergonomics in this region.

Barbara McPhee, a former ESA President, is currently undergoing a difficult period of treatment for cancer. She has been greatly encouraged in her fight for a healthy outcome, by the stream of good wishes that has flown from members of the society as they become aware of the situation. Many people who saw her at the recent Brisbane conference have been amazed by her apparently sudden collapse over Christmas. Barb advised the editor in early December that a report about Honours & Awards 2003 recipients and call for nominations for 2004 would be finalized in January for the March edition. With her sudden illness that has not been possible. This delay was beyond her control and others on the committee will now attempt to address the matter in time for June edition, although the 2003 recipients are listed in Noticeboard in this March edition.

As noted in December editorial, the current submission deadlines are unrealistic without a reserve of material awaiting publication. The message seems to have been heard and the editor is delighted to report that for the first time in the two year history of the new journal format there is a steady stream of material in the pipeline. This is essential as the review process takes time even when the referees are as reliable and prompt as they have proven to be ... very few papers for any conference or journal publication do not require further refinement that may involve considerable interaction between editor, authors and referees. All the participants are on a learning curve that continues as long as the little grey cells keep functioning! Further offers of assistance have been forthcoming from NSW ... the present editorial team is heavily dependent on the willing efforts of several members in NSW, Queensland and Victoria. We really would like to have more states represented to fill the roles of referees and/or contact persons to actively solicit papers and promote the journal to academe and industry. This journal is our best means of educating the public about the depth and range of ergonomics available to assist in both research and practical application for a more efficient and effective workforce.

A number of people have asked about specific guidelines for formatting material for publication in Ergonomics Australia. To date the informally recommended standard for referencing has been the Harvard one prescribed for recent ESA Conference Proceedings. However even the term Harvard covers a variety of modifications that are promulgated by individual teaching departments and publications. Given the teething problems in acquiring sufficient copy for a quarterly journal with a very short lead-time for modifications, the editor has been happy to accept whatever referencing system the author has submitted, as long as the style is internally consistent. A number of professional journal styles are currently being investigated with a view to determining a “house style” for EA that will enhance the quality of the production. Once this has been determined, the formal, detailed guidelines for authors will be available for downloading from the HFESA website. Notification of these guidelines becoming available will be made in the Journal, on the members’ list server, and in the planned new HFESA Newsletter to be edited by Christine Zupanc and distributed electronically by the Canberra Secretariat.

Two issues have been the subject of lively discussion by members corresponding via both the HFESA and IEA list servers. One relates to “common sense” and the other to bureaucratic changes being arbitrarily introduced to describe an employee work category. The first highlights a frequent problem for a specialist in any field. Years of study and practical experience plus acute observation skills are liable to make even complex problems seem easily resolved by experts in that field. The apparent ease with which the expert provides a solution is then seen to represent an obvious result ... which anyone with an ounce of common sense would have realised! Isn’t it strange that until that point no-one had evinced such common sense? This is a perennial problem that causes much frustration but is unlikely to be resolved given predictable interaction of human factors! The most important lesson is not to take ourselves too seriously; rather bow with humour to the ignorant! Otherwise it becomes a matter of “methinks s/he doth protest too much”.

The second matter has more serious implications. WorkCover NSW has been decimated since 1999 when the Inspectorate Division was amalgamated with the Risk Management Division and given a new title of Occupational Health and Safety Division. Management of the new division devolved to the Inspectorate. It is significant that generally this management stratum comprised people with no experience as OHS practitioners in industry. It is a further telling indictment that no professional officers have been appointed since the prevailing wisdom has been that inspectors could undertake this work. Such a management style was workable under the old-style prescriptive legislation but is in serious trouble under the new performance based legislation. As a result there has been a significant brain drain from the organization — in parallel with a desperate attempt at corporate window dressing.
The latest WorkCover NSW action has resulted in the replacement of the category of Ergonomist by the title Industrial Engineer/Ergonomist. Perhaps this only serves to highlight the poor impact and understanding of the term ergonomics in the bureaucratic world, let alone the wider community. While the word engineer is not a restricted title (there are many who claim that word without professional qualifications) the Institution of Engineers Australia has long fought for recognition of the formal designation of Chartered Professional Engineer (CPEng) for qualified engineers across the various engineering disciplines. Numerous universities here and overseas offer four year undergraduate and postgraduate degree programs and diplomas in Industrial or Manufacturing Engineering. Certainly not all ergonomists are engineers and nor are all engineers qualified ergonomists. Obviously this situation calls for education of the bureaucracy and this need should be strongly promoted. How many ergonomists were aware of, and responded to, an apparent call for submissions to an Inquiry into WorkCover NSW, that was announced over the Christmas period and has already passed the response date? The HFESA President was alerted at this time and has obtained permission for a late entry.

The President of IEA, Pierre Falzon, will make a very brief visit to Melbourne and Sydney this month. The branches in both cities are planning events to welcome him and the editor hopes to introduce a new column in the June edition of EA, Lunch with Pierre. This should enable a wider membership to hear about his interests, goals and concerns for international ergonomics issues.

Keep thinking and start writing!

Best regards

Shaun Gibbs PhD
Editor

Friends

One day, when I was a freshman in high school, I saw a kid from my class was walking home from school. His name was Kyle. It looked like he was carrying all of his books. I thought to myself, "Why would anyone bring home all his books on a Friday? He must really be a nerd." I had quite a weekend planned (parties and a football game with my friends tomorrow afternoon), so I shrugged my shoulders and went on.

As I was walking, I saw a bunch of kids running toward him. They ran at him, knocking all his books out of his arms and tripping him so he landed in the dirt. His glasses went flying, and I saw them land in the grass about ten feet from him. He looked up and I saw this terrible sadness in his eyes. My heart went out to him. So, I jogged over to him and as he crawled around looking for his glasses I saw a tear in his eye. As I handed him his glasses, I said, "Those guys are jerks. They really should get lives." He looked at me and said, "Hey thanks!" There was a big smile on his face. It was one of those smiles that showed real gratitude.

I helped him pick up his books, and asked him where he lived. As it turned out, he lived near me, so I asked him why I had never seen him before. He said he had gone to private school before now. I would have never hung out with a private school kid before. We talked all the way home, and I carried some of his books. He turned out to be a pretty cool kid. I asked him if he wanted to play a little football with my friends. He said yes. We hung out all weekend and the more I got to know Kyle, the more I liked him, and my friends thought the same of him.

Monday morning came, and there was Kyle with the huge stack of books again. I stopped him and said, "Boy, you are gonna really build some serious muscles with this pile of books everyday!" He just laughed and handed me half the books.

Over the next four years, Kyle and I became best friends. When we were seniors, we began to think about college. Kyle decided on Georgetown, and I was going to Duke. I knew that we would always be friends, that the miles would never be a problem. He was going to be a doctor, and I was going for business on a football scholarship.

Kyle was valedictorian of our class. I teased him all the time about being a nerd. He had to prepare a speech for graduation. I was so glad it wasn’t me having to get up there and speak. Graduation day, I saw Kyle. He looked great. He was one of those guys that really found himself during high school. He filled out and actually looked good in glasses. He had more dates than I had and all the girls loved him. Boy, sometimes I was jealous. Today was one of those days. I could see that he was nervous about his speech. So, I smacked him on the back and said, "Hey, big guy, you’ll be great!" He looked at me with one of those looks (the really grateful one) and smiled. "Thanks," he said.

As he started his speech, he cleared his throat, and began. "Graduation is a time to thank those who helped you make it through those tough years: your parents, your teachers, your siblings, maybe a coach... but mostly your friends. I am here to tell all of you that being a friend to someone is the best gift you can give them. I am going to tell you a story.”

I just looked at my friend with disbelief as he told the story of the first day we met. He had planned to kill himself over the weekend. He talked of how he had cleaned out his locker so his Mom wouldn’t have to do it later and was carrying his stuff home. He looked hard at me and gave me a little smile. "Thankfully, I was saved. My friend saved me from doing the unspeakable.” I heard the gasp go through the crowd as this handsome, popular boy told us all about his weakest moment.

"Friends are angels who lift us to our feet when our wings have trouble remembering how to fly.”

Anonymous
Letters

As those who were there will attest, I was very surprised to receive a great honour at the 2003 Annual Conference Dinner, in the form of the Society Medal, awarded for service to the HFESA. My surprise was so great that I had extreme difficulty in making a suitable verbal response at the time - "speechless" is the word which comes to mind. So, if I may, I will crave the editor’s indulgence to make a response through the pages of EA.

