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The Official Journal of the HFESA
Human Factors and Ergonomics Society of Australia

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HFESA Mission Statement
Promoting systems, space and designs for People
A variety of ergonomics issues are discussed in this edition. An interview with Professor Pierre Falzon, President of the International Ergonomics Association (IEA), features some of his ideas for improving communication and professional development among and between all levels of the international ergonomics community. He is clearly aware of how easily an hierarchical organization can lose touch with its individual members. Pierre spoke with ergonomists and friends at specially convened meetings in Melbourne and Sydney during his brief visit downhill in order to meet IEA delegates in Australia and New Zealand. This is a leader who has a detailed knowledge of the creation and historical background of IEA and cares about its future growth and relevance.

For many reasons the seafood industry has not been at the forefront of ergonomics attention in the past and this is changing rapidly as the industry becomes more sophisticated. Readers may recall an article in this journal (June 2002) by Tom Mitchell in which he discussed ergonomics opportunities in the fishing industry. Now in June 2004 there is an article by Fiona Weigall and Katrina Simpson about ergonomics in the seafood processing industry. Further topics of continuing debate in the international ergonomics community are also included in this edition. Jennifer Legge reviews the nature and acceptability of pre-employment screening for prevention of musculo-skeletal disorders; and Max Hely continues his musings about stretching exercises.

In the last few years, articles have included discussion about complex systems affecting staff safety in the health industry; aquaculture; ethics; coffee harvesting; gymnasiums; an innovative prosthetic foot; fall-arrest harnesses in the construction industry; preliminary research about musculo-skeletal disorders among various nursing populations; and most recently the future of research for occupational injury in general. The latter article (March 2004) was particularly timely given further changes to the National Occupational Health and Safety Commission (NOHSC) that have since been promulgated. The organization has been subject to criticism and change over many years and something is clearly needed to restore its credibility. An honest assessment of performance goals rather than political point scoring and bureaucratic window dressing is needed for an effective national occupational health and safety research and implementation program.

It is interesting to note that the journal has attracted contributions from Columbia and Japan as well as from the Australian scene. This diversity is continuing with future papers being offered from Japan, India and Singapore as well as the eastern states. Eventually it is hoped that someone in the western and central parts of our own continent will join the list of contributors.

At this point it gives the editor great pleasure to advise readers of the following development in journal credibility. Jean Dartnell, Research Publication Reporting Project Officer, Information Resources, James Cook University Queensland, contacted the HFESA Secretary to request confirmation of EA peer review status, for inclusion in the annual report to the Australian Government about national publications. It was a joy to be able to forward the following message:

“In 2003, the upgraded quarterly journal Ergonomics Australia notified its readers that in future all papers would be subject to peer review prior to publication. The following notice appeared in March 2004 edition and will be repeated under “Information for Contributors” in future editions:

“Articles published in Ergonomics Australia are subject to peer review”.

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. …”

It would appear that an ageing population is a matter of international concern to politicians, health planners and practitioners, and marketing strategists alike. As the standard of living improves across developed nations the implications of an older cohort have begun to dominate public debate. Sadly, but not necessarily surprisingly, the emphasis has been on an anticipated universal dependency and incapacity of aged persons. As in the last quarter of the twentieth century, when the need for more retirement and nursing homes became an issue, there is still a focus on the 5% of the population that may require such care. The remaining 95% are seemingly invisible.

A glance through any professional conference program is almost certain to have a least one section/paper highlighting the ways and means of providing systems approaches that minimize the affect of mental and physical deterioration in an older working population. The discussion invariably relates to the ergonomics of improved process work, prevention of slips and falls, or home adaptations for the elderly. Some enlightened human factors analysts have made the point that such improvements are likely to be of universal benefit and not confined to an ageing cohort.

There is a danger of treating the aged as yet another welfare dependent sector needing special gadgets to survive daily living. There are people who are self managers and others who are dependant personalities who are prone to a “victim mentality” in any age group. Anecdotal evidence abounds about the increase in health problems associated with people who retire while still capable of productive work. Medical science and technology have combined to prolong life expectancy some twenty or thirty years beyond the previously anticipated retirement age. This has generated the need for sustainable social and economic changes in employment patterns.

Female participation in the workforce is still in a transitional state in relation to the complex interactions of full time, part time, casual, permanent and temporary workplace engagement. The active aged of both sexes will soon be added to that number of unresolved female concerns. Most ergonomists would know colleagues who have continued working beyond the official retirement age. What are the criteria for such prolonged activity? How will they be meshed with the overall employment issues for a sustainable community? Will these matters be debated in the Forum section of this journal and future conference papers about ageing and ergonomics?

Shann Gibbs PhD
Editor
Something to think about:
Do you realize that the only time in our lives when we like to get old is when we’re kids?
If you’re less than 10 years old, you’re so excited about aging that you think in fractions. “How old are you?” “I’m four and a half!” You’re never thirty-six and a half. You’re four and a half, going on five. That’s the key.
You get into your teens, now they can’t hold you back. You jump to the next number, or even a few ahead. “How old are you?” “I’m going be 16!” You could be 13, but hey, you’re going to be 16!
And then the greatest day of your life . . . you become 21. Even the words sound like a ceremony . . . YOU BECOME 21. YESSSS!!!
But then you turn 30. OOOOHH, what happened there?
Makes you sound like bad milk. He TURNED; we had to throw him out. There’s no fun now, you’re just a sour-dumpling. What’s wrong? What’s changed?
You BECOME 21, you TURN 30, then you’re PUSHING 40.
Whoo! Put on the brakes, it’s all slipping away. Before you know it, you REACH 50 . . . and your dreams are gone. But wait!!! You MAKE it to 60. You didn’t think you would!
So you BECOME 21, TURN 30, PUSH 40, REACH 50 and MAKE it to 60.
You’ve built up so much speed that you HIT 70! After that it’s a day-by-day thing; you HIT Wednesday!
You get into your 80s and every day is a complete cycle; you HIT lunch; you TURN 4:30; you REACH bedtime.
And it doesn’t end there. Into the 90s, you start going backwards; “I was JUST 92.”
Then a strange thing happens. If you make it over 100, you become a little kid again. “I’m 100 and a half!”
May you all make it to a healthy 100 and a half!!

HOW TO STAY YOUNG
1. Throw out nonessential numbers. This includes age, weight and height. Let the doctors worry about them. That is why you pay them.
2. Keep only cheerful friends. The grouchies pull you down.
3. Keep learning. Learn more about the computer, crafts, gardening, whatever. Never let the brain idle. “An idle mind is the devil’s workshop.” And the devil’s name is Alzheimer’s.
4. Enjoy the simple things.
5. Laugh often, long and loud. Laugh until you gasp for breath.
6. The tears happen. Endure, grieve, and move on. The only person who is with us our entire life is ourselves. Be ALIVE while you are alive.
7. Surround yourself with what you love, whether it’s family, pets, keepsakes, music, plants, and hobbies, whatever. Your home is your refuge.
8. Cherish your health: If it is good, preserve it. If it is unstable, improve it. If it is beyond what you can improve, get help.
9. Don’t take guilt trips. Take a trip to the mall, even to the next county, to a foreign country, but NOT to where the guilt is.
10. Tell the people you love that you love them, at every opportunity.

AND ALWAYS REMEMBER: Life is not measured by the number of breaths we take, but by the moments that take our breath away.

Unknown author

Nutrition and Health
For those of you who watch what you eat... Here’s the final word on nutrition and health. It’s a relief to know the truth after all those conflicting medical studies:
1. The Japanese eat very little fat and suffer fewer heart attacks than the Americans, Australians & British.
2. The Mexicans eat a lot of fat and suffer fewer heart attacks than the Americans, Australians & British.
3. The Japanese drink very little red wine and suffer fewer heart attacks than the Americans, Australians & British.
4. The Italians drink excessive amounts of red wine and suffer fewer heart attacks than the Americans, Australians & British.
5. The Germans drink a lot of beers and eat lots of sausages and fats and suffer fewer heart attacks than the Americans, Australians & British.

Conclusion:
Eat and drink what you like. Speaking English is apparently what kills you.

Anonymous
Karen Patricia O’Rourke  
28th June 1972 – 16th April 2004  

It is with great sadness that I inform the Ergonomics and Health & Safety community of the sudden and tragic loss of our dear friend and colleague Karen O’Rourke. Karen (aged 31 years) lapsed into a seizure on Easter Saturday, was on life support and passed away after a brave fight six days later.

After a private school education in Brisbane, Karen studied health promotion and worked in western Queensland before returning to Brisbane to spend some time in hospitality. After further study she came to Workplace Health and Safety Queensland eight years ago, as a young graduate professional full of life, enthusiasm and idealism. She was well suited to ergonomics and was passionate about anything she did. Karen not only rose professionally to become one of our Principal Ergonomics Inspectors, she was recognised for her many contributions made to the field of Ergonomics that was considered within the OH&S jurisdiction, ‘too hard to deal with’. She was the one to be ‘ground breaking’ or ‘controversial’ and was always involved. Find a heated debate, a complex problem or an interesting project and you would find Karen. She is particularly noted for being one of the first female inspectors to work in construction in Queensland.

Karen’s enduring legacy is her major contribution to important research in the field of musculoskeletal injury prevention. Next to the Chief Investigators, Karen had the most involvement in the development and delivery of this research program over the past four years including auditing, working at the University of Qld to deliver an ergonomics intervention to workplaces, participating in evaluation and delivering the intervention to the mining industry in Queensland. This gained her significant recognition and lead to her most recent appointment with Mt Isa Mines where she has worked in hygiene and ergonomics since December 2003. Many aspects of this research will now be dedicated to Karen’s memory including the Mining Industry Handbook.

Karen was passionate about ergonomics and committed to continuous learning. Karen was studying a Masters Degree in Ergonomics at University Queensland for the last few years. She will be posthumously awarded the Post Graduate Diploma in Ergonomics for her work completed so far.

Karen was an asset to ergonomics. She was ‘a passionate ergo’, a wonderful work colleague and a dear friend. She will be remembered and sadly missed by the Queensland ergonomics and OH&S community, Workplace Health and Safety Queensland, the national Government Ergonomics Group and The Human Factors and Ergonomics Society of Australia. Karen’s legacy not only remains in ergonomics and her research work but her gift of life to three people (two of whom were parents with families) through donation of her organs.

Please pray and give thanks for the life of Karen and remember her to those who were fortunate enough to have known her.

Roxanne Egeskov  
Senior Principal Adviser Ergonomics  
Workplace Health & Safety Qld  
(colleague and friend)
Presidents Column

Conference
We are at the half-way point of 2004 and rapidly approaching the annual conference and AGM, being held in August this year in sunny Cairns. The conference is being jointly presented by HFESA and the Pan Pacific Congress of Occupational Ergonomics. The program looks very interesting and I urge you all to attend.

Face to Face meeting
On the weekend of the 15-16 May, HFESA Board members met in Canberra for the face to face meeting. The meeting was very productive and many sound decisions were made including the decision to keep membership fees at the current level.

In the matter of reserve funds, the Board has decided to explore all options regarding the acquisition of land and existing property.

Photographic competition
The HFESA Inaugural Photographic competition is open to members and the $35.00 entry fee will be reduced to $25.00 for delegates at the conference, so get those cameras clicking...

2005 Conference
The ACT Branch is hosting the 2005 HFESA Conference and planning has already commenced. Look out for the call for papers in your pack in Cairns.

Newsletter
Please forward articles, information on Branch activities and gossip to Jen at the Secretariat, who will pass them on to Christine Zupanc, the Editor. It is anticipated that the electronic newsletter will be distributed every two months.

