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Australian Defence Force
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Australian Military Medicine Association

Statement of Objectives

The Australian Military Medicine Association is an independent, professional scientific organisation of health professionals with the objectives of:

- promoting the study of military medicine
- bringing together those with an interest in military medicine
- disseminating knowledge of military medicine
- publishing and distributing a journal in military medicine
- promoting research in military medicine

Membership of the Association is open to doctors, dentists, nurses, pharmacists, paramedics and anyone with a professional interest in any of the disciplines of military medicine.

The Association is totally independent of the Australian Defence Force.

Editorial

From the Guest Editor

HMAS KANIMBLA sails this month from Norfolk, Virginia, to Australia. She brings with her our erstwhile editor who is currently enjoying the North American fall. Having recently returned from the wilds of the Northern hemisphere, I have the pleasure of being the guest editor of this issue. This allows me to be a little controversial and to throw a few bouquets and brickbats.

First, the bouquets. One thing that struck me during my time away is that the Australian military health services compare very favourably with their overseas counterparts. I believe that this competence and general professionalism is now being put to good use in the Surgeon General's Office. This Office is now far more proactive, operationally aware and, in many areas, ahead of the game. This is not meant as a chauvinistic pronouncement. The Office, like all organisations, has warts. Given the scale of its task, this is not unexpected. It is productive, however, and I believe that the fruits of these labours will become obvious to all over the next few years.

Now, the brickbats. This issue marks three years of publication of Australian Military Medicine, in one form or another. The Journal continues to grow but is still progressing through the problems of the early gestational phase. The most marked of these problems is the lack of articles, reviews and abstracts. Whilst partly alleviated by articles presented at the Annual Conferences, there continues to be a paucity of material. This is, however, not a unique problem to us. Indeed, as I look at other small journals, like the Journal of the South Pacific

Underwater Medical Society and Radiation Protection in Australia, they appear to have similar problems. This should not be an issue. As I wander through the corridors of Campbell Park, and talk with my colleagues around the country, I continue to be amazed by the expertise we have in all aspects of military medicine. So fellow writers, dust off that research, review those articles, limber up the fingers and flash up the computers. I would certainly like to see Australian Military Medicine at least double its present size by the end of 1995.

Plague, medical negligence and vector control are the major issues in this edition. Given the recent plague outbreak in western India, the RAN's preparations for achieving University accredited training for all its medics and the mysterious horse disease in Queensland, these articles are very topical and pertinent to the military health practitioner. A new section on Conference reports has been introduced for this issue and I recommend you read the excellent summary of the Mosquito Control Conference. Many other Conferences are attended by our members during the year and this new section provides an excellent forum for reports on advances in all areas of healthcare, military and otherwise. So, the editor awaits your response.

Andy Robertson

CONTRIBUTIONS

Contributions for the December issue should be forwarded to:

The Editor
Australian Military Medicine
PO Box 373
MOONAH TAS 7009

Deadline is 25th November 1994

President's Message

As you may have noted, should you have read my presidential missives over the years, that research is a particular crusade of mine. While the military is fertile soil for interesting and valuable research, not just for military medicine questions, but for medical issues in general, the resources available to the military medicine practitioner to exploit the opportunities is meagre.

Time is probably the most valued resource, and I have noted an ever decreasing availability of time to pursue research. This is one regrettable aspect of the continued striving for efficiencies. In order to conduct research, many must be prepared to sacrifice their own time.

Money is the other obvious limiting factor. There is no research vote available in the ADF to conduct research, outside of the three dedicated specialist units, Army Malaria Research Unit, School of Underwater Medicine and Institute of Aviation Medicine. Even here, research is only one of many tasks.

In clinical practice, and the myriad of other manifestations of military medicine, there is precious little available money.

AMMA is dedicated, as one of our prime aims, to further military medicine research. To this end, we have made available the primary forum in Australia to present military medicine research, the annual conference. This 'journal' is a further means of disseminating research results. The Weary Dunlop award is a recognition of an outstanding achievement in military medicine research, and provides some financial reward for this. These are incentives to devote personal time and energy to the project. All of these are available after the research has been conducted; what is further needed is resources to actually conduct the research.