I have found my service roles in the HFESA to be extremely rewarding both personally and professionally. My first service role in the HFESA was in about 1992 as Qld Branch Treasurer (now there is a scary thought, pity Maurice Oxenburgh, then the Federal Treasurer!). This role was my first experience of organising conferences (the first of a series of Ergonomics Weeks held in Queensland). This was also my first experience of working with the Branch Secretary, Roxanne Egeskov – I think it is fair to say that without these, and many subsequent interactions through the HFESA, our subsequent research collaboration would have been unlikely to have taken place. It was also though a service role in the HFESA (as part of the committee headed by Jim Carmichael which defined competency based standards for Ergonomists) that I first worked with Leon Straker. At last count, Leon & I have joint research grants worth more than $800,000, including two NHMRC grants. For an academic collaboration, that is about as good as it gets, and again, it wouldn’t have happened without the networking opportunities provided by the HFESA.

I’ve had a number of other roles in the HFESA, including two terms on the Professional Affairs Board, a year as PAB chair and Board member, and most recently, chair of the 2003 conference committee. However the most demanding role I have undertaken was three years as Editor of Ergonomics Australia (thanks a lot Verna); however this was also the most satisfying. So a special plea: if you do nothing else to support the HFESA, please consider documenting what you do, and send it to the current Editor, Shann Gibbs.

Finally, while there are professional rewards, and great friends to be made through the HFESA, the society does not exist for the benefit of members. It exists to further the science and practice of Human Factors and Ergonomics within Australia. May I challenge you to use your gifts and talents to assist the HFESA to achieve this goal?

Best wishes,

Robin Burgess-Limerick
PhD CPE

We’ve changed our name...

I am pleased to inform you that the Ergonomics Society of Australia Inc, on the wishes of members present at the AGM 2003, decided to vote in favour of a name change. Our name is now the Human Factors and Ergonomics Society of Australia Inc.

The name change was due to a perception among members that the community thought of us primarily as being interested only in backs and chairs. Changing our name is a move towards a society that clearly embraces the full breadth of our multi-disciplinary nature.

For the time being, all post-nominals and the journal Ergonomics Australia will remain as they are currently.

Margaret Head
President
Happy New Year to all our HFESA members. I trust you are well rested and ready for a successful year ahead. 2003 flew by and already we are half way through January as I write. I hope 2004 will be a time of consolidation for members and provide our profession with many opportunities for identifying new areas of interest where we can make a positive difference.

After the 9/11 attacks of 2001 in the United States; and the constant reminders of terrorist activity now and into the future, much attention is being paid in Australia and elsewhere to the protection of critical infrastructure. These developments are underway now and there is a real need for the involvement of Ergonomists to represent the human factor in the safe design of structures and systems – taking an all-hazards approach towards designs that protect against not only terrorist attack but also fire, earthquake, flood etc. A multi-disciplinary approach to preventing disaster by including a range of professionals in the design of the built environment is essential if the best outcomes are to be achieved. I am sure you will agree with me that no expert panel attempting to address human variability within a system is complete without input from Ergonomists. The Society will be working to impress on Government and Industry the importance of ergonomics in preparedness, and design and safety. Watch this space.

During the holiday season I learned about the illness of one of our dearest, most distinguished colleagues, Barbara McPhee. Barbara is in the Mater Hospital in Newcastle receiving chemotherapy so if you can send her a get well card I’m sure she will appreciate it. I am sure you will join me in wishing Barbara a speedy and complete recovery.

A reminder: from time to time the Society is approached to give ideas or opinion to students undertaking research projects. It is important that the Society in providing such assistance is not unwittingly harmed. It is also important to keep in mind that professionals can be criticized when there is a lack of concordance between them. This usually occurs because they have been briefed differently. Because of the potential to unwittingly undermine our professional image I propose that the society develop some guidance on the topic which I shall take to the next teleconference.

In my role as President of this wonderful Society I have the opportunity to speak with many of our members, usually to explain the HFESA position on something of concern to the member. I have to say that speaking with our membership has been a most rewarding experience.

Margaret Head
President

IEA DELEGATE’S COLUMN
IEA Website – for news on the IEA and all the Standing Committees, click onto the website: www.iea.cc

This is the first report about the International Development Committee of the 2003-2006 IEA Executive.

It is my pleasure as the chair to thank the many members of the IEA who have volunteered their time to assist the promotion of ergonomics through this committee.

An Action Plan detailing the main projects is provided on the IEA website: www.iea.cc

News from our committee activities:

Section one: external agencies

1.1 ILO Ergonomics Instrument

The ID Committee has developed the review of ergonomics research and government programs to address MSD risks within the workplace. An extensive paper has been prepared on behalf of the IEA by Latrobe University (Melbourne) Australia. The principal author Dr Wendy MacDonald brought together research and review from an international team including members of the IEA technical committee on MSD.

The resulting paper has been accepted by the ILO and, once appropriate summaries are finalized, they will use this paper in the development of their draft Instrument. This is anticipated in 2004.

1.2 ILO Ergonomics Checkpoints

The ILO plans to relaunch a revised edition of this important publication at the IEA Congress, Maastricht in 2006. Members of the ID Committee, and their affiliates, are encouraged to forward any feedback and suggestions at their convenience. These can be forwarded to: davidcaple@pacific.net.au

1.3 ILO Ergonomics Checkpoints in Agriculture

Professor Kazu Kogi has been involved in a major IEA / ILO initiative relating to the development of checkpoints on ergonomics relevant to agriculture. This is a joint initiative between our organizations and involves co-operation with a range of IEA members.

1.4 ICOH / IEA Initiative on Ergonomics Guidelines

An active team involving Pat Scott (South Africa), Barbara McPhee (Australia), and Kazu Kogi (Japan), have been working on this joint publication. This is part of the occupational health guidelines to be disseminated through ICOH with assistance from the IEA.

1.5 HINARI Project

The IEA is working with the Health Inter Network Access to Research Initiative (HINARI) introduced by the United Nations and led by the WHO. See http://www.healthinternetwork.org/ for further information.
Section two: IEA twinning project

2.1 Netherlands Ergonomics Society (NVvE) Twinning Project in Indonesia. Pieter Rooikamker has reported on three projects being assisted in Indonesia, that include:

- Development of hand tool devices for agriculture applications.
- Looking at the implications within Bali after the Kuta disaster using a range of small scale ergonomics projects.
- Work with the ICT. The commitment from the Netherlands is initially for a three year project to be reported at the IEA Congress in Mastricht, 2006. We congratulate them for this initiative.

Section three: Training

3.1 Ergonomics Training in Africa

We are fortunate to have two separate programs happening in Africa as part of the ID program.

Firstly, Pat Scott and her team at Rhodes University are conducting ergonomics programs for Forestry workers in Natal. Pat has been the editor of the South African Ergonomics Journal, which has seen an increase in international coverage of recent times.

3.2 A separate program in Africa is being conducted by Houshang Shahnaz.

Details of his teaching program can be explored on his website: www.cedc.info. His current programs are being conducted in Botswana. Houshang has also a program in Iran.

3.3 Lena Karlquist (Sweden) has conducted an ergonomics program in India

This has been part of her work with the Institute for Working Life and specifically relates to the ergonomics issues facing children in the workforce.

3.4 Professor Gaur G Ray from India

Professor Ray has provided information through the Indian Society of Ergonomics (ISE) Newsletter on the successful activities at the ergonomics laboratory at Calcutta University. Ergonomics projects have been conducted in a wide range of industries including jute, railways, heavy engineering, cotton, tea and food processing. The products developed through the laboratory include protective shoes, shovel, harness for hand cart pullers, and hand tools for Jute mill workers.

3.5 Online Ergonomics Programs

The University of Lulea, Sweden is offering free places for their online ergonomics program in 2004. Contact them on www.cedc.info

Rhodes University, South Africa will have its online program ready by 2004. Check the IEA website for details of all the ergonomics education programs notified to the IEA from many countries across the world.

Section Four: Donations Program

4.1 IEA Donations Program

The ID Committee has been active in donating CD’s from conferences and ergonomics texts to ergonomics teaching locations in:

- Cuba
- Ukraine
- South Africa
- Northern Africa
- Colombia
- India
- Indonesia
- China
- Thailand
- Lithuania
- Brazil

CD’s have been provided from:

- SEAES 2003
- ODAM 2003
- IEA 2003

Many thanks to those conference Conveners who have arranged to make the CD’s and books available. If you are able to assist in identifying potential recipients of free access to journals from these countries, I would be delighted to hear from you.

David C Caple
Chair – ID Committee

Graduates with their teacher,
Queensland University December 2003

[David Bacon (NSW) M Erg,
Dr Robin Burgess-Limerick,
Catherine Cook PhD, and
Valerie O-Keeffe M Erg]
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Historically, there can be no doubt that some lifestyle factors such as better sanitation, improved housing, and improvements in food intake and water quality have contributed to this improvement, but less in this century. Weatherall (2) states it thus: “Until the nineteenth century, medical science did not make a great impact on the health of society, and many of the improvements over the centuries resulted from higher standards of living, better hygiene and other modifications of the environment. The picture has changed dramatically in this century....”