Strategic Plan
The Strategic Plan has been ratified by the Board and has been sent to Branches for implementation.

IEA President
IEA President Pierre Falzon met with Victorian and NSW HFESA members in late March, promising greater communication in the future between IEA and national bodies. HFESA welcomes this initiative.

NOHSC
A matter of great concern is emerging as we go to press and that is the apparent scaling down of NOHSC. As President, I will be meeting with the Minister for Employment and Workplace Relations, Kevin Andrews, on 23rd June to represent the HFESA view. We will also be meeting with Craig Emerson the Shadow Minister, on the same day.

A final word of thanks
As this will be my last report to you as President of the Society, I will take this opportunity to personally thank Jenny Kerr (Federal Treasurer) and Les Hogg (Federal Secretary) for their determined hard work on your behalf over the last two years. Without their efforts our Society would not be in the great shape it is. However, it is a fact of life that we are all busy people and we are all volunteers with the best of intentions. At times there are things that take a little longer than we would desire however my experience is that members are very gracious and I thank you all for your generosity.

Margaret Head
President
IEA Column

The major local activity during the last quarter has been the visit to Australia of the IEA President, Prof. Pierre Falzon, from Paris, France. Pierre conducted visits to the HFESA branches in Melbourne and Sydney. Feedback from Pierre related to the invaluable direct communication that he was able to have with members of our society. It also provided an excellent promotional opportunity for ergonomics. The public seminar conducted in Melbourne through the Central Safety Group was attended by around 50 people. None of these were members of the Ergonomics Society but were interested to listen to Pierre promoting ergonomics and its application to industry.

In my role as the IEA Chair of the International Development Committee, I have been preparing my report for the IEA Board meeting in July. A full copy of the Action Plan that I have been working with my committee can be made available if you would like the specific details.

There are a range of 8 different areas where active promotion of ergonomics development has been identified and projects are underway. This is a very exciting time for the IEA and it is my privilege to be in the “driving seat” to oversee these projects. In particular, our closer association with world agencies such as the World Health Organisation and the International Labour Organisation helps to maintain the profile of the ergonomics profession as an important member of this world community. I will provide further details on this work to the editor of EA to enable further publication for our members.

I propose to attend the IEA Board meeting in Madeira during late July 2004. There are no critical voting items on the agenda at this stage that require consultation with the HFESA Board.

One output from Pierre’s visit to Australia was a desire for closer direct communication between the IEA Executive and the Federated Society President and members. As a result, a series of workshops will be held during this IEA Board meeting to discuss methods of more direct communication and engagement. One consequence of these workshops will be greater opportunities for broader representation of members on IEA programs and working groups. I will look forward to discussing the details of this upon my return.

You would be aware that HFESA now has sufficient members to send two delegates to IEA Board meetings. Whilst this is a wonderful opportunity for a member to join me in attendance, there is no funding provided for this by the IEA to Federated Societies, and in the past it has been up to the individual member to fund themselves. With this qualification in mind, I would welcome the Board to nominate another HFESA member to join me at this Board meeting, and subsequent Board meetings which are held on an annual basis.

If no member is able to attend, I will vote with both arms accordingly. It is pertinent to plan for the next main IEA Congress in 2006 at Maastricht in the Netherlands. The HFESA is normally well represented at these congress meetings and it is an ideal opportunity to introduce a second delegate.

Barbara McPhee was this delegate during the IEA 2003 congress in Seoul. I will report again after the IEA meeting in July.

Regards and best wishes,
David C Caple

Interview

Lunch with Pierre Falzon

On a sparkling early autumn morning Shann Gibbs met Pierre Falzon at Sydney Airport and took him for a short day tour before the NSW Branch meeting that evening. We visited Centennial Park to see the ducks and set the mood before proceeding via Paddington to Watson’s Bay and the Naval Chapel on South Head. Conversation bubbled as we drove back to the city, across the harbour bridge and out to Manly and North Head to get views to the city and Middle Harbour as well as up and down the coast. Then it was time to drive north to the Newport Inn for lunch overlooking Pittwater where we lingered longer over an excellent meal before driving back to his city hotel via the northern suburbs and the French designed Anzac Bridge. The following is a brief outline of some of the formal discussion caught on tape during lunch and augmented by Pierre’s slides kindly bequeathed after the evening’s presentation.

SG: As Secretary of IEA prior to being elected President in mid-2003 you would have a good idea of its general functioning. What do you see as the major issues for attention during your time at the head of the international association?

PF: There has been a big increase in membership recently and while the formal infrastructure is in place to deal with this, better two-way communication needs to be established to share Federated Societies’ concerns and increase awareness of IEA operations and actions. Specific attention must be given to education, certification, scientific development and the various interest groups ...

SG: How do you see this being implemented?

PF: In the first instance I believe I should travel to meet delegates in the various member countries in order to establish personal contact with each group and listen to local concerns. There is a danger in large international societies whereby an executive can operate in isolation from the general membership! Also there is a tendency to have groups inside and outside the main stream that must be brought together. In the course of my travels I hope to stress the need for more effective communication at all levels.

A major concern is that national presidents should be the delegates to the IEA as they should be in a position to speak for their community.

SG: That is fine in principle but national presidents may be excellent front-persons for an organization and very busy with its internal operations, but not necessarily the best communicators ... there are also benefits from having continuity over time with a dedicated ongoing delegate who does perform well as an information conduit.

PF: While that may be true there is a need to involve the presidents in direct communication.

SG: Perhaps there are other ways to ensure that channel without altering the existing structure? This is especially important for those societies entitled to only one delegate and who may be in real need of sharing the load of responsibility. Another relevant factor in all this is that places like Australia and New Zealand are far from northern hemisphere centres of ergonomics activity. Their membership is not large enough to fund the cost of a delegate’s overseas travel and nor does IEA do this ... that could place an additional financial burden on many people if it were restricted to a national president. Costs are an issue for any person who gives considerable voluntary time to a society that is largely dependent on their unpaid activity.
PF: This is something I will have to think about further as I am concerned about the present level of involvement between societies and the IEA executive committee. There is a problem where a delegate is not the most appropriate person as it can result in endless meetings without a decision. Also there is a developing need for formal representation by IEA on a number of international bodies and its representatives must be well-informed about national information and attitudes. This is especially important in terms of the larger societies of which HFESA is one.

SG: Speaking as the editor of EA I must stress that the Australian delegates in my experience have been both knowledgeable and meticulous in sharing IEA information… notably through the pages of our journal… by far the most reliable of any contributors! (For the record, both Margaret Bullock and David Caple had been national presidents prior to taking on this role.)

I had not really considered Australia to be one of the larger societies as we tend to regard ourselves as a small and geographically scattered membership largely based on our capital cities.

PF: In fact there are three categories in terms of membership size. USA is clearly the largest, having more than 3500 members; but Japan, the Nordic countries and UK all have over 1000 members. Canada, Australia and Korea along with the French Language Society are in the next category of 500 to 1000 members; while the remaining 33 members in category 3 have between 25–500 members. Incidentally, there is no French Society; it is named for the combination of French speaking Canadian ergonomists and French ergonomists… Quebec is not Canada!

Australia has the numbers for a significant presence and should have a high profile… which it does have with David’s role with developing countries.

SG: What other channels of communication do you propose and do you plan to make greater use of the Internet?

PF: One of the people I particularly wanted to visit was David Moore in New Zealand who is taking over the role of editor of a revamped IEA Newsletter. He is charged with setting up an independent email communication network among the national journal editors. It is also intended that the Newsletter will reach individual members of the various societies electronically… via email rather than just the website. IEA is aware of the problem of updating email addresses; it is still new technology and it will take time for people to adjust to its use.

SG: The problems associated keeping email lists up to date has been the real problem in Australia. How does IEA plan to cope with an international database?

PF: Each country will maintain its own list as it should be possible to send the newsletter from a central point (NZ) to each national secretariat for electronic distribution. It would be too hard to keep a central database.

SG: Sounds great. Do you envisage any difficulty obtaining copy for this new format?

PF: That was a very real problem with the old version and one of the reasons for its replacement. We hope to have a whole new approach to this in the future as it is a key means of maintaining links with the world wide community of ergonomists. There is a need for a less formal, more approachable and timely form of information sharing than is presently provided by the research dominated accredited IEA journals.

SG: In terms of communication, have you been involved with Cyberg as a concept?

PF: That name sounds familiar... tell me more.

SG: Cyberg is the triennial IEA Internet Conference held in the year prior to the triennial land conference of IEA. It was started by Leon Straker at Curtin University in Perth Western Australia in 1996 and organized by him again in 1999. Andrew Thatcher from Witwatersrand University in Johannesburg South Africa took over in 2002 and will be General Chair again in 2005.

It has a relatively small but active group of international participants compared to the land conference. Like it, the papers are subject to prior peer review and selected contributions are transcribed to CD and issued to all registered participants a month in advance of the conference opening. Once Cyberg commences, the papers are online and participants can comment and question over the next month in their own time. Authors are required to check in regularly and respond as well as to participate in general debates and the virtual social club. As someone who has joined in all three events I can vouch for its value. Naturally it has some of the downside of any conference in terms of quality of material contributions and discussion but it allows much greater thoughtful input than is generally permitted by time constraints of a land-based conference.

You can tell I’m a convert, but it is early days and lacks the necessary critical mass of attendees to really make a splash on IEA consciousness! Do give this venture your active and valuable support please! I do believe it is the most affordable and effective means of reaching both developed and developing ergonomics communities.

PF: I will seek more details about this activity and give any encouragement I can. The Internet is clearly going to increase its importance as an effective and timely means of communication.

SG: Perhaps it will not be too long before we can anticipate regular webcasting rather than simple teleconferencing as the preferred means of national and international communication. There is little doubt that talking is better than just emailing but seeing people makes for the best type of communication with fewer misunderstandings or misinterpretations.

What do you see as needing further attention in your term of office?

PF: There is some concern that fragmentation of interest groups will detract from the effectiveness of the IEA. It is difficult to maintain the interest of splinter groups if we cannot target their roles and tasks as part of the general field of ergonomics. In order to maintain existing memberships and attract new members we need more than a focus on musculo-skeletal disorders.

We must target both the specialist groups and a broad range of ergonomics roles to share information with the wider ergonomics community and thereby encourage active membership participation. Again there is a problem of whom to put in charge and how to get valuable individual and independent input about these issues.
SG: Has there been any thought given to introducing an individual membership of IEA? In earlier times I was a member of the Australian Association of Occupational Therapists and an individual member of the World Federation of Occupational Therapists (WFOT).

PF: This has been raised over the years. Originally the IEA was a society of individual members from the inaugural seminar, Fitting the job to the worker, organized by the European Productivity Agency in the Netherlands in 1957. A meeting in Oxford UK in 1959 declared the creation of the IEA for which members could be individuals or societies. This was endorsed by the meeting in Germany in 1964 although it was made clear that the committee was of the opinion that the future trend of IEA should be towards a federation of ergonomics societies.

Since then there has been a strong feeling against individual memberships as it was feared that they could interfere with the national interest and possibly influence the voting patterns quite apart from perhaps giving undue influence to fragmented interest groups.

SG: While I can see that could be a problem, surely it is also an expression of insecurity? On the one hand the executive seeks greater individual involvement and yet limits the ways in which this might be offered. Is this not part of the problem of ergonomists having failed to establish a clearly defined role? The great diversity of our membership fields of practice is seen as both an advantage and a cause of concern in presenting a corporate image to the wider community. This is of special concern in the area of expert witness work as opposed to various types of consultancy.