AMMA's own resources remain limited, but we are in a position to provide some grants with the primary aim to allow projects to proceed that may otherwise have faltered. The amounts may be small, but could make all the difference. It may help to conduct a literature search, or purchasing statistical software, or some equipment/supplies. Depending on demand and supply, the available funds will be reviewed annually. The criteria for selection follow. The council is open to comment on this whole process, but with two provisos: the rules for the 1995 grants are set, and there will be no comments on the merits of a particular application.

I hope that you, as AMMA members, will avail yourselves of this opportunity to conduct some research.

James Ross

DISCLAIMER

The views expressed in this Journal are those of the authors and do not reflect in any way official Defence Force policy or the views of the Surgeon General, Australian Defence Force or any military authority.

1995 AMMA Military Medicine Research Grants

TOTAL AMOUNT AVAILABLE: \$2000

CONDITIONS

- ☐ Distribution of the grants may be in one or more lots, as determined by AMMA council.
- ☐ Principal researcher to be member of AMMA.
- ☐ Research must be in the field of Military Medicine.
- ☐ There must be a commitment to publish in 'Australian Military Medicine'. There may be recourse to publish in another publication should the council determine that the research is of sufficient import.
- ☐ Grants are to be made preferentially to projects that otherwise may not proceed.
- ☐ Grants are not to be made to projects that have other sources of funding, other than the researchers themselves.

PROPOSALS

- ☐ Proposals that require ADMEC approval are to submit the completed ADMEC submission with the grant application.
- ☐ Proposals that do not require ADMEC approval are to provide:
 - Principal researcher's publication history
 - Synopsis of proposed research (100-250 words)
 - Brief review of the subject (around 250 words)
 - Timeframe of research
 - Other researchers

- ☐ All proposals are to submit:

- Resource requirements and source of resources.
- Resources requested and amount of requested grant.

- ☐ There are to be six monthly reports of progress to AMMA.

APPLICATIONS

- ☐ Applications may be received at any time, but grants will be issued once a year only. Applications for the years allocations close on 30 April.
- ☐ Successful applicants will be decided by council by 30 June and advised by 7 July.
- ☐ A sub-committee of Council, comprising one or more members, may be established to recommend to Council the distribution of grants and to administer and monitor the grants system.
- ☐ No correspondence will be entered into regarding the distribution of grants

**Submissions are to be sent to AMMA Secretariat,
PO Box 373, Moonah, Tasmania, 7009**

Letter to the Editor

Hospital Ships Comfort

From: Surgeon Captain Michael J. Flynn, RAN

(OIC RAN TGMSE USNS COMFORT, Jan-March 1991)

I refer to the correspondence in the June 1994 edition of your journal (Vol 3, No 2), and note with interest the letter from Colonel Atkinson (currently serving with UNAMIR II, ASC RWANDA).

Although a large number of hospital ships were sunk by the Germans in World War I (Rupert Goodman in his book lists seventeen including the WARILDA which had been staffed by the RAMC), and the CENTAUR was torpedoed with heavy loss of life on the 14th May 1943, the WW II US Hospital Ship COMFORT was not sunk as stated by Colonel Atkinson.

The current USNS COMFORT (T-AH 20) is in fact, the third such hospital ship to bear the name.

The first COMFORT (ex USAT HAVANA) was built in 1906 and was commissioned as a hospital ship in March 1918. She joined the Cruiser and Transport Force, Atlantic Fleet making three voyages returning wounded personnel from Europe.

The second COMFORT (AH-6) was launched 18 March 1943, and commissioned 5 May 1944. COMFORT was manned by a Navy crew with Army medical personnel and operated for a time out of Brisbane. Operating from Hollandia, the ship evacuated wounded from Leyte, Philippines. On the 30th April 1945 off Okinawa, she was struck by a Japanese kamikaze which killed twenty-eight persons (including six nurses) and wounded forty-eight others. Although it caused considerable damage, it did not sink, and after repairs at Guam and Los Angeles, it returned to service in Subic Bay in September 1945 before finally decommissioning in April 1946.

As Colonel Atkinson would be aware from his own time on board USNS COMFORT, this class of ship has a high degree of survivability.

With regard to his entreaty for tri-Service co-operation, he can rest assured that significant progress has been made towards the development of common doctrine, procedures and equipment in the Health Services that will facilitate inter-operability not only between the three Services, but also with allied forces. Current deployments of Health personnel from all three Services such as those to Rwanda and to Bougainville bear testimony to this. The introduction of Level III facilities on board HMAS KANIMBLA and MANOORA will further enhance ADF capabilities.