In amplification of that result, Whitworth (3) exemplifies the successful role of medical research in developing vaccines against such scourges as smallpox, diphtheria, whooping cough, polio, tetanus, measles and hepatitis B, and it seems clear that the greatest benefits in terms of increased life expectancy have been in the areas where the medical sciences have been most active, ie in the conquest of infectious and parasitic diseases.

One of the best examples of the effectiveness of health research is the reduction in deaths from tuberculosis. Causes of death are tabulated annually by the Australian Bureau of Statistics. Inspection of that collection (ABS Catalogue 3303.0) clearly shows that, in only half a century, this disease virtually has been eradicated as a major source of mortality. The results are shown in Table 2 and the contrast with injury is stark.

One consequence of that success deserves emphasis and is well stated in the 7th biennial report of the Australian Institute of Health and Welfare “Australia’s Health 2000” in these words: “This (success) has led to a major shift in the causes of death from infectious diseases to non-communicable diseases.” One of the major non-communicable diseases is that of unintentional injury, and Table 2 amply demonstrates that the non-communicable disease of accidental injury has lacked the benefit of research findings. The thrust of the argument in this paper is that Australia’s health research should now be re-aligned to combat this emergent threat.

THE FRAMEWORK FOR HEALTH RESEARCH

Which types of research have been more effective?

As a broad generalisation, research activities can be considered in a continuum ranging from “basic” to “applied”. Basic research is designed to provide new knowledge and not to answer the specific problems that are the target of most “applied” projects.
Relevant to the issues raised in this paper is the question as to which of these types of research has been the more effective in providing solutions to health problems.

In Australia, there was no doubt. In 1999, the powerful Health and Medical Research Strategic Review Report (the Wills Report) concluded, inter alia, that:

"Curiosity-driven, investigator-initiated, peer-reviewed fundamental research is the foundation of our current success and it must remain so. It must underpin our research effort as it does in other successful research countries."

This finding fits exactly with the classical work of Comroe and Dripps who reviewed some 4,000 published articles in cardiovascular and pulmonary medicine and surgery (their areas of expertise), published over a period of several decades. After identifying 529 essential or key articles, they concluded that basic research, where scientists sought knowledge for the sake of seeking knowledge paid off in terms of key discoveries almost twice as handsomely as all other types of research and development combined.

They specifically cited the work of Roentgen who, whilst studying a basic problem in physics with no connection to health, discovered x-rays which immediately became a vital tool for the diagnosis of many diseases and for the treatment of some others.

Although both these reports relate to medical research, their findings apply more widely. The value of investigator-initiated and investigator-driven research was strongly stressed by the National Research Council of the US National Academy of Sciences (1997) who cited the importance of basic research as the foundation for the later technical development of such everyday 20th century devices as cellular telephones, computers, lasers, satellites and optical fibre networks, amongst many others.

Whitworth stressed the important role of investigator-initiated and investigator-driven research by citing the effectiveness of the Salk vaccine in the conquest of poliomyelitis, the discovery of lithium as a treatment for manic depression, the value of hypertension research in preventing heart attack and stroke, and a host of others. She specifically cited the investigator-initiated and investigator-driven peer-reviewed research carried out by Sir Richard Doll whose pioneering work was designed to answer the question “Is there a link between smoking and cancer?” That work was not carried out in order to provide new knowledge.

The consequences of that new knowledge have resulted in massive beneficial changes in public health policies world-wide. For example, the Victorian “Quit” campaign, aimed to reduce the incidence of cigarette smoking, and strongly supported by successive governments from both sides of politics, has been spectacular. In 1945, 72% of adult males and 26% of adult females smoked. By 2001, these figures had been reduced to 25% and 21% respectively. (see: http://www.quit.org.au)

In sharp contrast Figure 1 shows that there has been no similar reduction in accidental deaths in Australia in the twentieth century. In the field of road trauma, deaths increased dramatically until the 1970s when the first programs of injury research were introduced. Figure 1 shows that, as a consequence of that research, motor vehicle traffic accident deaths have fallen from their peak figure of 3,952 in 1970 to 1,759 in 1999, a reduction of about 55% in the last quarter-century. This success throws into even stronger relief the lack of research and, hence, the unsatisfactory progress in other areas of accidental injury – including occupational injury. As shown in Figure 1, mortality from “all other accidents” has outstripped deaths from both road traffic accidents and infectious diseases in the two most recent quinquennia.

![Average annual mortality Australia 1905-99](Image)

Fig 1: Average annual mortality Australia 1905-99 [Source: Cause of Deaths, Australia. Canberra. Australia Bureau of Statistics. Catalogue 3303.0 Annual]
What types of research grant support have been more effective?

Although most good research is cost-effective in the longer term, it is also expensive. Hence, it requires major financial support, almost always from governments. As another broad generalisation, these funds can be administered in two ways. One way is from the relevant government department downwards: the other is from the scientific research community upwards in a competitive, peer-reviewed process.

In the former case, many Government departments quite understandably use research to solve problems that have arisen in their field of responsibility. They often detail the problem for which they seek improvements, such as at what height from the floor should fire extinguishers be mounted? The resulting activity can only very generously be described as research: it is more realistically designated as an ad hoc investigation.

The grant application process used by both the National Health and Medical Research Council (NHMRC) and the Australian Research Council (ARC) is quite different. Although Federal and State Departments of Health from time to time earmark funds to encourage research in a particular field, these projects — together with the other proposed projects — are reviewed and prioritised in a strictly scientific but highly competitive framework by the research community itself. Each investigator-initiated grant application is subject to review by the researcher’s peers who are well qualified to ask the hard questions. “What is your hypothesis?” and “What precisely do you wish to do?” “To which subjects?” and “With what expected outcomes?” “Have you the resources and the techniques to carry out this work?” and so forth.

Mayhew(9) has pointed out that OHS projects were poorly supported by both the NHMRC and the ARC in the year 2000 and suggested that “Investigator-initiated grants are very rare. The State authorities are now the major sponsors of OHS research but their capacity to support high-quality and long-term substantive studies is questionable”.

This author agrees. The essential point of this paper is that the peer review process of investigator-initiated and investigator-driven projects into infectious diseases has been the keystone of the hugely successful contribution to Australian health made by the medical research community in the twentieth century. It is now time for that system to be applied to the emerging problems of non-communicable diseases — including occupational injury. It is therefore relevant to review the current arrangements for occupational health and safety in Australia.

THE CURRENT ARRANGEMENTS FOR OHS RESEARCH IN AUSTRALIA

Any review of occupational safety research in Australia should start with an examination of the contribution of the National Occupational Health and Safety Commission (NOHSC). Such an examination leads to the conclusion that, since the mid-1990’s, that national contribution is somewhere on a scale between listless and lifeless. Two pieces of evidence are offered here, taken from the published works of Quinlan(10) and Wigglesworth(11).

Michael Quinlan is well qualified to discuss the research contribution of NOHSC since he was an expert member of its Research Standing Committee and has also acted as a referee for both ARC and NHMRC grants. He writes of his concern that “NOHSC’s role as a facilitator and leader of OHS research in Australia — arguably one of its most critical functions — is largely defunct”. He describes how, after the 1996 election, the NOHSC budget was cut by about a third, as one consequence of which there was a loss of about 75% of research staff, leaving only a “rump of researchers”.

Whilst applauding the sentiments expressed in the NOHSC document “National OHS Improvement Framework” he comments that “the brutal truth is that there is no NOHSC infrastructure left to achieve these laudable goals”. As a further consequence of this down-sizing, Quinlan makes the devastating comment that “decisions on what is and what is not research can be made by persons lacking the qualifications to make this judgement” and rightly expresses his concern about this unsatisfactory situation.

After a critique of the limitations of the competitive tender process, and the reasons why the NHMRC and ARC prefer a peer and panel review process, (which fit comfortably with the sentiments expressed in this paper), he offers a series of possibilities to overcome the present problems. With his fundamental ideas, there can be no quarrel: with his belief in the resurrection of NOHSC there must be some doubt. One reason is that it is now almost four years since his paper was published, and NOHSC has done little in that time to justify his faith. A second reason is that NOHSC has now been relocated in Canberra with an almost complete reduction in its research capability.

Hence, in the opinion of the present author, the time for NOHSC to support research in any meaningful and continuing way has now passed.

Quinlan’s qualitative comments are entirely in line with the quantitative results reported by Wigglesworth(12) who, in 1999, was asked by the Safety Institute of Australia to develop a Register of Research for work that had been completed in the previous five years in the field of occupational injury. By April 2000, some 300 responses had been received divided equally between those projects reported in peer-reviewed journals, and those with no publications. Only the former were included in the Register, which can be accessed at the Safety Institute’s website at www.sia.org.au.