PF: I would have to agree. This is a continuing problem while the organization tries to approach the problem in a linear fashion.

SG: Are you actually on my wavelength about social organizations being an expression of complexity?

PF: Yes. Complex organizations respond to attractors and we must develop our contacts with those attractors in the special interest groups while ensuring they remain under the umbrella of the society.

As the IEA improves its links with official international organizations such as the World Health Organization and the International Labour Organization a clearer profile of ergonomics should become evident.

SG: In effect ergonomics is still in an emerging state of understanding for both its members and the wider public.

PF: Yes. Given the accelerated pace of technology and the diversity of ergonomics applications the communication between the various components will be a major determinant of future outcomes for the IEA to establish a cohesive identity.

SG: What is the strongest element in the French speaking society given that there seems to be a particularly strong human factors engineering basis to ergonomics in the USA?

PF: Human Computer Interaction is the main sub-group.

SG: What would you see as the main reason for a person to become a member of an ergonomics society?

PF: Probably the networking opportunities with a trade-off in professional credibility apart from the more altruistic aim to share acquired knowledge and experience. There seems to be little linked financial benefit and that certainly applies to members who are primarily operating in a sub-specialty or educational environment not specifically seen as exclusively ergonomics.

SG: We have been around the world of ideas so perhaps we should conclude this formal interview with a list of IEA priorities during your term as President:

• mutual support of worldwide ergonomics communities to aid in their development;
• international level advances in the science and practice of ergonomics;
• enhancement of the contribution of the ergonomics discipline to the global society;
• development of Ergonomics Quality in Design (EQUID) Certification Program;
• development of IEA Guidelines for the Masters Degree Program in Ergonomics;
• development of joint actions and cooperation with international bodies;
• improved communication with societies; and
• generation of a review of 50 years of IEA by 2006 Congress that will address:
  - a re-thinking of the IEA role towards the Federated Societies;
  - a rethinking of the role of the Federated Societies within the IEA; and
  - issues of general interest affecting membership, practitioners and researchers, thematic groups and certification.

My grateful thanks are extended to Pierre Falzon for this unique opportunity for discussion.

Shann Gibbs
sit-stand seats

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METHODS

Biomechanical, psychophysical, and epidemiological data were gathered for this project. In the first stage the following techniques were used:

- analysis of the injury and incident data in the seafood industry;
- visits to 20 premises (including fishing co-operatives, wholealers, retailers, transport companies, and fish processors) using an observational checklist to gain an overview of manual tasks;
- in-depth face-to-face and phone interviews using a semi-structured questionnaire with 35 staff members and proprietors; and
- informal interviews with 50 staff members and proprietors.

From this preliminary information, specific ‘high risk’ tasks were identified for further assessment and analysis. The more detailed analyses included the following methods:

- OWAS – The Ovako working posture analysis system (Karhu, Kansi & Kourinka 1977; Karhu, Harkonen, Sorvali & Vepsalainen 1981; Louhevaara & Suurnakki 1992) was used to measure postures. Assessments were made from recordings with a hand-held Panasonic NV-A5A video camera of each subject performing selected manual handling tasks at various selected angles. Observations were made at either 3 or 5 second intervals with a total of 2,371 recorded observations.
- RULA – The Rapid upper limb assessment (McAtamney & Corlett 1993) was used to record and assess upper limb postures, and was based on footage taken with a hand-held Panasonic NV-A5A video camera, and from still photographs and direct observation.
- NIOSH equation – The revised National Institute of Occupational Safety and Health equation (Waters, Putz-Anderson, Garg & Fine 1993) was used to determine the level of risk associated with selected manual handling activities.
- Nordic Musculoskeletal Questionnaire (Kourinka, Jonsson, Kilbom, Vinterberg, Biering-Sorensen, Andersson & Jorgensen 1987) – was used to investigate the subjects’ reported musculoskeletal problems over the last year and week.
- Measurements of weights, forces, sizes, distances moved – these were assessed using various tools including a Salter Model 16 tension and compression tester (to 40kg), electronic scales, and steel retractable tapes.

Each method was applied and results analysed following the relevant guidelines from the above literature and all methods were piloted prior to formal testing. One researcher conducted the OWAS while the other conducted the RULA to avoid possible inter-observer variability. Participants gave written informed consent to be interviewed, videoed and/or photographed.
RESULTS

Injuries
The analysis of the major injury patterns demonstrated that manual handling was the most common mechanism of injury in the seafood industry, accounting for 64% of all injuries. Manual handling included activities such as lifting, carrying, putting down; handling objects other than lifting, carrying and putting down; and/or activities or postures that imposed muscular stress with no objects being handled; as well as repetitive movement with low muscle loading. Sprains and strains and disorders of muscle, tendons, and other soft tissues accounted for an average of 50% of all reported injuries. The most common agencies of injury were 'non-living animals' and 'cartons and boxes' (WorkCover NSW 1999/2000).

Injury data from a survey undertaken by the Master Fish Merchants' Association of Australia (MFMA 2001) was consistent with the WorkCover data.

Manual handling risk factors
The manual handling risk factors outlined in the National Standard for Manual Handling (National Occupational Health and Safety Commission 1990) and the NSW Occupational Health and Safety Regulation 2001 (WorkCover 2001) were assessed in this project. A summary of the main results follows.

Characteristics of loads
The typical loads handled in the seafood industry were plastic crates, boxes and loose seafood products. They included live fish, crabs and iced products so those products could be slippery, sharp, greasy and/or icy and therefore difficult to grasp. Table 1 provides a summary of the most common loads.

Large 'bulk bins' and boxes that were moved mechanically were also used, and these typically measured 1300mm long, 1300mm wide and 950mm deep. These bulk bins were filled with loose seafood products that were later sorted into smaller containers.

Table 1: Common loads that were manually handled

<table>
<thead>
<tr>
<th>Load type</th>
<th>Description of load/product</th>
<th>Load dimensions in mm</th>
<th>Capacity and/or size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard (large) fish crate</td>
<td>Plastic, stack and nest, with drain holes, handholds on each end (Nally IH065)</td>
<td>L 711 W 438 H 316</td>
<td>54.5 litres Empty crate 3.14kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weight of loaded crates vary, eg gross weight approximately 40kg+</td>
</tr>
<tr>
<td>Half fish crate</td>
<td>Plastic, stack and nest, with drain holes, handholds on each end (Nally IH036)</td>
<td>L 711 W 438 H 190</td>
<td>32.2 litres Empty crate 2kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weight of loaded crates vary, eg gross weight approximately 22kg+</td>
</tr>
<tr>
<td>Poly boxes</td>
<td>Polystyrene boxes with lids, some have 7mm bevel area (too small to grasp), and some covered in plastic making it difficult to grip</td>
<td>Various sizes ranging from: L 570 - 750 W 310 - 410 H 210 - 260</td>
<td>Empty box weights range from 300 - 800 grams Weight of loaded boxes vary eg gross weight approximately 22kg+</td>
</tr>
<tr>
<td>Loose seafood</td>
<td>Very small (eg prawns) to very large fish (eg tuna, shark, broadbill) These loads are manually sorted according to species, size etc. Often difficult to grip due to slipperiness and spikes etc</td>
<td>Large fish can be 1500 - 3000 long</td>
<td>Weights vary Gross weights of large fish between 100 to 350kg</td>
</tr>
<tr>
<td>&quot;Coffins&quot; eg tuna, broadbill</td>
<td>Large, long cardboard boxes with large fish wrapped in plastic Tuna is expensive and fragile so extra care must be taken when handling</td>
<td>Various eg L 1800 W 470 H 300</td>
<td>Gross weights vary eg 45 - 60kg</td>
</tr>
</tbody>
</table>
Location of loads and distances moved

A number of tasks including stacking and unstacking crates and boxes; filling and emptying bulk bins; and packing and unpacking seafood from boxes and coffins required lifting to and from floor level. Handling crates, boxes and whole fish above shoulder height was also common. For example fish crates were typically stacked to 5 high (a reach of 1330mm), and during transport fish crates were often stacked to seven and eight crates high (resulting in the handles being over 2000mm high). [Refer to Photo 1]

Heavy loads were mainly moved with hand trolleys but boxes and crates were also thrown or were pushed (often in stacks) over the floor. A survey of typical handling aids in the industry revealed a number of factors that increased the risk of work-related musculoskeletal injury. For example the most common aid for fish crates – a flat base hand trolley with vertical handles – was difficult to use. The problems were: it was hard to push the base under the crates; the near vertical handles required very deviated and flexed wrists; and the heavy weights in the crates needed high forces to lever the weight back and onto the trolley then to lower the trolley in a controlled manner. [Refer to Photos 2 & 3]

Weights and forces

The weight of the loaded fish crates was identified as the most important issue by all sectors of the seafood industry, followed by other heavy loads such as coffins and loose whole fish. A small sample of crates and boxes of seafood was analysed showing that the average gross weights of the standard crates was almost 40kg with weights of 50kg being not uncommon. Staff were unaware of the gross weights as varying amounts of ice were used and the containers’ weights also varied. The gross weights were often two to three times the net product weight, as illustrated in Figure 1.

The manual forces required to move loads varied depending on the load, the flooring and the aids (if any) used. For example a common scenario involved the pulling or pushing of fully laden crates over a concrete floor. The initial force to move 3 crates (net weight 73kg, estimated gross weight 120kg) was 32kg, followed by a sustained force of 23kg. A stack of four crates required forces greater than 50kg which exceeded the capacity of the force gauge.

Actions and movements and working postures and positions

Ovako working posture analysis system (OWAS)

All the manual handling activities analysed with OWAS (Karhu, Kansi & Kourinka 1977; Karhu et al 1981) demonstrated a high proportion of time spent in harmful back postures. For example, to sort fish from bulk bins and coffins involved 54% of the time with the back bent and twisted, and when the worker was shovelling ice the back was bent 72% of the time. A summary of the back postures is provided in Figure 2, and a table of the OWAS analyses is provided in Table 2.
Forty-two common handling tasks were assessed using the RULA method (McAtamney & Corlett 1993). Many of these tasks scored above the highest ‘action level’ indicating that changes were required immediately. These tasks included:

- Shovelling ice
- Packing fish into coffins
- Unloading tuna from coffins
- Sorting fish from coffins
- Sorting fish from sorting table
- Sorting fish from bulk bins
- Moving & sorting from poly boxes
- Moving and sorting crates (7 high)
- Moving & sorting crates

Table 2 – Percentage of time spent in postures according to OWAS variables for common manual handling tasks