The contribution from NOHSC was deemed disappointing since it included just 39 publications in refereed journals in five years. This was compared with the 1995 WorkSafe Research Report “Putting Research to Work 1993-94”. This listed 50 publications...
by NOHSC staff in peer-reviewed journals in that single year. Seeking reasons for this massive reduction in output, Wigglesworth wrote:

"The answer can be found in the restructuring of NOHSC that took place in 1996, which can only be described as unfortunate, scientifically unjustified and totally counterproductive to the task of reducing the toll of workplace injuries in Australia". His comment went on to describe this as "an abrogation of responsibility at the highest level. It seems almost inconceivable that any national government could so comprehensively turn its back on the research-based scientific methods of reducing injury that have been so successful in every other field of public health".(24)

Taken together, these reviews by Quinlan and Wigglesworth seem to suggest that the research contribution of NOHSC has now ended, and we should therefore hold a wake for its demise. Alternatively — and preferably — we could awake to the needs of occupational safety research which are fourfold. There are two scientific needs: conceptualisation and an adequate data set; and two infrastructure needs: adequate finance and a peer-review system of grant applications.

THE SCIENTIFIC NEEDS FOR HEALTH RESEARCH

Conceptualisation

The fundamental need is for occupational health and safety to be conceptualized as a public health and not as a behavioural or industrial relations problem. That conceptualisation is an essential prerequisite to permit the development of a program of rigorous, scientific research that will parallel the successful research programs in other areas of public health.

An adequate data set

A further essential requirement is for an appropriate enumeration. In simple terms, if we cannot count, then we cannot control. In more scientific terms, it is only after the substitution of quantitative measurements instead of qualitative judgements that an investigator is able to evaluate any particular initiative and to state the direction and extent of the results of that initiative. This basic strategy can only be implemented if there are comprehensive, compatible data on the incidence and distribution of occupational injuries. Currently in Australia these data seem not to be available.

What is required is a reliable count of the number of new cases each year for each jurisdiction, by age, gender, occupation and industry group of the injured person, by type of injury and by bodily location of injury and by two (or three) levels of severity (including mortality) and by hour of day and by day of week. Appropriate denominator data are also needed. All these measurements are factual. Such tables were produced annually by the Australian Bureau of Statistics (ABS) before the advent of WorkSafe, and it may therefore be appropriate to ask the ABS to resume that collection.

The point is of more than academic importance. Australia is a logical site for intervention studies. The federal system of government leaves much scope for legislative and other OHS innovations at State Government level. This situation permits innovations by one State to be evaluated using data from one or more non-participating States as a control. Precisely this technique was used by a veritable host of road safety research workers(18-21) to measure the effectiveness of mandatory seat belt use following the pioneering legislation introduced in Victoria in 1970. An equivalent opportunity to evaluate new strategies in OHS can only be utilised if there are uniform comprehensive nation-wide data.

Until those data are readily available, and are on a par with those available for road trauma, Australian workers will continue to be subject to an unnecessarily high level of personal injury. Additionally, the business community will continue to be saddled with the massive financial consequences of these avoidable injuries.

THE INFRASTRUCTURE NEEDS FOR HEALTH RESEARCH

Financial support

The need for adequate financial support is self-evident. A useful guide to quantum can be found in the paper by Moller and Cantwell(24). They reported that in 1995-96, research spending on cancer and heart disease were each about 1% of health care costs in these fields. This suggests that research on the third leading cause of death — accidental injury — should also be supported by research funds of about 1% of those costs. As workplace injury and illness is estimated to cost $25 billion or more(20), this implies an annual fund of around $250 million.

Unfortunately, the lack of support for occupational health and safety research in previous years means that Australia does not have the depth of research expertise that could beneficially utilise a fund of this size. Instead, it is here suggested that a much smaller fund of $25 million — or about one tenth of 1% of the costs of workplace injury — be allocated annually by the Federal Government for research into occupational health and safety.

This meagrely sum would help bridge the gap between Australia and the United Kingdom where annual spending on occupational research approximates £20 million (£AUS50 million)(25), and also between Australia and the United States where occupational research funding slightly exceeds $US212 million ($AUS280 million)(23).

Peer review

“Curiosity-driven, investigator-initiated, peer-reviewed fundamental research is the foundation of our current success and it must remain so. It must underpin our research effort as it does in other successful research countries.”(26)

This requirement seemingly precludes the National Occupational Health and Safety Commission with its orientation to tripartism. That orientation was strongly criticised in the McKay Report (25) which suggested that “Expertise rather than tripartism should be the principal criterion”. Additionally, given the virtual elimination of its research capability described by Quinlan(18) there seems little...
likelihood of that organisation attracting the expertise necessary to carry out that role in any reasonable timescale.

The need is for a similar administrative structure to that of the NHMRC. One obvious candidate is the NHMRC itself with its proven track record, its huge expertise in assembling peer-review teams to assess applications, and the high regard in which it is held by the Australian community. To extend its brief into occupational safety would be a relatively small step. In this context, it is pertinent to point out that, in America, the National Institute of Occupational Safety and Health (NIOSH) is part of the Centers for Disease Control and Prevention, itself an agency of the Department of Health and Human Services.

**OCCUPATIONAL HEALTH AND SAFETY RESEARCH — AN OVERSEAS MODEL**

There is an excellent overseas model that testifies to the value of occupational health and safety research. In 1996, the Swedish Council for Worklife Research published a book entitled “Fifteen years of occupational accident research in Sweden” and the preface to the book states:

“Swedish occupational accident research has both breadth and expertise and is of high quality from an international perspective. The researchers describe perspectives and approaches, theoretical models, practical methods and preventive aids. Their joint contribution to knowledge and understanding comes from a variety of disciplines, including medicine, technology, psychology and education. Research and development with roots in the workplace itself are coming ever more into focus.”

Against this background, it is pertinent to examine the Swedish experience. In this context, the following ten-year data for Labour Market Insurance, shown in Table 3 are relevant.

<table>
<thead>
<tr>
<th>Year</th>
<th>Absence Absence</th>
<th>Impairment</th>
<th>Impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8–30 days</td>
<td>&gt;30 days</td>
<td>1-15%</td>
</tr>
<tr>
<td>1987</td>
<td>17,627</td>
<td>13,100</td>
<td>4,823</td>
</tr>
<tr>
<td>1997</td>
<td>12,815</td>
<td>6,829</td>
<td>2,876</td>
</tr>
</tbody>
</table>

Table 3: Trends in work-related injuries 1987 – 1997 in Sweden (Source: Swedish Council for Worklife Research)

**CONCLUSION**

The present arrangements for research into occupational health and safety in Australia are somewhere on a scale between nebulous and negligible. Perhaps we should hold a wake in recognition of this situation, and continue to subject Australian workers and Australian industry to a totally unnecessary burden of avoidable injury and avoidable injury costs respectively.

Alternatively we could suggest that this is now the time for Australia to awake and to emulate the occupational research activities of its overseas competitors and to support research projects into this field in order to reduce the current toll — and the financial burden — of occupational injury. The overseas activities point the way.

That approach is suggested in this paper.

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Research Reports

(1) A COMPARISON OF METHODS USED FOR MEASURING POPLITEAL HEIGHT

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ABSTRACT
Popliteal height is the main anthropometric dimension used in school chair design and specification to determine appropriate seat height. Three methods of measuring popliteal height – anatomical, table (weight-bearing) and knee-crease methods were investigated in a sample of 10 university students measured twice by each of two observers. Inter- and intra-observer repeatability for each method was good with the exception of inter-observer repeatability for the knee-crease method which was poor. The knee-crease method was not considered repeatable enough for it to be of practical use. Popliteal height measurement obtained using the table method was significantly greater than the other two methods by between 63 and 89 mm (3.7% – 5.3% of stature). In this small sample no variation was detected in the difference between the methods in relation to the size of the individual. Implications for specification of school chairs are discussed.

INTRODUCTION
Popliteal height is the main anthropometric dimension used in school and other chair design and specification to determine appropriate seat height. In designing a chair to suit a population, the popliteal height is used to ensure that members of the population are able to sit with their feet supported on the floor, and without undue pressure behind the knees. Likewise, comparing the popliteal height of an individual to the seat height of the available chairs can assist in selecting the most suitable size for that individual. Popliteal height can be measured using different methods. The majority of anthropometric data on popliteal height data has been produced using an anatomically based method of measurement (Pheasant, 1992), however there are questions as to whether this is the best method on which to base seat height of a chair. A weight-bearing “table” method of measuring popliteal height has been advocated as providing a more functional indication of appropriate seat height (Molenbroek et al., 2003). Alternatively, the height of the crease at the back of the knee in standing has been proposed as an easier method for use by teachers untrained in anthropometric measurement to assign the appropriate size chair for school children. Measurements taken using these different methods are all called popliteal height and have been referred to as if all were measurements of the same parameter. The different methods of measurement however measure different things and the values obtained are potentially quite different.

In order to better understand the relationship between measurements taken by the three methods and the usefulness of each method, a small pilot study was undertaken to determine the following:
1. the inter- and intra-observer reliability of the three methods;
2. whether there is a significant bias (consistent difference) between the three methods;
3. if there is a bias, whether it is constant or varies with the size of the individual.

METHOD
The sample consisting of ten volunteer university students (4 male, 6 female; mean weight = 65 kg, SD =12 kg; mean stature = 170 cm, SD = 8 cm), had their popliteal height measured on a single day by two observers, one a Musculoskeletal Physiotherapist and the other a secondary school student. Each observer measured the unshod right leg of each subject using each of the three methods – anatomical, table, and knee-crease methods, and then repeated the three measurements on that subject. Although blinding is not possible for one observer performing repeated measures, an attempt was made to minimise the likelihood of observer bias by each measurement being recorded on a separate sheet and each observer taking measurements of the same subject using the two other methods before repeating any measurement.

For the anatomical method, the popliteal height was measured with the subject in an upright sitting position as the vertical distance from the insertion of the biceps femoris tendon to the floor (Pheasant, 1992). Variations of this method have been reported in the literature including that used by Parcells et al. (1999) and Legg et al. (2003) who measured to the less clearly defined “posterior surface of the knee or popliteal space”. For the table method, subjects were seated on a horizontal table with the back of their knees near the edge and their lower leg vertical. A second horizontal surface was raised until the subject’s foot was resting on it. The measurement was taken as the vertical distance from the tabletop to the horizontal surface under the subject’s foot (Molenbroek et al., 2003). For the knee-crease method, the subject was standing next to a sheet of paper taped to a wall. The height of the knee-crease on the lateral side of the knee was marked on the paper and the distance from this mark to the floor was recorded.

For assessment of reliability, each measurement was treated individually resulting in 20 repeated measures. The inter- and intra-assessor reliability was assessed by two methods. Intra-class correlation coefficients (ICC) were performed to give an indication of the degree of correlation between repeated measures. Intra-class correlation coefficients however do not indicate the bias or the size of the difference resulting from measurements by the two methods. To indicate the size of the bias between the two repeated measures, repeatability coefficients (Bland & Altman, 1999) were also calculated. The repeatability coefficient (Equation 1) indicates the range within which 95% of repeated measurements would be expected to lie and is expressed in the same units as the original measurement.
Equation 1

95% repeatability coefficient = 1.96 \sqrt{2} \times S = 2.77S

Where S is the within subject standard deviation

For comparing the three methods the averages of the two repeated measures for each method by each observer were used for analysis again making a total of 20 measurements for each method. Means and standard deviations for popliteal height in millimetres as well as a percentage of stature were calculated for each method of measurement and Student’s t-tests were used to compare the groups. The approach of Bland and Altman (1999) was also used to compare the methods of measurement as it is able to provide an indication of the size and uniformity of differences between methods. Using this method the difference between measurements of the same subject by the two methods is calculated. The mean of these differences is the bias or how much the measurements by one method vary from those of another. The standard deviation and 95% confidence interval of the mean can then be applied to the bias giving the interval within which we can reasonably expect the actual bias to lie. It is important to note that the confidence interval is different from the repeatability coefficient described above. The confidence interval relates to the group bias, whereas the repeatability coefficient relates to the difference between a pair of measurements (no bias would usually be expected between the means of repeated measures using the same method). The difference between the measurements by each pair of methods can then be plotted against other factors which might influence the size of the bias - in this case popliteal height (expressed as the average of the two methods) or stature. If the difference between the two methods appeared to be related to popliteal height a regression analysis would be performed to quantify the relationship. Statistical analysis was performed using SPSS v.12.0 with significance levels were set at .05 for all tests.

RESULTS

Correlation coefficients and inter- and intra-observer repeatability coefficients for each method are shown in Table 1. All three methods demonstrated good inter-observer reliability with the anatomical method being superior to the other two. Both the anatomical and table methods also showed good intra-observer repeatability with the anatomical method again being superior. The knee-crease method however showed poor intra-observer repeatability with 95% repeatability coefficient of nearly half the measured popliteal height.

<table>
<thead>
<tr>
<th>Method</th>
<th>Repeatability coefficient (F-test value)</th>
<th>ICC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomical</td>
<td>± 25mm</td>
<td>.91 * (14.2)</td>
</tr>
<tr>
<td>Table method</td>
<td>± 51mm</td>
<td>.86 * (7.3)</td>
</tr>
<tr>
<td>Knee-crease</td>
<td>± 57mm</td>
<td>-.50 (.7)</td>
</tr>
</tbody>
</table>

Repeatability coefficient indicates the range within which 95% of repeated measures would be expected to lie.

*indicates significant correlation (p < .05)

Table 1: Inter- and intra-observer repeatability coefficients and correlation coefficients for each measurement method

The means and standard deviations for each method of measurement expressed in millimetres and as a percentage of stature are shown in Table 2. A comparison between the anatomical method and the other two methods showing the bias and the 95% confidence interval of the bias is shown in Figure 1. The popliteal height measured using the anatomical method was less than that measured by the anatomical method by 76 mm (95% confidence interval 63 – 89 mm) or 4.5 percent of stature (95% confidence interval 3.7 – 5.3 %) while the anatomical method was 19 mm (95% confidence interval -3 mm - 41 mm) or 1.2% (95% confidence interval -0.1% - 2.5%) less than the knee-crease method. No significant differences were detected in the bias in relation to popliteal height or stature.
Table 2: Popliteal heights for each measurement method

<table>
<thead>
<tr>
<th>Method</th>
<th>Popliteal Height (SD)</th>
<th>Popliteal Height as percentage of stature (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomical method</td>
<td>443 mm (36 mm)</td>
<td>26.2% (1.4%)</td>
</tr>
<tr>
<td>Table method</td>
<td>519 mm (49 mm) *</td>
<td>30.7% (1.9%) *</td>
</tr>
<tr>
<td>Knee-crease method</td>
<td>462 mm (48 mm)</td>
<td>27.4% (2.5%)</td>
</tr>
</tbody>
</table>

* Table method was significantly different from both anatomical and knee-crease methods (p < .05) when expressed either in millimetres or as a percentage of stature.

Figure 1: Comparison of popliteal height measured by the anatomical and the table methods and anatomical and knee-crease methods. The difference between the measurement obtained by the two methods is plotted vs the mean of that pair of measurements. The mean of the differences is the bias between the two methods of measurement. The 95% confidence interval is the range within which one can expect the actual bias to lie. Although the number of samples is small there is no apparent variation in the size of the bias with increasing popliteal height.
DISCUSSION

This study set out to clarify the usefulness of three methods of measuring popliteal height. In order for a measurement to be useful, it must not only be reproducible, but also be relevant to the objective for which the measurement is being used. The knee-crease method was included in this study as it had been proposed as a simple means to assess students for appropriate chair size by school staff who are untrained in anthropometric measurements. The intra-observer repeatability however was unacceptable.

A possible reason for the larger variation in the measurements taken using the knee-crease method is that it may be difficult for observers without training to determine the point of the knee crease from which to take the measurement. The knee-crease is not horizontal, but rather is typically higher laterally than medially and may continue beyond the posterior surface of the knee. Although the mean for the knee-crease method was not significantly different from the anatomical method, the high variability of the knee-crease method combined with its lack of relation to a functional dimension would indicate that it would not be useful as a quick method for untrained personnel to use for assessing popliteal height in the school setting.

The remainder of the discussion will thus concentrate on the two remaining methods — the anatomical and table methods. The repeatability for both of these methods of measurement was good, with the anatomical method demonstrating better repeatability for both inter- and intra-observer comparisons. The bias of 63 mm to 89 mm between these two methods is surprisingly large considering that the average popliteal height measured by the anatomical method was less than 450 mm 1.

One would expect this bias between the two methods of measurement to vary with the size of the individual e.g. to be longer in taller individuals. For this small sample size of skeletally mature subjects, however there was no detectable variation in the bias with increasing height. Other factors that were not included in this study could also affect the difference between the methods of measurement. An individual of the same height with a higher body mass index would be unlikely to have a different reading using the anatomical method, but may, as a result of having thicker thighs have a lower measurement on the table method. Further data with a larger sample size over a greater range of ages and sizes would be necessary in order to clarify the factors affecting the bias or to determine if it is possible to accurately convert a measurement by one method to the equivalent of that taken using another method.

The question remains as to which method of measurement is more useful for determining the appropriate seat height for a population or the fit of an individual to a fixed height chair such as a school chair. The anatomical method has good repeatability as the location of the insertion of the biceps femoris tendon used for the anatomical method provides a distinct landmark and is easy to access on the outside of the leg. It is less clear what relevance this point has for determining the appropriate seat height. The biceps femoris tendon is not the first part of the posterior thigh to contact a chair seat, as the tendons on the medial side of the knee are lower. Neither is the biceps femoris tendon particularly sensitive to pressure or compression. A seat height such that biceps femoris insertion is contacted by the front of a chair would not produce compression of the nerve or vascular structures in the popliteal space, but it is not clear how much higher the seat could be before such compression occurred.