<table>
<thead>
<tr>
<th>Posture</th>
<th>Moving &amp; Sorting Crates (7 high)</th>
<th>Moving &amp; Sorting Crates</th>
<th>Sorting fish from bulk bins</th>
<th>Sorting fish from sorting table</th>
<th>Sorting fish from coffins into crates</th>
<th>Unloading tuna from coffins</th>
<th>Packing fish into coffins</th>
<th>Shovelling ice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back</td>
<td>31.5</td>
<td>29.5</td>
<td>33.8</td>
<td>20</td>
<td>14.5</td>
<td>14</td>
<td>30.5</td>
<td>21</td>
</tr>
<tr>
<td>Straight</td>
<td>31.5</td>
<td>29.5</td>
<td>33.8</td>
<td>20</td>
<td>14.5</td>
<td>14</td>
<td>30.5</td>
<td>21</td>
</tr>
<tr>
<td>Bent</td>
<td>9.4</td>
<td>10.0</td>
<td>6.0</td>
<td>1.7</td>
<td>28.9</td>
<td>25</td>
<td>20.7</td>
<td>14.5</td>
</tr>
<tr>
<td>Twisted</td>
<td>35.8</td>
<td>33.3</td>
<td>35.1</td>
<td>28</td>
<td>31.9</td>
<td>18</td>
<td>21.1</td>
<td>23.5</td>
</tr>
<tr>
<td>Bent &amp; twisted</td>
<td>26.2</td>
<td>26.7</td>
<td>24.9</td>
<td>54</td>
<td>23.4</td>
<td>43</td>
<td>29.1</td>
<td>41.5</td>
</tr>
<tr>
<td>Arms</td>
<td>Both arms below shoulder level</td>
<td>63.4</td>
<td>83.5</td>
<td>96.7</td>
<td>99.3</td>
<td>99.5</td>
<td>7</td>
<td>91.1</td>
</tr>
<tr>
<td>One arm below shoulder level</td>
<td>1.1</td>
<td>6.1</td>
<td>3.3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>6.1</td>
<td>2</td>
</tr>
<tr>
<td>Both arms at or above shoulder level</td>
<td>1.0</td>
<td>8.4</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>2.75</td>
<td>0</td>
</tr>
<tr>
<td>Legs</td>
<td>Standing</td>
<td>13.6</td>
<td>11.1</td>
<td>9.3</td>
<td>10.3</td>
<td>55.1</td>
<td>55</td>
<td>33.9</td>
</tr>
<tr>
<td>Standing on 1 leg straight</td>
<td>34.1</td>
<td>23.2</td>
<td>38.2</td>
<td>43.3</td>
<td>18.3</td>
<td>44</td>
<td>39.9</td>
<td>48</td>
</tr>
<tr>
<td>Standing both legs bent</td>
<td>4.9</td>
<td>2</td>
<td>1.6</td>
<td>3.7</td>
<td>4.1</td>
<td>7</td>
<td>2.75</td>
<td>2</td>
</tr>
<tr>
<td>Standing one leg bent</td>
<td>12.1</td>
<td>10.7</td>
<td>7.9</td>
<td>20.7</td>
<td>2.75</td>
<td>16</td>
<td>9.95</td>
<td>12</td>
</tr>
<tr>
<td>Kneeling on one knee</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Walking</td>
<td>35.4</td>
<td>43.1</td>
<td>44.3</td>
<td>19.3</td>
<td>7.6</td>
<td>18</td>
<td>8.25</td>
<td>23</td>
</tr>
</tbody>
</table>

Figure 2. OWAS back postures during common manual handling tasks performed in the seafood industry

Rapid Upper Limb Assessment (RULA)
Forty-two common handling tasks were assessed using the RULA method (McAtamney & Corlett 1993). Many of these tasks scored above the highest ‘action level’ indicating that changes were required immediately. These tasks included:

- Posture: Moving & Sorting Crates
- Posture: Moving & Sorting Crates (7 high)
- Posture: Sorting fish from bulk bins
- Posture: Sorting fish from sorting table
- Posture: Sorting fish from coffins into crates
- Posture: Unloading tuna from coffins
- Posture: Packing fish into coffins
- Posture: Shovelling ice
- Lifting crates (40kg) from stacks over the worker's chest height eg from 5 to 8 crates high; [Refer to photo 1]
- Levering the handles of a standard hand trolley (with base foot plate) to unload a stack of 4 crates onto the floor; [Refer to photos 2 & 3]
- Lifting and handling large fish between containers or tables at low levels eg lifting fish in or out of crates or coffins at low levels;
- Pushing standard hand trolleys under stacks of crates (eg 4 crates);
- Lifting and handling large fish (eg yellow fin tuna) from stacks of coffins positioned over shoulder height; [Refer to photo 4]
- Throwing fish crates (eg a distance of approximately 5m while sorting them on the auction floor);
- Filleting fish and associated tasks (eg steeling); and while oyster shucking was not assessed is considered likely also to be beyond safe limits.

National Institute of Occupational Safety and Health (NIOSH) equation

The NIOSH calculations provide trends in estimated risk, with the potential for increased risk when the worker is not close to the load. This can be due to individual methods (such as standing at a distance from the load), the size and shape of the load and the positioning of the load.

The calculations in Table 3 show that the recommended weight limit (RWL) for moving and sorting large fish crates was between 7.1kg and 11.3kg and the RWL for lifting large fish such as tuna was 6.45kg to 8.1kg. These RWLs were calculated on the assumption that the lifting conditions were optimal - ie close to the load, good grip, minimal twisting. As the mean weight of the large fish crates was 40kg and large fish varied in weight from 25 to 60kg it was evident that risks were present with these lifting tasks. Obviously, if the lifting conditions were not optimal, as they often weren't, the RWLs would be smaller and the lifting indexes correspondingly larger (see Table 3).

The NIOSH equation recognises that there is an ‘excessive risk of injury’ with a lifting index over 3.0 (Waters et al 1993). Tasks that were found to have a lifting index above ‘3.0’ were lifting and moving large fish crates and lifting large fish such as tuna and broadbill from coffins and bulk bins.

The RWL for lifting and sorting fish from bulk bins was 4.4kg. The lifting index for sorting fish from bulk bins for fish under 10kg was below 3.0 if the task was performed under optimum conditions. Even though the lifting index was < 3.0, Waters et al (1993) reported that lifting tasks with a lifting index of >1 pose an increased risk of lifting related low back pain for some fraction of the workforce. [Refer to photo 5]
Duration and frequency of handling tasks

In many areas within the seafood industry manual handling tasks were performed for long periods and required frequent, repetitive movements. Based on timings of selected tasks, some of the most repetitive manual tasks were:

- moving and sorting fish crates — the average number of lifts/lowers of one crate (40kg) was 2.9 per minute and average push/pulls of a stack of crates from 1-5 high was 3.4 per minute (without handling aids) — this equated to moving almost 2 tonnes of crates each 15 minute work cycle;
- filleting and scaling fish — the rate for filleting medium-sized fish was 10 seconds per fish, with each fish requiring 8 knife cuts, plus ‘steeling’ the knife once each 1 – 3 minutes during filleting; and
- sorting fish from bulk bins — grasping and sorting one fish per second if using one hand, and one fish per 2 seconds for larger fish requiring two hands.

Heavy tasks were also performed repeatedly. For example a truck driver had to manually load and unload his truck with 115 x 15 kg boxes each day as a consequence of the narrowness of the truck door, and the loading area designs prohibiting the use of handling equipment.

Though not assessed, typical rates for oyster shucking in Sydney are reportedly between 25 to 35 dozen oysters per hour by an experienced oyster shucker.

Work environment

Floor surfaces, cold temperatures, and poor lighting were identified as increasing the risk of staff developing injuries from manual handling tasks.

Floor surfaces were typically concrete or tiled without matting at the workstations, and were wet and slippery with ice and seafood juices. Coolrooms often had large build ups of ice restricting safe access. The flooring was generally uneven because of drains and grating, and hoses that lay across the floor. Steps in and out of premises and into coolrooms and freezers were common. Many of these factors created slip and trip hazards and restricted the use of hand trucks and other wheeled aids.

Most staff were constantly handling cold product, cold equipment and ice, and filleters and oyster shuckers had the additional issue of working with their hands immersed in cold water. These staff reported becoming de-sensitised to the cold water, but also found that over time their hands had become stiff and lost mobility. For example two filleters described an inability to pick up and grip small items such as screws and nails after having worked as filleters for many years.

Lighting was often poor in freezers, coolrooms and filleting areas. This resulted in staff needing to lean down to see, and also added to the risk of slip and trip accidents.

| Origin of lift: Lifting large fish crates from floor | Destination: onto one fish crate (stack of 2) | RWL = 11.3 |
| Actual weight of fish crate = 40kg |
| Lifting Index = 3.5 |
| Origin of lift: Lifting large fish crates from floor | Destination: onto four crates (stack of 5) | RWL = 9.85 |
| Actual weight of fish crate = 40kg |
| Lifting Index = 4.06 |
| Origin of lift: Lifting large fish crates from stack of 5 high | Destination: to the floor | RWL = 7.1 |
| Actual weight of fish crate = 40kg |
| Lifting Index = 5.6 |
| Origin of lift: Lifting large fish crates from stack 5 high | Destination: to 3 crates (stack of 4) | RWL = 8.3 |
| Actual weight of fish crate = 40kg |
| Lifting Index = 4.8 |
| Origin of lift: Lifting and sorting fish from bottom of bulk bin | Destination: to the top of the bulk bin (900mm high) | RWL = 4.53 |
| Actual weight fish = <1 to 10kg |
| Lifting Index = <1 to 2.2 |
| Origin of lift: Lifting fish from middle of a bulk bin | Destination: to the top of the bulk bin (900mm high) | RWL = 4.4 |
| Actual weight of fish = <1 to 10kg |
| Lifting Index = <1 to 2.2 |
| Origin of lift: lifting large fish into bulk bins (1050mm high side) | Destination: bottom of the bulk bin | RWL = 8.1 |
| Actual weight fish = 25 to 60kg |
| Lifting Index = 3.0 to 7.4 |
| Origin of lift: lifting large fish from coffins (2 coffins stacked on pallet) | Destination: display table (390mm high) | RWL = 6.45 |
| Actual weight fish = 25 to 60kg |
| Lifting Index = 3.8 to 9.3 |
**Workplace & workstation layout**

Seventy percent of the retail premises surveyed were leased, so the business had limited control over the design and layout of the interior, storage areas and loading areas. The main workplace design and layout issues that impacted on manual handling were in the following areas: loading; retail displays; counter design; filleting areas; access to and within coolrooms and freezers; and designs of tables, benches and scales. A summary of the main issues is provided in Table 4.

<table>
<thead>
<tr>
<th>Area</th>
<th>Design factors contributing to manual handling risk</th>
</tr>
</thead>
</table>
| Loading               | • Lack of loading dock and/or dock leveller  
  • Difficult access to premises (eg limited parking, steps, narrow corridors)                                                                                               |
| Retail displays       | • Display cases in the middle of the shop, so wet stock moved from the coolroom and filleting areas across the customer area                                                        |
| Counters and display cabinets | • Deep counters (eg 1200mm) sloped down to customer side required staff to lean and reach to product  
  • High counter tops (eg over 1450mm) required staff and customers to pass loads above shoulder height  
  • High beds of ice in cabinets (cabinet 850/900mm plus >300mm ice bed) resulted in some staff working at their chest height,  
  • With high ice use, large quantities of ice had to be shovelled and later cleared out (eg 20 to 25 crates of ice to fill display cases in an average-sized store)  
  • Scales placement was often at or above shoulder height and required staff to extend their neck to read the display |
| Filleting areas       | • High filleting benches (eg >1000mm) for filleters of relatively short stature (eg males below 1650mm tall) causing working with shoulders hitched  
  • Deep and large sinks (eg 350 - 400mm deep) requiring long reaches and forward leaning.  
  • ‘Footstools’ were used by filleters to keep them off the wet floor and raise their height to suit the bench, but these were often just foam lids or old timber boxes |
| Coolroom access       | • Access via one doorway, making loading and stock control difficult  
  • Access usually required one step, restricting or preventing use of trolleys.  
  • Limited storage space caused staff to have to reach and lift other products to gain access to the required product |

**Work organisation**

A number of organisational issues impacted on workload and manual handling risks. The main factor was the variable and unpredictable work-flow, with workloads and hours dependent on operators lower or higher in the chain. For example the arrival of the fishing boats at the co-operative, the size and type of the fishers’ catch, the truck delivery times, and the results of the Sydney auctions all influenced schedules and work loads. Fishing itself was affected by the season, weather and sea conditions.