The table method on the other hand relates directly to the function of seating by measuring the maximum height of a flat seat that will enable the user to sit with their heels on the floor (if the seat is flat and extends to immediately behind the knees). Sitting in this way, however would produce undue pressure on the nerve and vascular structures in the popliteal space. In practice and according to the current and proposed Australian standards for school chairs the front edge of the seat is rounded and seats do not extend to immediately behind the knee. The maximum height of the front of a seat that would enable an individual’s feet to reach the floor would therefore be somewhat different from the height measured by the table method. In spite of this the table method of measuring popliteal height would seem to provide the best starting point from which to determine the maximum allowable seat height for school chairs. A correction factor would need to be applied to the popliteal height measured by the table method to ensure prevention of unwanted pressure in the popliteal space and to allow for the effects of shorter rounded seats used in the actual school chairs.

While it is not possible to determine the maximum front of seat height directly from any of the popliteal height measurements, for a particular individual the table method provides an approximation of the maximum height of the front of a seat. The appropriate seat height would also be affected by factors including the body mass index of the individual and the angle, depth and contour of the seat and can probably only be accurately determined by an individual sitting in a particular chair.

CONCLUSION

The knee-crease method of measuring popliteal height did not demonstrate the level of repeatability necessary for it to be a useful method. The anatomical and table methods demonstrated good repeatability, but produced quite different measurements of popliteal height.

The different methods of measuring popliteal height are not interchangeable and further data would be necessary to be able to convert a measurement taken using one method to its equivalent using another method. The table method would appear to have face validity as the most appropriate method on which to base dimensions for sizes of school chairs. Measurements of populations or individual students taken using any of the methods however may not provide sufficient information to adequately specify the most appropriate seat height.

1 The reader can appreciate the size of the difference on themselves. Sit on a table or desk with the back of your knees near the edge and your feet unsupported and your heel against the table leg. Lift one knee until the biceps femoris tendon — the hamstring tendon on the lateral side of your knee — just lifts off the table. The distance your heel has moved is the difference between the popliteal height measured by the table and anatomical methods.
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(2) MUSCULOSKELETAL DISORDERS AMONG CHINESE NURSING STUDENTS: RESULTS FROM A PILOT STUDY
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ABSTRACT
Although nursing students may be affected by Musculoskeletal Disorders (MSD), no research from Mainland China has yet been published in the English-language literature. Therefore, we investigated MSD among students within a typical Chinese nursing school using a questionnaire survey. By location, lower back MSD was the most common condition, affecting 28.1%. This was followed by MSD of the feet (19.3%), neck (15.8%), knee (12.3%), shoulder (8.8%), wrist (8.8%), upper back (7.0%) and upper legs (5.3%). The period-prevalence of any MSD over the past 7-days was 31.6%, and over the past twelve months 49.1%. Students reporting an MSD within the previous seven days were more likely to report an MSD occurring in the previous twelve months (OR 6.0, 95%CI 2.5 – 21.5, P = 0.0079). Depression was found to increase the risk of any twelve month MSD nine times (OR 9.0, 95%CI 1.6 – 74.7, P = 0.0198), as too, increasing BMI (OR 11.9, 95%CI 1.3 – 142.3, P = 0.0357). Interestingly, undertaking regular exercise reduced the twelve month MSD risk among students within our investigation (OR 0.1, 95%CI 0.02 – 0.5, P = 0.0090). Overall, this pilot study provides some interesting ergonomics data regarding Chinese nursing students, for what appears to be the first time.

Keywords: Student nurse, musculoskeletal disorders, China, low back pain, survey

INTRODUCTION
Previous studies have shown that nursing students and nursing school applicants may be affected by Musculoskeletal Disorders (MSD) at reasonably high rates. To our knowledge however, there has been no research from Mainland China published in the English-language literature. As questionnaires represent a common method for collecting ergonomics data, we chose to investigate MSD among students within a typical Chinese nursing school using such a protocol.
METHODS

This investigation involved an epidemiological analysis of MSD among nursing students with data gathered by means of a self-reporting questionnaire. We selected a hospital-based nursing school from Shijiazhuang city in Hebei province, China, whose members were fairly typical of Chinese nursing students in general. Shijiazhuang is a regional city of around 1 million people, located approximately 250 km south of Beijing. Our Chinese-language questionnaire comprised a three-page anonymous form, including questions such as age, sex, year of study and various demographic items. Other questions focussed on the occurrence of MSD symptoms at specified body sites over the last seven days and the previous twelve months. As Chinese nursing students begin their hospital practicum in the 2nd year, all participants were currently working at the teaching hospital. Surveys were distributed to all students within our nursing school and collected on the same day. Data was entered into a common spreadsheet program before being analysed by statistical software. Descriptive statistics were calculated and logistic regression was also performed to determine possible risk factors (Cochran Mantel-Haenszel method). Results were expressed as odds ratios (OR) with 95% confidence intervals (95%CI) and probability (P) values. Odds ratios were evaluated using separate models and adjusted for age and year of study in the nursing course. Probability values (P) below 0.05 were considered statistically significant throughout.

RESULTS

A complete group of 57 nursing students were recruited from the hospital component of a university nursing school in Hebei province, China. There were two grades of student, with each group comprising roughly half of the total (2nd years: 47.4% and 3rd years: 52.6%). All students were female and there were no tobacco smokers. Alcohol consumption was very low, with only 7.0% reporting any. Their mean age was 21.1 years (SD 0.9), height 161.6 cm (SD 3.5), weight 53.0 kg (SD 4.9) and Body Mass Index (BMI) 20.3 kg / m2 (SD 1.8). Refer to Table 1.

<table>
<thead>
<tr>
<th>Demographics</th>
<th>n (%) a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>4 (7.0)</td>
</tr>
<tr>
<td>Tobacco</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Depression</td>
<td>48 (84.2)</td>
</tr>
<tr>
<td>Exercise</td>
<td>40 (70.2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year of study</th>
<th>n (%) a</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd year</td>
<td>27 (47.4)</td>
</tr>
<tr>
<td>3rd year</td>
<td>30 (52.6)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean ± SD</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>21.1 ± 0.9</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>161.6 ± 3.5</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>53.0 ± 4.9</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>20.3 ± 1.8</td>
</tr>
</tbody>
</table>

Table 1: Demographic items

Seven day Twelve month

<table>
<thead>
<tr>
<th>Upper body</th>
<th>n (%) a</th>
<th>n (%) a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck</td>
<td>4 (7.0)</td>
<td>9 (15.8)</td>
</tr>
<tr>
<td>Shoulder</td>
<td>2 (3.5)</td>
<td>5 (8.8)</td>
</tr>
<tr>
<td>Upper back</td>
<td>3 (5.3)</td>
<td>4 (7.0)</td>
</tr>
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<table>
<thead>
<tr>
<th>Trunk</th>
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<tbody>
<tr>
<td>Elbow</td>
<td>1 (1.8)</td>
</tr>
<tr>
<td>Wrist</td>
<td>1 (1.8)</td>
</tr>
<tr>
<td>Lower back</td>
<td>8 (14.0)</td>
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</table>

<table>
<thead>
<tr>
<th>Lower body</th>
<th>n (%) a</th>
</tr>
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<tbody>
<tr>
<td>Upper leg</td>
<td>6 (10.5)</td>
</tr>
<tr>
<td>Knee</td>
<td>3 (5.3)</td>
</tr>
<tr>
<td>Feet</td>
<td>6 (10.5)</td>
</tr>
<tr>
<td>Any MSD</td>
<td>18 (31.6)</td>
</tr>
</tbody>
</table>

Table 2: Musculoskeletal disorder prevalence

Around half the students (49.1%) reported some type of MSD affecting them over the previous 12-month period. By location, lower back MSD was the most common condition, affecting 28.1%. This was followed by MSD of the feet (19.3%), neck (15.8%), knee (12.3%), shoulder (8.8%), wrist (8.8%), upper back (7.0%) and upper legs (5.3%). There were no statistically significant differences in MSD prevalence by year of study.

The seven day period prevalence of MSD was also reported by students at rates as follows: lower back (14.0%), upper leg and feet (both 10.5%), neck (7.0%), upper back and knee (both 5.3%), shoulder (3.5%) and finally, MSD of the elbow and wrist (both 1.8%). The period-prevalence of any MSD over the past seven days was 31.6%, and over the past twelve months 49.1%.

Refer to Table 2 and Figure 1.
Table 3: Risk factors associated with MSD at any site over the past twelve months

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Category</th>
<th>OR  (95% CI)</th>
<th>P value</th>
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</thead>
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<tr>
<td>Previous MSD</td>
<td>No</td>
<td>1.0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>6.0 (1.7 – 25.1)</td>
<td>0.0079</td>
</tr>
<tr>
<td>Depression</td>
<td>No</td>
<td>1.0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>9.0 (1.6 – 74.7)</td>
<td>0.0198</td>
</tr>
<tr>
<td>Regular exercise</td>
<td>No</td>
<td>1.0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>0.1 (0.02 – 0.5)</td>
<td>0.0090</td>
</tr>
<tr>
<td>Increasing BMI</td>
<td>All</td>
<td>11.9 (1.3 – 142.3)</td>
<td>0.0357</td>
</tr>
</tbody>
</table>

* risk factors calculated using logistic regression and expressed as odds ratios (OR), 95% confidence intervals (95%CI) and probability (P) values (odds ratios adjusted for age and year of study in the nursing course), * percentage of all students in each subcategory (N=57), * previously reporting an MSD over the last 7-days, * odds ratio calculated using a continuous variable with increasing increments of 1 kg/m²
DISCUSSION

As twelve months represents the most common recall time-frame within ergonomics studies, the following discussion focuses on that particular segment of our data. With roughly half the group (49.1%) reporting some kind of MSD in the past twelve months, our result was lower than a previous study conducted in Australia (80.0%) \[11\], but higher than other studies from Japan (21.6%) \[24\] and (36.9%) \[23\]. Low Back Pain (LBP) represented the most common body site among students in our study, having been reported by 28.1% of them. This result is lower than two previous Australian investigations (67%) \[12\] and (59.2%) \[13\], but higher than that documented among nursing school applicants in Finland (31% to 42%) \[17\]. When compared to working nurses, LBP among our students was lower than research conducted on British (38%) \[16\], Japanese (54.7%) \[19\] and Swedish hospital nurses (56%) \[20\]. Interestingly, LBP was also less frequent among young Chinese nursing students than that self-reported by young Australiains in a previous study (34%) \[20\].

MSD of the ankles and feet was the second most frequently reported category among our group (19.3%). As such, it is higher than previous studies of both Japanese (1.8%) \[22\] and Australian (16.5%) \[21\] nursing students. Alternatively, a relatively low proportion of the Chinese students reported neck MSD (15.8%). Previous investigations have revealed a higher prevalence of this disease among working nurses in Japan (31.3%) \[20\], the United States (45.8%) \[14\] and Sweden (48%) \[14\]. Neck MSD also affects non-nurses, with the prevalence among general Swedish workers reported at (43%) \[21\]. Interestingly, MSD of the shoulders was not commonly reported during this study (8.8%), which is lower than a previous study of Japanese students, where it affected 14.9% \[23\]. Our result was also lower than another student nurse investigation within rural Australia, where almost one-quarter (23.9%) reported this condition in the previous 12 months. \[20\]

Various MSD risk factors were identified during the current study, many of which were consistent with previous ergonomics research. Although arduous physical work is often believed to be the most important risk factor for MSD, contemporary literature has begun highlighting the complicity of various psychosocial and personal attributes. Among them, psychological distress, \[30\] demographic conditions \[30\] and psychosocial factors \[30\] have all been mentioned. Our finding that regular exercise offers a protective effect against MSD is also consistent with other demographic conditions \[31\] and \[32\] and psychosocial factors \[33\]. It is important to interpret our results with caution however, as the overall sample size was rather small.

ACKNOWLEDGEMENTS

We are grateful to all the student nurses who participated in this study, and also to Dr Sa Tang from the University of Yamanashi in Japan for her assistance with questionnaire development. Derek Richard Smith was the recipient of a Japan Society for the Promotion of Science (JSPS) post-doctoral fellowship throughout this project.

REFERENCES

New Members

**December 2003 & January 2004**

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<tr>
<th>Name</th>
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<tr>
<td>Alex Doyle-Bogicevic</td>
<td>ACT M</td>
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</tr>
<tr>
<td>Phillipa Duel-Piening</td>
<td>VIC A</td>
<td>No</td>
</tr>
<tr>
<td>Janelle Samuels</td>
<td>QLD A</td>
<td>No</td>
</tr>
<tr>
<td>Shi Kai Tan – SA Prize winner</td>
<td>SA A</td>
<td>No</td>
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<tr>
<td>Emma O'Neil – SA Prize winner</td>
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<td>No</td>
</tr>
<tr>
<td>Nicolas Coleman</td>
<td>NSW M</td>
<td>No</td>
</tr>
<tr>
<td>Belinda Cox</td>
<td>QLD CPE</td>
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**February 2004**

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<tr>
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<tr>
<td>Ellen Rigbye</td>
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<tr>
<td>Ron Lo</td>
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<tr>
<td>Alan Brindley</td>
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</tr>
<tr>
<td>David Trembearth</td>
<td>VIC CPE</td>
<td>Yes</td>
</tr>
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**Correction:**

A new member listed in September 2003 edition of *Ergonomics Australia* has alerted the Secretariat that she was recorded as being in NSW. This is incorrect as she lives in Victoria and has asked that the directory be so amended.

Susan Leonard-Brown
12 Menzies Ave.
BRIGHTON, Victoria 3186

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**Noticeboard**

**CALLING ALL VICTORIAN WORKPLACES**

As part of the annual Work Safe Week for 2004, we are looking for those Victorian workplaces that are keen to improve their health and safety, to enter this year’s WorkSafe Victoria Awards.

There are seven award categories. Some of these encourage the development of solutions to health and safety problems, while other categories are concerned with recognising those who have demonstrated leadership with their role.

The Awards recipients and finalists for 2003 that were showcased at the WorkSafe Awards dinner were of a very high quality.

So if you know an organisation or individual, a colleague or client, that has made a significant contribution to a safer or healthier workplace they may be eligible for a WorkSafe Victoria Award. You are encouraged to pass on this information.

You are invited to call Terry Crosby, WorkSafe Victoria, to discuss your award application on: 613 9641 1365.

The closing date for applications is 21st May 2004.

Entry forms can be obtained by telephoning 613 9641 1365 or you can download copies from www.workcover.vic.gov.au.

The WorkSafe Victoria Awards are WorkSafe’s way of recognising individuals and organisations that make a difference and are committed to making work safe, together.

**HFESA 2004 PHOTOGRAPHIC COMPETITION**

Timing of events in 2004 has alerted some people to the fact that the dates given in the Inaugural Photographic Competition Announcement in December Ergonomics Australia must be changed! The HFESA conference will be held in Cairns in August this year rather than the more usual end of year event. The 8th October deadline as announced therefore must be altered.

PLEASE NOTE:

As the HFESA Conference will be held August 23–25, entries for the photograph competition will close June 30, 2004. Other than the change of date the program remains as advised.

**THE IEA-LIBERTY MUTUAL PRIZE IN OCCUPATIONAL SAFETY AND ERGONOMICS**

The IEA is inviting applications for the 2004 Liberty Mutual Prize

Submission deadline: April 1, 2004

Through this prestigious award, the IEA seeks to recognize outstanding original research leading to the reduction or mitigation of work-related injuries. The main criteria include significant advancement of theory and understanding, innovation and development of new directions or approaches.

The award recipient will receive a prize of $5,000. In addition, the award recipient will be automatically competing for the 2004 Liberty Mutual Medal. The Medal, carrying an additional stipend of $15,000, will be awarded during the IEA Triennial Congress in 2006 (Maastricht, The Netherlands) to the best of the 2004, 2005 and 2006 Prizewinners.

Applicants need not belong to the IEA or any of its constituent groups. Relevant disciplines include ergonomics, epidemiology, biomechanics, cognitive and behavioural psychology, design, physiology, medical sciences, economics, engineering, etc.

**Submission Requirements**

To be considered for the Liberty Mutual Prize, the applicant must submit a letter of application and a research paper in the domain of accident prevention, injury reduction and/or early return to work, including rehabilitation by April 1, 2004.

The paper must:

- be scholarly in nature such as an original paper describing laboratory, field, or intervention research (see Q&A for further elaboration)
- contain non-proprietary data
- be unpublished at the time of submission (but may be in press)
- be thirty pages or less, single-spaced using point size 12 with 1 inch margins

The paper should address the following topics:

- contributions of the research to theory, i.e., how the work had advanced the understanding of the causes of accidents and/or ability to mitigate occupational injuries or disability
- aims of research
- originality and creativity
- study methodology
- implications for risk reduction
The cover letter should highlight:

- main innovative aspects of the study (e.g., approach, methodology, analysis, etc.)
- anticipated contribution to occupational safety

An International Review Committee established by the IEA will select the winning contribution.

The authors of the winning paper are expected to submit the paper to Ergonomics for publication. The authors may make a case to have the paper submitted to an alternative journal for publication.