Because of the work flow, work hours were very variable and included night, early morning and weekend work. The survey of 35 people in the industry revealed that the average number of hours worked was more than 52 per week, with 10 of the respondents working in excess of 70 hours a week. People who worked the longest hours tended to be business owners or managers. Truck drivers also worked long hours when the work was available. Most permanent staff in the seafood industry were paid a weekly wage, but casual staff were paid for hours worked or on a piece rate.

Multiple or ‘double’ handling of crates and boxes was also a feature of work throughout the industry. The method of crate and box stacking itself was a factor that forced multiple handling. As crates and boxes were stored in tall stacks, to gain access to the bottom crate or box a worker would have to lift all of the other loads and then re-stack them. The impact of this was if a ‘wheeler’ (the person collecting auctioned crates) had an order for 20 crates that each happened to be at the bottom of a stack of 5, they would have to perform 9 lifts per stack. This equates to 180 lifts in total to collect just 20 crates.

**Skills and experience**

Specific educational and training backgrounds were not assessed, however informal conversations revealed that most had learnt ‘on the job’. Some staff worked across a number of areas, while others specialised in one function - such as filleting and oyster shucking. Owners and managers appeared to be the most multi-skilled, participating in filleting, sales or coolroom activities as required.

The median length of employment of those surveyed was 8 years, with the longest being 42 years. Most businesses operated with a core of permanent staff supplemented by an equal number of casuals to cover peak periods such as Easter and Christmas. Consistent with other industries in NSW, there was a wide ethnic mix of people working in this industry with a range of statures and a range of language and communication requirements.
Managers and owners participating in the survey were asked about their background and training in occupational health and safety, and who they went to for advice or information in this area. Typical responses were that occupational health and safety was “common sense” not requiring special skills or knowledge, with experience in the industry considered more important. Businesses that appeared to have a better understanding of occupational health and safety and risk management were implementing food safety systems or had managers who had worked in other industries. According to staff surveyed, only 50% (18) had received any training in occupational health and safety, and most of these had received the training when they were working in other unrelated industries. Only 4 respondents reported having received training in manual handling issues related to their job in the seafood industry.

**Age**

The age range of subjects was 18 to 61 years old (median = 37 years) with many of these people having worked in the seafood industry from a young age. In peak periods when casuals were used the average age reportedly dropped as casuals were often young students.

**Clothing and personal protective equipment**

The typical clothing worn in processing and retail premises during the project (conducted in a Sydney winter) was casual long pants, shirts and warm tops, a full length plastic apron and water resistant footwear, with some staff wearing rubber gloves. Gumboots were the most common footwear, but staff complained that they did not keep their feet warm and were not comfortable when worn for long periods. These boots reportedly also tended to cause discomfort for some subjects by rubbing the skin on the calf area when the worker was squatting, and this directly impacted on their choice of handling techniques. The long plastic aprons also impacted on manual handling tasks as the fabric stiffness restricted ability to squat and to position loads between the legs. Subjects described the way in which the aprons created a dragging and heavy feeling on the neck area.

Subjects who sorted fish wore rubber gloves to protect them from the spikes and from the cold. However they also reported that the gloves made it more difficult to grasp the fish as they were slippery, commenting that the thick rubber reduced sensation in their fingers and hands. The thinner rubber or latex gloves were also unsuitable as the fish spikes easily penetrated them. At one site trainee filleters wore slash-proof gloves, however senior filleters found gloves too cumbersome when gripping and handling the fish and filleted without them.

**Other factors**

**Injuries and injury reporting**

Results from the Nordic Questionnaire (Kourinka et al 1987) are summarised in Figure 3. Many of those interviewed described existing musculoskeletal problems with 60% reporting low back problems, 48% reporting hand/wrist pain and 48% reporting knee pain. Interestingly 26% stated they would not inform anyone if they were injured and may even keep working. This was particularly the case for those employed in small businesses.

**DISCUSSION**

The results of this study provide both qualitative and quantitative evidence that many of the manual handling tasks currently performed in the NSW seafood industry place workers at high risk of developing work-related musculoskeletal disorders. The survey of workers in the NSW seafood industry showed the most common injury site was the low back followed by upper limb disorders, and these results are consistent with the available injury data. (WorkCover 1999/2000; MFMA 2001) These disorders are likely to be multifactorial in origin due to the “simultaneous exposure to and often synergy among, several risk factors” (OSHA 1999).

The major risk factors identified from this study were:

- Load weights and forces
- Postures and movements
- Frequency and repetition of some tasks
- Workplace layout
Notice of
The Human Factors & Ergonomics Society of Australia Inc
2004 AGM

The Human Factors & Ergonomics Society of Australia Inc will hold its **2004 AGM on August 23rd at 5pm** at the HFE 2004 Conference “Ergonomics for a BIZ-e World” in **Cairns, Australia** at the **Cairns International Hotel**.

Any member wishing to put forward a proposal which includes a change to the HFESA Constitution must deliver this proposed change into the hands of the General Secretary at least 6 weeks prior to the date of the AGM.

HFESA National Secretariat
June 8th 2004
The Human Factors & Ergonomics Society of Australia Inc

2004 Honours & Awards Nomination Form

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The Honours and Awards Committee of the HFESA process and endorse the Awards. All are based on merit and may not be bestowed every year.

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The Human Factors & Ergonomics Society of Australia Inc

2004 Honours & Awards Nominations

**Fellowship**

Criteria:

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Form of award: Certificate for each author
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**2004 Honours & Awards Nominations**

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Criteria:
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- Awarded to an individual, group or organisation having a relevant human factors and ergonomics connection with Australia.
- Covers work carried out over several years during the last five to ten years.

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- Individual student enrolled in a relevant Australian University program of study
- The Award is based on a paper summarising the report or thesis together with a supporting statement from the student’s supervisor.

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The Human Factors & Ergonomics Society of Australia Inc

2004 Honours & Awards Nominations

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- Effective Cost Beneit Analysis for Health & Safety Workshop
- Welcome Cocktail Party

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- Invited Speaker
- Design of Safety System Workshop
- MAnTRA Workshop
- HFESA AGM
- Exhibition & Trade Displays

Tuesday: E Business & Emerging Issues
- Cumming Memorial Lecture
- Site Visit & Briefing Forum
- Ergonomics & Office Efficiency Workshop
- Invited Speakers
- Scientific & Research Papers
- Exhibition & Trade Displays
- Conference Dinner "TJAPUKAI BU NIGHT"

Wednesday: WHS DAY
- PPCOE Invited Speaker
- Scientific & Research Papers
- MAnTRA Workshop
- Design in Health Care Workshop
- Site Visit
- Exhibition & Trade Displays

For More Information On The Program Please Contact:

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22nd – 25th August 2004

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About the HFESA
The Human Factors and Ergonomics Society of Australia (HFESA) is an interdisciplinary organisation of professionals concerned with the role of humans in simple and complex systems, the design of equipment and facilities for human use, and the development of environments for comfort and safety. The membership is composed of psychologists, designers, engineers, physiologists, health professionals and other scientists and professionals from Australia and around the world.

The membership voted, at its AGM 2003, to change the name of the Ergonomics Society of Australia to the Human Factors and Ergonomics Society of Australia. Annual conferences have been held since 1964 including the 11th Triennial IEA Congress in Sydney in 1988 hosted by the ESA.

About the PPCOE
The Pan Pacific Council on Occupational Ergonomics is a self-funded group that was established in 1997 to promote and support occupational ergonomics in the Pan Pacific region. It now has members from Japan, Korea, Hong Kong, China, Taiwan, Thailand, the USA, Australia and New Zealand. Previous biennial PPCOE conferences have been held in Wuhan and Beijing (China), Kitakyushu (Japan), Seoul (Korea), and Hsinchu (Taiwan).
When the findings for each specified ‘risk factor’ were compared against ergonomics and safety literature most of those risk factors exceeded what was considered to be safe. For example:

- Weights and forces exceeded those recommended in Snook and Ciriello (1991), in the revised NIOSH equation (Waters et al. 1993), and in guidelines from Mital, Nicholson and Ayoub (1993). Load characteristics were also far from ideal based on principles of load design for manual handling as recommended in Marras, Granata, Davis, Allread & Jorgensen (1996), Pheasant (1988), Chaffin and Andersson (1984), and Drury (1980) and described by Hely and Weigall (1998).

- Postural demands were rated as causing harm based on OWAS (Karhu et al. 1981) and nearly all the crate handling tasks also exceeded the guidelines from the United Kingdom’s Health and Safety Commission (as described in Pheasant and Stubbs 1991) due to the combination of heavy loads with stooping or twisting postures.

- Repetitive tasks were assessed using Kilbom (1994) as a guide and through the RULA (McAtamney & Corlett 1993), and many were found to require immediate change to reduce the risks. Findings regarding filleting were consistent with the published literature in this area (Ohlsson et al. 1994; Chiang et al. 1993), with evidence of risk factors for injuries to the upper limbs.

- Workplace layout was assessed using selected anthropometric databases (WorkSafe Australia 1992; Standards Australia 1994) and observation. Reach distances and working heights were often inappropriate for the population and the tasks.

The manual handling task that posed the highest risk in the seafood industry was handling the standard fish crates. As the project showed, loads were often in excess of 40kg and could be over 50kg and were generally handled by one worker. Research shows that even if people feel a load is acceptable, the compression and shear forces on the spinal column may place them at injury risk because of their personal characteristics (Mital et al. 1993.)

The results of the posture analyses (OWAS and RULA) confirmed that forward bending, twisting, reaching, and performing tasks over shoulder height were all common postures, and each of these postures increased the risk of musculoskeletal disorders (NOHSC 1990 & 1994). Most of these postures were a direct result of the shape and dimensions of the loads, the workplace layout, access to the loads and the availability of suitable manual handling equipment.

An important factor affecting the degree of risk with twisted or stooped postures is the time that the worker maintains this posture. After a period of 20 minutes in full flexion the spinal ligaments ‘creep’ and the disc annulus is forced posteriorly and remains in this position for a period of between 2 and 30 minutes (McGill 1997). Based on this theory, workers are at an increased risk of injury from heavy manual handling tasks during this ‘flexion recovery period’. This scenario was common when workers were leaning forwards to sort fish from bulk bins and were then required to lift heavy fish crates.

As well as task design, the designs of many premises negatively impacted on the ability of people to use good handling methods (such as to use handling aids, adopt an upright posture, have secure footing and handgrips). These workplace designs not only affected seafood workers but also affected people making deliveries, customers and others. Businesses’ apparent lack of awareness of their responsibility for the safety of others on their sites is not an uncommon problem in the retail and other industries in NSW (Weigall & Hely 1998) despite it being a requirement of the NSW OHS Act 2000 (WorkCover 2000) and NSW OHS Regulation 2001 (WorkCover 2001).

Environmental risk factors found to impact on the manual handling tasks in this study were also described in the literature. For example standing on hard surfaces for long periods reportedly results in people feeling discomfort in the back and legs as a result of the lack of postural sway and reduced blood circulation (Kim, Stuart-Bittle & Marras 1994; Madeline, Voigt & Arendt-Nielsen 1998). Cold temperatures are reported as likely to reduce the dexterity and sensitivity of the hands, and result in people exerting increased force to grip items (Tomada 1998; OHSC 1999), however the literature on the impact of cold hands in the seafood industry is not consistent (Lundqvist et al. 1990).

Other factors such as worker education and training, workplace occupational health and safety systems, and managers’ attitudes to occupational health and safety were also considered to impact on manual handling risk, although these areas were not fully explored. For example work-related musculoskeletal injuries may go unreported, and then risk becoming chronic. Also, if near misses and hazards are not reported, then investigated design improvements are less likely to occur.