Submission process:

Persons wishing to be considered for the 2004 prize should submit an application, including separate cover letter and paper, both in electronic format, to the IEA Awards Committee Chair at the following address:

Prof. Waldemar Karwowski
Chair, IEA Awards Committee
Center for Industrial Ergonomics
Lutz Hall, Room 445
University of Louisville
Warnock Street
Louisville, KY 40292, USA
Tel +1 502 852 7173
Fax +1 502 852 7397
karwowski@louisville.edu

The deadline for receipt of applications is April 1, 2004. Applicants should be notified of the results by mid-June.

Announcement of the award winner will be made public in July 2004.

If you require additional information, please do not hesitate to contact the IEA Awards Committee Chair at the above-noted address.

---

HFESA HONOURS & AWARDS 2003
Award Recipients 2003 – Nominations and Notes

<table>
<thead>
<tr>
<th>Award Name</th>
<th>Recipient(s)</th>
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<tr>
<td>Ron Cumming Memorial Lecture Medal</td>
<td>Lynn McAtamney</td>
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<tr>
<td>Society Medal</td>
<td>Robin Burgess-Limerick</td>
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<tr>
<td>Ken Provins Award – best poster at conference</td>
<td>Jennifer Long and Carmen Sui for Best Poster 2003 ESA Conference entitled:</td>
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<td>Two practical tasks for assessing depth perception at near distance –</td>
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<td></td>
<td>Comparison of human performance under monocular and binocular conditions.</td>
</tr>
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<td>Alan Welford Award</td>
<td>Leon Straker, Andrew Briggs &amp; Alison Greig</td>
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<td></td>
<td>The effect of individually adjusted workstations on upper quadrant</td>
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<td>posture and muscle activity in school children</td>
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<td>David Ferguson – Best student project</td>
<td>Grace P. Y. Szeto – PhD Thesis entitled</td>
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<td></td>
<td>An analysis of posture, muscle activity and keyboard dynamics in computer</td>
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<td>users with and without work-related neck and upper limb disorders</td>
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<tr>
<td>Gitte Lindgaard (CHISIG)</td>
<td>Andy Crabtree, Terry Hemmings, Tom Rodden (all Uni of Nottingham, UK)</td>
</tr>
<tr>
<td></td>
<td>and Keith Cheverst, Karen Clarke, Guy Dewbury, John Hughes, and Mark</td>
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<td>Rouncefield (all Lancaster Uni UK)</td>
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<td></td>
<td>Designing with Care: Adapting Cultural Probes to Inform Design in Sensitive</td>
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Conference Calendar

2004

19–22 May 2004
– Occupational Ergonomics and Safety Conference 2004
XVIII Annual International Conference of the International Society for Occupational Ergonomics and Safety
Houston, Texas, USA
Contact: OESC Conference Chair
E206-D3 Engineering Building 2
University of Houston
Houston, TX 77204-4008, USA

29 June – 2 July 2004 – WWCS 2004
7th International Conference on Work with Computing Systems
Kuching, Sarawak, Malaysia
Details: http://wwcs2004.org
Contact: Halimahtun Khalid
mahtun@wwcs2004.org

11–15 July 2004 – Premus 2004
5th International Scientific Conference on Prevention of Work related Musculoskeletal Disorders
Zurich, Switzerland
Internet: www.premus2004.ethz.ch

8–12 August 2004 – ICP2004
28th International Congress of Psychology
Beijing, China
Internet: www.icp2004.org

23–25 August 2004 – Ergonomics for a BiZ-e World
40th Conference of Ergonomics Society of Australia & 7th Conference of Pan Pacific Council on Occupational Ergonomics
Cairns, Queensland, Australia
Email: secretariat@ergonomics.org.au

12–15 September 2004 – ECCE
12th European Conference on Cognitive Ergonomics Living and Working with Technology
University of York, UK
12th 15th September 2004
ECCE-12 will be held immediately following the British HCI Conference in nearby Leeds. Important dates

Deadline for extended abstracts of full papers: January 30th 2004
Poster abstract deadline: February 6th 2004
Panel abstract deadline: February 6th 2004
Notification to authors: April 2nd 2004
Final submission of papers in camera-ready form: June 4th 2004

For an extended call and details of how to submit visit the ECCE-12 website: http://www.ecce12.org.uk/

8–10 October 2004
6th ICOH International Conference on Occupational Health for Health Care Workers
KITAKYUSHU, JAPAN
Conference Secretariat
Dr. Kazuhiko Uchida, Dr.Yoshiyuki Hino, Dr.Katsuya Furuki
University of Occupational and Environmental Health (UOEH), Japan
Iseigaoka 1-1, Yahatanishi-ku, KITAKYUSHU, 807-8555, JAPAN
Phone: +81-93-691-7171 Fax: +81-93-603-2155
E-mail: icohhw@mbox.med.uoeh-u.ac.jp
URL: http://www.hcw2004.uoeh.jp/

2005

24–27 May 2005 — Gerontechnology 2005
The International Society for Gerontechnology
Nagoya, Japan

22–27 July 2005 — HCI International 2005
11th International Conference on Human-Computer Interaction
Caesar’s Palace, Las Vegas, USA
Internet: www.hcii2005.engr.wisc.edu

1–30 September 2005 — Cyberg 2005
Fourth International Cyberspace Conference on Ergonomics
Internet: www.cyberg.wits.ac.za

2006

11–16 June 2006 — ICOH
International Conference on Occupational Health
Milan Italy
For more information as it comes to hand consult the ICOH website: www.icoh.org.sg

10 – 14 July 2006 — IEA 16th Triennial Congress — Meeting
Diversity in Ergonomics
MECC Congress Centre, Maastricht, The Netherlands
Contact: Ernst AP Koningsveld
Congress Chairman
E: nvve@planet.nl

2007

21–24 May 2007 — WWCS200
Work with Computer Systems – Computer systems for human benefits
Stockholm, Sweden
Internet: www.wwcs2007.se
**Information for Contributors**

Articles published in Ergonomics Australia are subject to peer review.

**Editor**
Dr Shirleyann M Gibbs
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E-mail: shanng@optushome.com.au

The deadline for issues in 2004:
- March edition: February 1
- June edition: May 1
- September edition: August 1
- December edition: November 1

**Contributions**
Contributions to Ergonomics Australia are always welcomed and encouraged. Articles are subject to peer review and members of a referee panel assist authors in achieving an optimal standard for publication. The activities, achievements, experiences, views and opinions of members are always of interest. These can be in the form of letters, notices, notes, reports, commentaries and articles.

Graphics (photos, illustrations, drawings, computer graphics etc) are particularly welcome and should be camera ready. Photos need not be black and white and negatives are not required. However it should be noted that ordinary digital photographs generally do not allow for good reproduction if only submitted electronically. It is preferable to include the digital photo in the text but to additionally provide an actual photograph which the publisher can scan with commercial quality equipment to produce a quality result.

The preferred form of submissions is via e-mail, either in the body of a message (short notices), or as an attachment (articles / letters). Files may also be mailed on floppy disc or CD. Microsoft Word, Corel WordPerfect or Adobe files are the preferred formats (the editor cannot transcribe MacIntosh files that are not in IBM compatible format.) Handwritten or hard copy submissions will only be accepted in exceptional circumstances.

Any inquiries about contributions should be directed in the first instance to the Editor.

---

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All advertising inquiries should be directed to the National Secretariat of the Society.

**Contact**
Ms Jennifer Allen
T: 02 6295 5959  Fax: 02 6295 5946
E-mail: secretariat@ergonomics.org.au
Monday – Friday 9.00 am – 5.00 pm

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Printed column sizes are 165mm x 225mm (double) or 80mm x 225mm (single)

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Tel: 03 9381 9696  Mobile: 0414 605 414
E-mail: goro@acuteconcepts.com.au

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<td>165</td>
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<td>$ 264</td>
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<td>$ 231</td>
<td>115.50</td>
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Pre-printed enclosures (leaflets, brochures) etc are welcome for inclusion with the Journal.

Enclosures should be pre-folded to fit inside the finished Journal.

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| Enclosure not requiring folding | $ 412.50 |
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Narrabundah ACT 2604

Advertising copy and enclosure submission deadlines for 2003 are the same as for Contributions — 1st of month prior to publication

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<td>August 1</td>
</tr>
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<td>December</td>
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Advertising and sponsorship opportunities also exist in the electronic version of this journal (EAOL) which is managed by Dr Robin Burgess-Limerick at Department of Human Movement at Queensland University. It is downloaded by more than 100 Australian and International readers each week.

To view EAOL: access it from either the University of Queensland or HFESA websites:
http://www.uq.edu.au
http://www.ergonomics.org.au

Caveats
The views expressed in the Journal are those of the individual authors and contributors and are not necessarily those of the Society. The Editor reserves the right to sub-edit material and be selective about the extent/length of any correspondence included in the journal provided it does not alter the author’s intent by so doing.

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