In summary, from the examination of the manual handling risk factors (WorkCover — NSW OHS Regulation 2001), it is evident that many tasks in the NSW seafood industry place workers at risk of developing injuries from manual handling.

**RECOMMENDATIONS**

This project highlighted that the NSW seafood industry’s approach to dealing with manual handling issues needed urgent action. To improve the manual handling methods and other occupational health and safety issues in the industry, a strategic, co-ordinated, and national approach was recommended. Elements of this approach were nominated as:

1. systems for managing occupational health and safety (including manual handling);
2. specific changes to improve safety of the identified high risk tasks; and
3. further research into identified manual handling issues.


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The recommendations were made available to the industry and since then the Sydney Fish Markets and the Master Fish Merchants’ Association of Australia have begun to develop more strategic approaches to aspects of the industry’s work. These organizations are also developing and trialling alternative handling methods and equipment in order to improve manual handling safety and further reduce the risk of injuries.

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- Mr Leon Lindley, (past) QA & OHS Development Manager, Sydney Fish Market Pty Ltd
- Ms Susanne Hollis, Convenor, Retail Industry Reference Group, WorkCover

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DISCLAIMER

This research was commissioned by the Seafood Industry Working Party on behalf of the Retail Industry Reference Group. The research conclusions and any views expressed are not necessarily those of WorkCover NSW.

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WORLD CLASS: BE PART OF IT

Vol 18, Number 2, June 2004
Pre-employment functional assessments as an effective tool for controlling work-related musculoskeletal disorders: a review

Jennifer Legge
JobFit System

ABSTRACT

Work-related musculoskeletal disorders have substantial direct and indirect costs to both employers and employees. It is in the best interest of both parties to implement workplace programs that reduce these costs. Pre-employment functional assessments (PEFAs) are a tool that may assist in reducing the severity and costs of work-related musculoskeletal disorders.

As with all work-related assessments, pre-employment functional assessments must meet five basic criteria: safety, reliability, validity, practicality and utility. The criteria of validity and utility are the focus of this review. When assessing the effectiveness of pre-employment functional assessments, the tester is advised to differentiate between issues of an individual’s safe working capacity and a prediction or speculation about possible injury.

An employee is considered physically capable of performing a task when their capabilities meet or exceed the key physical requirements of a job. Traditional methods of assessing a worker’s suitability for a task such as medical screening and isometric strength testing have been proven ineffective in making this judgement. Valid pre-employment assessments are based on functional tasks including fitness assessments and safe manual handling ability. The rationale for inclusion of various tests in a pre-employment functional assessment is discussed.

Pre-employment functional assessments meet the needs of the employee by providing a safe and objective assessment of their current physical capabilities. They meet the needs of the employer by identifying the matches between workers and their tasks in a non-discriminatory way to reduce the severity and costs of work-related musculoskeletal injuries. The need for further research into the effectiveness of pre-employment functional assessments as an effective tool for controlling work-related musculoskeletal disorders is identified.

Relevance to Industry

It is important to employers that when investing resources in the management of work-related musculoskeletal disorders that these resources are allocated to activities which have been shown to be appropriate for meeting their needs.

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<thead>
<tr>
<th>Safety</th>
<th>Is the test safe to administer?</th>
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<tr>
<td>Reliability</td>
<td>Are the test results reproducible on any occasion between evaluators (inter-rater) and participants (test-retest)?</td>
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<tr>
<td>Validity</td>
<td>Does the test measure what it reports to measure and is it predictive of performance?</td>
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<td>Practicality</td>
<td>Is the test easy to administer with reasonable / minimal cost?</td>
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<td>Utility</td>
<td>Does the functional test relate to job performance and does it meet the needs of the involved parties?</td>
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Table 1: Key Attributes of Work-Related Assessments

Based on Randolph (2000); Innes & Straker (2003); King et al (1998)
A key distinction needs to be made when evaluating the effectiveness of pre-employment functional assessments (PEFAs) in controlling work-related musculoskeletal disorders. That distinction relates to whether or not the assessment is being used to assess an individual’s current safe working capacity or as a predictor of injury. Anderson (1999) believes that the emphasis of a PEFA should be on objective information such as an individual’s ability to perform the job rather than speculative information such as risk of injury that may occur in the future. This approach is also consistent with current anti-discrimination legislation. Although it may seem that these are essentially the same thing, a review of the literature indicates a need for them to be treated as two separate issues to obtain accurate data on their effectiveness. The writer believes that much of the confusion in the literature and thus for consumers of these products occurs because these two issues are not clearly delineated. Another reason for the inconclusiveness of the available literature on the effectiveness of these tools is that in the vast majority of cases the focus of these studies has been concentrated on back injuries and thus the exclusion of the rest of the body which accounts for just over half of the remaining work-related musculoskeletal disorders.

Validity

An assessment task will be considered valid if the result can be equated to the job being evaluated (Randolph, 2000). To be able to make this comparison, first a comprehensive job analysis needs to be undertaken to determine the key physical requirements of each task and should include the weights, forces, frequency and duration (Scott, 2002). From this information a PEFA tailored to the job for which the applicant is applying can be developed. The results from this job-specific assessment can then be compared directly with the requirements of the job. For a worker to be considered suitable for a particular job their physical capabilities must be equal to or greater than the demands of the job (Worth, 2000). The purpose of a PEFA is not to exclude individuals from employment but rather to place them into a job for which they are most suited. Randolph (2000) offers a good description of the rationale for a PEFA in the following terms:

It is axiomatic that fitting a square peg into a round hole is not only difficult, but damages either the peg or the hole. Similarly, placing an individual into a job for which he or she may not be physically qualified increases the risk to the employer and the employee of costly injuries. (p. 815)

The design of a PEFA typically consists of the following activities:

• physical and musculoskeletal screen
• fitness test
• postural tolerances and dynamic activities
• manual handling tasks

Physical Screening

Physical screening is typically used to identify any conditions such as elevated blood pressure or restricted limb movement which may prevent the worker from safely participating in the required functional tasks. They can also be used to screen for any current injuries or injuries common to the job for which they are applying (Scott, 2002). In the past, and unfortunately in many cases still today, trunk mobility and muscle strength are also tested in an effort to predict worker performance. There are numerous publications that refute the inclusion of these tests for this purpose alone. Mooney et al (1996) in a study of 152 shipyard workers found no evidence that isometric strength testing of back extensors would predict workplace back injury. Isokinetic back strength testing of a group of 171 nurses, as well as past history of reported pain, were also found to be poor indicators of low back pain or injury in work-related manual tasks (Mostardi et al, 1992). However, there may be some bias to this study in that only volunteers, and thus those with confidence in their performance, were tested. The assessors also acknowledged that the lifting activities in the study were controlled, whereas in a clinical setting they would be unpredictable and thereby likely to involve a heightened risk of injury. These results are not surprising considering that neither isometric nor isokinetic strength are functional measures of lifting performance. In contrast, Reimer et al (1994) makes a valid point in highlighting the fact that isokinetic testing is at least a reproducible assessment of range of motion lifting capabilities and uses the test in conjunction with dynamic lifting activities. In addition, a designer of any physical screening test needs to consider that isolated muscle strength tests are not job-specific and may not be justifiable under current anti-discrimination legal requirements.

Fitness tests

Fitness tests are designed primarily to determine whether the worker has the aerobic capacity to perform the required tasks based on aerobic requirements identified in the initial task analysis. Aerobic physical fitness is not infrequently included as predictor of physical injury. Numerous studies including a study of a group of 1652 firefighters by Cady et al (1979) have indicated that there is a graded protective effect for added levels of fitness against the incidence and cost of back injuries. Cady et al’s measure of fitness was based on a total score from five items, including three of cardiovascular fitness, and one each for isometric back and leg strength and flexibility. They suggested that future studies may be able to determine if different components could be weighted separately to give more accurate predictions. Based on the previously discussed limited evidence to support isometric strength and flexibility testing, it appears that aerobic fitness may be a clearer indicator. A preliminary retrospective study by Bigos and Battlé (1987) also indicated that low cardiovascular fitness level is a risk factor for chronic back pain disability.
Postural tolerances and dynamic activities

Postural tolerance and dynamic tolerance tests include activities such as reaching forward, squatting, stooping, climbing, walking and balancing. Again, their inclusion should be based on the job analysis. Procedures for assessing these tasks are extremely varied and their reliability depends greatly on standardized procedures for assessment. Information directly related to these tasks was scarce in the peer-reviewed published literature and could only be identified in product training manuals.

Manual handling tasks

There is a wealth of published information, and subsequent debate, about the methodology for, and validity of lifting assessments. There are two main topics of debate. Firstly, what comprises safe lifting? Secondly, which is a more accurate predictor of performance – isometric, isokinetic, kinesiophysical, functional, or isoinertial tests? In consideration of comments previously made about including assessment tasks consistent with actual work tasks, the kinesiophysical methodology would seem to be the most obvious choice. Batté et al (1989) in a four-year follow up study of 3020 voluntary aircraft manufacture workers failed to demonstrate that isometric lifting strength in either a torso, arm or leg lift position was indicative of an ability to predict that an individual was at risk of industrial back problems. Interestingly, partway through the initial testing phase, the torso lift (straight legs and bent forward position) was discontinued following a number of participant injuries. It is common knowledge that the power lift or a modified leg lift is the current preferred method for lifting.

The validity of the lifting component of the PEFA also relates to an ability to translate information obtained during the assessment relating to a participant’s occasional lifting capacity (up to 33% of a workday) to that of a frequent lifting capacity (33% to 67%) or more. Saunders et al (1997) concluded that estimates of frequent lifting capacity can be made from occasional lifting capacity but that the usefulness of these estimates is questionable and such estimates should be used with caution. When these lifting assessments are transferred for application in an industrial environment there are additional limitations that need to be acknowledged.

Whilst it was not specified, these estimates are typically based on an 8-hour working day and as such may not be as easily transferred to a 12-hour working day which is becoming more common in labour-intensive industries such as mining and construction. The additional demands of awkwardness of loads, positions, team lifting and harsh environments have also not been taken into account. Ting et al (2001) found that work simulation tasks using the Baltimore therapeutic equipment (BTE) tended to overestimate the real lifting endurance performance in healthy men and thus caution should be exercised when transferring these results to real-life situations.

Utility

There are two concerns associated with utility ... “Does the functional test relate to job performance and does it meet the needs of the parties involved?” As previously discussed, the design of a valid PEFA is based upon an accurate task analysis of the job for which the participant is applying for. Therefore by meeting the requirement for task analysis and considering the issues of validity noted above, it can be assumed that the first component of this question will be addressed.

The developer of a PEFA must then determine, “What are the needs of the involved parties?” It may be anticipated that a worker’s primary need will be for a safe test that will best display their current physical capacity to perform the key physical requirements of the job for which they are applying. For the employer, it could be anticipated that in addition to the key attributes outlined above, the provision of a cost-effective program for the promised results will take account of statutory legal obligations.

A recent study by Nassau (1999) followed the effects of a graduated program implemented at a large medical centre over 10.5 years in an effort to control the incidence and cost of work-related musculoskeletal disorders. The program consisted of three stages with the introduction of generic pre-employment musculoskeletal screens in the second stage (year two), and functional pre-work screens based on job demands introduced in the third stage (year six). The first stage was regarded as a control period. Nine hundred and five of the centre’s one thousand eight hundred and eighty three employees were screened with the focus on those workers involved in ‘heavier’ manual tasks or from departments with a higher injury rate, such as nursing assistants. The results indicated that since the commencement of pre-work functional screenings, even though the frequency of injury was relatively unchanged, the severity of back sprains and strains and their associated costs were significantly lower in physically laborious jobs. It should be noted that case management and early return to work programs were also introduced over this period, and may also have also contributed to a lowering of the costs of work-related injuries. Scott (2002) describes a case study, involving a large industrial employer, that was undertaken in order to determine the cost-effectiveness of post-offer screening in reducing the number and costs of injuries post hire. Only those that passed the screening test were placed in the jobs on offer. Out of a total group size of 220 new hires evenly divided between those who had been screened and those who had not, the number (1% versus 23%) and resultant costs ($6,500 versus $2,073,000) of post-hire injuries was substantially less in the screened group. The physical requirements of the screening test were not identified. While these studies indicate positive benefits, more scientific research needs to be conducted into the utility of pre-employment functional assessments.
CONCLUSION

Provided the limitations of a PEFA are addressed in the design phase, the positive impact of such programs is potentially a classic “win-win” situation – the employee benefits by avoiding an injury, and the employer benefits by avoiding the primary and secondary costs of workplace injuries (Randolph, 2000). In addition to the reduction in work-related musculoskeletal injuries and their associated costs, there are additional advantages to pre-employment functional assessments when they are applied in an appropriate manner. These include: the confirmation of the worth of an occupational health professional to an organisation by successfully matching employees to suitable jobs, as well as the potential for task and equipment modification to be implemented in physically demanding jobs. These two benefits alone should increase the pool of suitable candidates and thereby further reduce the risk of work-related musculoskeletal disorders.

RECOMMENDATIONS

Snook (1987) offers a useful summary of the value and limitations of pre-placement testing:

“Pre-placement testing and selection of workers can make a significant contribution towards reducing musculoskeletal injuries, but it must be supplemented by training, ergonomics, appropriate treatment, enlightened management and cooperative unions”.

Whilst there is some evidence for the use of pre-employment functional assessments as a tool for controlling work-related musculoskeletal disorders, there is still a large gap in the knowledge surrounding their effectiveness. Some key areas for additional research regarding this topic include, but are not limited to:

- validation of various test components for inclusion as predictors of performance
- identification of additional items for testing to assess indicators for risk of work-related musculoskeletal disorders other than back injury, and also as predictors of performance
- identification of the relationship between predictors of performance and risk of work-related musculoskeletal disorders
- consensus regarding ‘safe lifting technique’
- understanding of the needs and expectations of consumers of pre-employment functional assessments.

REFERENCES


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Forum

“I Do My Ergonomics Every Morning... .” - Stretching & Evidence Revisited.
Max Hely
Safety Science Associates Pty Ltd

Those who keep up with discussions on “Ergoweb” - the US-based ergonomics e-forum - would be aware that “the stretching debate” has reared its head again and, in many respects, it echoes the discussion of 12 months or so ago here in Australia (see Matfin, Hely, and Worringham in Ergonomics Australia, Dec., 2002, pp. 19-21). This time, the debate surrounds two questions:

1. does stretching prevent workplace injury? and
2. can stretching be regarded as ergonomics?

The recent Ergoweb discussion has been remarkable more so for the light it sheds on the way scientific “evidence” is understood than for the light it sheds on stretching. As is all too often the case, contributors cite references to support their views when the original article(s), if read carefully and fully, provide no such support.

Although the primary focus here is the question of “stretching”, this debate raises broader issues related to how human factors and ergonomics professionals should critically examine the scientific evidence that underpins any aspect of our disciplines.

Does “stretching” work?

A literature review by Hess & Hecker (2003) among others, stimulated the recent debate, and has been cited by discussants to both support and refute the value of “stretching”. Other articles (including those of Pope et al which stimulated last year’s debate and other recent reviews of sports stretching literature) have been selected by contributors to support their positions on workplace stretching. Hess & Hecker found five studies of working populations which investigated the association between flexibility and musculoskeletal pain or injury. All of these were concerned with - and measured flexibility of - the lower back. They found a further three studies which specifically evaluated the effect of quantitative changes in flexibility due to workplace stretching programs.

In the earlier debate about the efficacy of stretching, studies by Herbert & Gabriel (2002), Pope et al (1998) and Pope et al (2000) were cited as “proving” that stretching does not confer protection against injury - this was widely publicised and taken to mean that any stretching in any context was a waste of time and effort. In fact, the Herbert & Gabriel paper included only two studies - the two by Pope et al referred to above - that examined effects of stretching on injury (the other studies reviewed by Herbert & Gabriel examined the relationship between stretching and delayed onset muscle soreness).

The two studies by Pope et al were quite restricted in scope, examining the effect of brief pre-exercise stretching on subsequent injury in military recruits during their physically intensive basic training. An earlier critique of the relevance of these studies to conclusions about the viability of “stretching” for injury prevention can be found in Hely (2002). Here it is sufficient to reiterate that the most that could reasonably be said of those findings is that extremely limited stretching is probably not protective in intense training environments and is most unlikely to be beneficial in preventing the types of injuries that probably don’t arise due to lack of normal or supranormal joint ranges of motion. Whatever their questionable relevance to either athletic or military training, those studies hold little-to-no relevance for injury prevention in more conventional workplaces. Yet they are routinely invoked as support in debates about workplace stretching.

Careful reading of the more recent Hess & Hecker review also reveals its constraints and limitations - limitations which its authors readily acknowledge. It was not comprehensive (nor did it claim to be), it did not distinguish between the specific types of interventions and it reported primarily the conclusions of the original papers’ authors. Moreover, the authors were overt in their objective of raising questions and highlighting the dearth of adequately refined studies which ask answerable questions on this topic. As such, it was a good and useful review. But, like the papers of Pope et al, it has been leapt upon by others on both sides of the “stretching” fence to support their own, apparently preconceived, positions.

In a response to earlier Ergoweb contributions, Jennifer Hess herself has, I believe, hit the nail on the head. She draws attention to the great range of conditions, circumstances, approaches, targets and variations which might be subsumed under that very global term “stretching” (Ergoweb, 26th August 2002). Some of the questions Hess raises include:

- Who most benefits from stretching? Older or younger workers? Those with an acute or chronic injury or those who have never been injured?
- What body regions are most likely to respond favorably to stretching? Is there a differential effect of stretching at, e.g., the back, the wrist and the neck?
- Are all stretching programs equal in terms of their content? Compare five-minute generic programs with programs that target specific muscle groups for a specific task?
- What are optimal temporal arrangements? Is it preferable to stretch in the morning, in increments throughout the day or just before any high exertion task? What should be the duration of these?
- What is the differential effect of stretching on different populations? Should the effects of stretching in young athletes be compared with workers across many ages and fitness levels?

Intuitive opinions are often provided on these questions, but research is lacking.

Perhaps the greatest pitfall of unquestioningly accepting the so-called “evidence-based” approach is to assume that studies with methodological rigour - and which will therefore be included in reviews - have also asked the right questions. Failure to consider the underlying phenomenon in detail can lead to failures in...
understanding that will not be saved by good study design. For example, the studies included in Hess & Hecker’s review which examined back injury risk quantified differences in low back flexibility by either the Modified Schober test (a test of lumbar flexion) or a sit and reach test (which reflects combined hip extensor, posterior trunk and shoulder girdle flexibility). Yet contemporary research suggests that, to protect the spine, the lumbar region should remain stable and neutral while hip extensor flexibility should be improved in isolation (e.g., see McGill, 2002). How could any preventative effect of stretching be discerned if the wrong body parts are being stretched and/or measured?

Related to the above point, some practitioners have also questioned the exclusion of what they have termed “stress-reducing stretching exercises” which are not intended to increase joint range of motion but rather to “increase blood supply to statically loaded muscles” (Jeannette Murphy; Ergoweb, 2nd April 2004).

Much more to the point, how can any review or meta-analysis draw conclusions about the efficacy of “stretching” per se, given the wide variety of conditions and treatments which that term subsumes, unless rigorously defined constraints have been employed in determining what will be encompassed by the review?

Unfortunately, the “lumping together” of vastly different activities, states and/or conditions under the one global descriptor and then attempting to make a binary decision (yes or no) about either its states and/or conditions under the one global descriptor and then determining what will be encompassed by the review? Unless rigorously defined constraints have been employed in determining what will be encompassed by the review?

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Unfortunately, the “lumping together” of vastly different activities, states and/or conditions under the one global descriptor and then attempting to make a binary decision (yes or no) about either its efficacy or reality is not a new phenomenon. Similar travesties attempting to make a binary decision (yes or no) about either its states and/or conditions under the one global descriptor and then determining what will be encompassed by the review? Unless rigorously defined constraints have been employed in determining what will be encompassed by the review?

In other words, it is often unjustified to gather disparate evidence together, treat it as equal and conclude that evidence for the efficacy of some intervention is “inconclusive”. Gatchel & McGeary offer a number of recommendations for the informed consumer of scientific evidence. Pre-eminent among these is the following:

- “Do not blindly accept the conclusions of Cochrane Reviews (this applies to “reviews” in general – this author’s note). They must be as carefully scrutinised as any other study in the scientific literature.”

Of the other recommendations made by Gatchel & McGeary, two are of particular relevance to both ergonomics in general and the current debate in particular:

- “Do not be misled into accepting the argument that an RCT (Randomised Controlled Trial) is the only research methodology available to produce scientifically acceptable outcome results.”

- “Remember that the interpretation of results from any study, regardless of the research methodology employed, is an inferential process. The statement “unequivocal results or conclusions” can rarely be made in the scientific literature of clinical outcomes research.”

Contrast this last recommendation with the number of times contributors to scientific discussions – including the recent “stretching” discussions – refer to one study or another as having “proved” something!

As Adams et al (2002) point out in a critique of this somewhat “nihilistic” approach to epidemiological evidence, there is the potential in such reviews for insightful or innovative studies to be “swamped” by the more numerous findings from more mundane studies. More telling, however, is that for topics which have been subjected to numerous systematic literature reviews, the findings of the reviews themselves are more likely to contradict than support each other (Furlan et al, 2001).

In summary, it appears that the question of the efficacy of stretching as a workplace intervention has yet to be even defined and asked in a tractable and sufficiently refined manner. In the absence of evidence, opinion and anecdote rise to the fore, as they must. However, in view of some of the commentary in this debate, it is not unreasonable that we remember that most basic tenet of scientific evidence. Pre-eminent among these is the following:

Scientific evidence. Pre-eminent among these is the following:

- “Do not blindly accept the conclusions of Cochrane Reviews (this applies to “reviews” in general – this author’s note). They must be as carefully scrutinised as any other study in the scientific literature.”

- “Remember that the interpretation of results from any study, regardless of the research methodology employed, is an inferential process. The statement “unequivocal results or conclusions” can rarely be made in the scientific literature of clinical outcomes research.”

Is “stretching” ergonomics?

Is “stretching” ergonomics? The answer to this is perhaps not as straightforward as many would like. We could equally ask:

- Is training in safe lifting techniques ergonomics?
- Is strength or endurance training ergonomics?
- Is training in visual scan patterns ergonomics?

1 Hess & Hecker did not do this, but their review was interpreted by some as though they had. Other reviews certainly have done this.
Some would unequivocally answer “No”, yet many studies on each of the above and other similar person-centred interventions have been published in mainstream ergonomics literature. They are certainly concerned with human capabilities and limitations. It may be that it is less important to ask if these are part of human factors and ergonomics than to ask what is its effectiveness relative to the available alternatives. The answer to this would, obviously, vary widely, depending on the particular circumstances and the available alternatives. Again, a global, binary decision about such matters would be misleading.

There would, I presume, be little argument that, in general, the philosophical underpinnings of human factors and ergonomics are quite different to those of health and fitness training (which typically includes stretching) – the former diagnoses and prescribes measures for the work environment, the latter for the individual. However, regardless of the efficacy of particular interventions, as Owen Evans says “Not every workplace intervention is ‘ergonomics’” (Ergoweb, 14th August 2002). Or to quote Jennifer Hess: “Whatever stretching is, it is clearly not a substitute for ergonomic analysis and intervention……When workers say “I do my ergonomics every morning,” we need to pay attention to better education and more care in implementing stretching programs” (Ergoweb, 26th August 2002).

Pragmatism must ultimately play a major role in the choice of intervention(s). The conventional ergonomics approach of designing work or products to suit the widest practicable range of people is markedly superior – by all measures – to an intervention that must be provided to every extant and new individual in a workplace and which must be maintained by those individuals throughout the duration of their exposure. The practice of ergonomics does not necessarily exclude the opportunity for suitably qualified practitioners to provide complementary services and, in so doing, produce better adapted humans as well – only that the latter approach is relatively unreliable (both in its implementation and stability over time), generally more costly than design-based alternatives (if undertaken comprehensively) and requires significant levels of personal attention to ensure both effectiveness and safety in its implementation.

Of course, there will always be exceptions. Some “workplaces” cannot be designed – consider firefighting, police, military, emergency services, work in natural environments, etc. For those circumstances, after designing clothing, equipment and procedures, the only remaining option may be to “improve” the individuals. But for conventional workplaces, opting for “stretching” (however it is conceived) instead of or in preference to ergonomic design is ill-advised and certainly could not be regarded as “ergonomics” in action. I suggest, however, that it is equally ill-advised to close the book on “stretching” when, as the evidence shows, much of it remains to be written.

Note
Unfortunately, Ergoweb discussion threads are not archived, so it is not possible for the reader to refer back to these in their entirety. However, selected excerpts are available at www.ergoweb.com (enter “stretching” into the search field).

Some Ergoweb references in this article were from the earlier 2002 discussions. These are still relevant, have been provided on Ergoweb as context for the current discussion and, as such, they have been included here.

References


Correspondence:
max.hely@safetyscience.com
New HFESA members

March 2004

Marnie Douglas NSW A
Joanna Kelton NSW A
Alana Railey QLD A
Christopher Munro VIC A

April 2004

William de Leeuw NSW M
Claudia Walker NSW M
Derek Smith O’Seas M
Janet Cawte QLD M

May 2004

Gary Ewing SA M

The Human Factors & Ergonomics Society of Australia Inc

The changes to the deadlines for HFESA Honours & Awards nominations have been brought about by the forthcoming HFESA Annual Conference being held in August rather than the usual time in late November/December. There needs to be sufficient time for the H&A committee to review the nominations and to present the Awards at the Annual Conference in Cairns.

2004 Honours & Awards Nomination Form

The Human Factors & Ergonomics Society of Australia presents eight national Awards that reflect outstanding achievement by individuals or groups for service to the Society and the human factors and ergonomics profession as well as to the research and application of human factors and ergonomics in Australia. The HFESA Board and the 2004 Annual Conference Committee nominate the Society Medal and the Ron Cumming Memorial Lecturer respectively. Members of the HFESA are invited to nominate eligible people for the remaining Awards. Five of the Awards are named after Founders of the Society who have been Presidents and Fellows of the Society.

The Honours and Awards Committee of the HFESA process and endorse the Awards. All are based on merit and may not be bestowed every year.

All members of the HFESA were sent hard copy forms for the nomination(s) to be lodged. The HFESA Secretariat will send a checklist to the Nominator requesting the evidence required to support each nomination. Nomination close early this year as the Annual Conference and AGM are to be held in August 2004.

Completed forms should be sent to:
The Human Factors & Ergonomics Society of Australia Inc
Honours & Awards
Creeda Business Centre
281 Goyder Street
Narrabundah, ACT 2604
02 6295 5959 or email secretariat@ergonomics.org.au.

News of Dr Mike Regan

Dr Mike Regan, a past Chairman and Secretary of the ACT Branch, and Member of the Victorian Branch of the Society, was elected recently to two Standards Australia Committees - SF 21 (Human Factors) and IT 23 (Transport Information and Control Systems). Committee IT 23 is concerned with the development of standards for the design and deployment of intelligent transport systems for roads and vehicles. Mike will become the inaugural chair of a Sub-Committee of IT23 which will develop Australian human factors standards for the design of the human-machine-interface for intelligent transport systems. Mike is also the Australian member of International Organisation for Standardisation (ISO) Technical Committee 22, Sub-Committee 13 (Ergonomics Applicable to Road Vehicles), which develops international standards for the ergonomic design of vehicle cockpits. Mike is Head of the Human Factors and Simulation Group at the Monash University Accident Research Centre (MUARC), in Melbourne, and was recently promoted to Senior Research Fellow - Level D (equivalent to Associate Professor). MUARC was the recipient of the Society’s 2002 John Lane Award.

NIOSH Publication

A new NIOSH publication entitled Overtime and Extended Work Shifts: Recent Findings on Illnesses, Injuries, and Health Behaviours [DHHS (NIOSH) Publication No. 2004-143] presents an integrative review of the methods and findings from 52 studies. The review indicates that the influence of long working hours on health and safety involves a complex interaction of a number of factors. It also recommends issues and priorities to consider in future research. The document was released in conjunction with a national conference entitled Long Working Hours, Safety, and Health: Toward a National Research Agenda which was held on April 29-30, 2004 on the University of Maryland campus in Baltimore, Maryland. The conference brought together researchers and representatives from labour and industry to discuss the sociological, economic, and health aspects of long work hours. The conference was conducted under the auspices of the National Occupational Research Agenda (Organization of Work Team) and cosponsored by NIOSH, the University of Maryland School of Nursing, and the U.S. Department of Justice. For more information on the conference, visit http://nursing.umaryland.edu/longworkhours. The document can be accessed at http://www.cdc.gov/niosh/docs/2004-143.

Robin Burgess-Limerick PhD
robin@hms.uq.edu.au

NOHSC Re-structure

The Federal Workplace Relations Minister Kevin Andrews has advised that the Federal Government will replace the National Occupational Health and Safety Commission with a trimmed-down "ministerial advisory group". Department of Employment and Workplace Relations 18/05/2004 number 11204 Check out the media release:
Australian Safety and Compensation Council

The Australian Government has today proposed a new body that will lead to improvements in workplace safety and workers compensation in Australia. The proposal is to establish the Australian Safety and Compensation Council (ASCC). Federal Employment and Workplace Relations Minister Kevin Andrews announced the Australian Government’s proposal at the Workplace Relations Ministers’ Council (WRMC) in Sydney today. The new body will comprise representatives from each State and Territory government, as well as the Australian Government, along with employer and employee representatives. The ASCC will establish a national approach to workplace safety and workers compensation which currently does not exist in Australia. There is currently no national body for workers compensation in Australia. This means there is no consistency to workers compensation, nor is there a national approach. Workers compensation is a complex system which employers and employees struggle to understand. The ASCC’s main role will be to coordinate research and provide policy advice to the WRMC – which comprises the Federal Workplace Relations Minister and his State and Territory counterparts. ASCC will be a forum for better national discussion and coordination while respecting states’ jurisdictions over workplace safety and workers compensation. The Australian Government will maintain its current funding for this body.

For media inquiries, contact:
Felicity Dargan Press Secretary 0409 550 446

Forwarded by Pepe Marlow
Physiotherapist / Ergonomist

International Symposium: "Assessment and promotion of work ability, health and well-being of ageing workers".

We have received more than 120 preliminary applications from 27 countries and a large number of proposals of oral or poster presentation. We look forward to your participation and to receiving an abstract in due time. On our part we are trying to do our best to provide a satisfactory organization of the event such that it meets your expectations in Verona.

Giovanni Costa and Daniela Fano
ergonomia@unimi.it

7th International Conference on Work With Computing Systems (WWCS)


The final program with 180 refereed papers can be downloaded from www.wwcs2004.org

Take the opportunity to join us in Malaysia – to learn about true cultural diversity and harmony in a multiethnic society. Various scenic places and exotic cuisine await you – visit http://www.wwcs2004.org/info.htm

We look forward to welcoming you!

Martin Helander
Co-Chair WWCS 2004
Conference Calendar

2004

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
Correspondence: BBS Congress GmbH, Barbara Bühlmann
PO Box 3000 Bern 25
Switzerland
Tel: +41-31-331 82 75
Fax: +41-31-332 9879
Email: bbsongress@swissonline.ch

5–6 August 2004 NZ Ergonomics Society Conference:
Capthorne Manuels Hotel and Resort, Taupo NZ.
Additional information: www.ergonomics.org.nz.
Inquires can be directed to David Tappin:
Email: david.tappin@cohfe

8–13 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
ECCE-12 will be held immediately following the British HCI Conference in nearby Leeds.
For an extended call and details of how to submit visit the ECCE-12 website: http://www.ecce12.org.uk/

20 – 24 September 2004
48th Annual Meeting of Human Factors & Ergonomics Society (USA)
New Orleans, Louisiana USA
Featuring hands-on workshops geared to professionals at all levels as well as more than 100 technical sessions on a broad range of ergonomics-related topics: book, service and product exhibits; technical and research facility tours.
Further details: http://hfes.org
HFES PO Box 1369 Santa Monica, CA 90406-1369 USA
Tel: +1 310/394-1811
Fax: +1 310/394-2410
E: lois@hfes.org

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 (UEOH), Japan
Iselagaoka 1-1, Yahatanishi-ku, KITAKYUSHU, 807-8555, JAPAN
Phone: +81-93-691-7171  Fax: +81-93-603-2155
E-mail: icohhw@mbox.med.uoh-u.ac.jp
URL: http://www.hcw2004ueoh.jp/

18-20 October 2004, Verona, Italy
2nd International Symposium on Work Ability
Assessment and promotion of work ability, Health and well-being of ageing workers.
Please note that this announcement, as well as any other eventual further announcement/communication, will be available at website: www.cdldevoto.it/ageing.htm

2005

21-24 March 2005, New Orleans, Louisian, USA
Hyatt Regency, New Orleans, LA
http://appliedergonetwork.iienet.org/conference
NEW DEADLINE for Abstracts - August 9, 2004 to be submitted online
Questions? Call:+1 800 494-0460, +1 770 449-0460 or e-mail: cs@iienet.org.
Institute of Industrial Engineers
3577 Parkway Lane
Suite 200, Norcross, GA 30092

30 March - 2 April 2005
International Conference - HEPS 2005 - Healthcare systems
Ergonomics and Patient Safety
Florence, Italy
www.heps2005.org

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.hci2005.engr.wisc.edu

1-30 September 2005 — Cyberg 2005
Fourth International Cyberspace Conference on Ergonomics
Internet: www.cyberg.wits.ac.za
2006

30 March - 2 April 2005
International Conference - HEPS 2005 - Healthcare systems
Ergonomics and Patient Safety
Florence, Italy
www.heps2005.org

11 - 16 June 2006 — ICOH
International Conference on Occupational Health
Milan Italy
For more information as it comes to hand consult:
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

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.

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The deadline for issues in 2003:
- 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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Contact
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T: 02 6295 5959  Fax: 02 6295 5946  E-mail: secretariat@ergonomics.org.au
9.00 pm – 5.00 pm Monday to Friday

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