Bibliography

Goodman R. "Hospital Ships" Boolarong Publications 1992

T-AH Hospital Ship General Information Manual 1990

Contributed Articles

Post Critical Incident Debriefing Nov 91-March 93 Survey

Group Captain R.I. Fawcett

ABSTRACT

Over the period November 1991 to March 1993 the author was involved in conducting eight Critical Incident Stress Debriefing (CISD) sessions following five major incidents involving RAAF or St John Ambulance Victoria District personnel, with a total of 80 persons being debriefed. The aim of this paper is to give an overview of Critical Incident Stress Management in addition to reporting this post CISD survey's findings.

INTRODUCTION

The management of Critical Incident Stress is aimed at preventing the onset of Post Traumatic Stress Disorder (PTSD) following an individual's exposure to an "abnormal" situation. PTSD is an anxiety reaction caused by an uncommon, extremely stressful event that is sufficiently stressful to cause a reaction in most individuals. The reaction should be seen as a normal one to an abnormal situation rather than an abnormal reaction to a normal situation. Kaplan and Sadock state, PTSD develops in persons who have experienced emotional or physical stress that would be extremely traumatic for virtually any person. Such traumas include combat experience, natural catastrophes, assault, rape and disasters such as building fires". (1). Furthermore, it is felt that when the stressor is of human origin rather than natural, the disorder is likely to be more severe.

The three main features of PTSD are the re-experiencing of the trauma through dreams and waking thoughts; emotional numbing to other life experiences, including relationships; and associated symptoms of autonomic instability, depression and cognitive difficulties, such as poor concentration.

The DSM-111R requires the following criteria to be met when establishing a diagnosis of PTSD:.

- a) Existence of a recognisable stressor that would evoke significant symptoms of distress in anyone.
- b) Re-experiencing of the trauma as evidenced by at least one of the following:-
 - i) Recurrent and intrusive recollections of the event,
 - ii) recurrent dreams of the event, and
 - iii) sudden acting as if the traumatic event were reoccurring, because of association with an environmental or ideational stimulus.
- c) Numbing of responsiveness to or reduced involvement with the external world, beginning some time after the trauma, as shown by at least one of the following:-
 - i) marked diminished interest in one or more significant activities,
 - ii) feeling of detachment or estrangement from others, and
 - iii) constricted affect.
- d) At least two of the following symptoms that were not present before the trauma;
 - i) Hyperalertness or exaggerated startle response,
 - ii) sleep disturbance,
 - iii) guilt about surviving when others have not, or about behaviour required for survival,
 - iv) memory impairment or trouble concentrating,
 - iv) avoidance of activities that arouse recollection of the traumatic event, and
 - vi) intensification of symptoms by exposure to events that symbolise or resemble the traumatic event.

The preventive strategy for Critical Incident Stress Management involves the following:-

- a) Development of a policy statement and management infrastructure for the coordination and application of the processes involved. Senior management must be committed to the concept.

- b) Training of selected health (mental) professionals and peers in the identification of risk situations, the application of the processes of Critical Incident Stress Debriefing and Defusing, recognition of individuals requiring further referral and the provision of awareness education for supervisors (all levels) and individuals whose employment may place them at risk of experiencing a significant traumatic event, may place them at risk of experiencing a significant traumatic event, on the principles involved and how to access the relevant processes.
- c) Ensure adequate follow-up capability is available and accessible, if required.
- d) Establish review/validation mechanisms with respect to the overall strategy.

The process of CISD is one of the major intervention strategies in the PTSD preventive process. The two main goals of CISD are to lessen the impact of the distressing critical incident on the individuals exposed and to accelerate their recovery from any strong "normal" stress response to that incident. (2).

The actual CISD process follows a carefully designed structure that progresses through seven phases and thus provides important stress reduction information. The seven phases in order are introduction, fact, thought, reaction, symptom, teaching and re-entry. Additionally, the strict confidentiality of the information shared during the CISD process needs to be strongly emphasised so that the integrity of this process is ensured. (3).

AIM

The review/validation aspect of the Critical Incident Stress Management Strategy remains an essential element in that, unless some valid outcomes are achieved by the application of the strategy and in particular CISD one of the key processes, then it will not be too long before this intervention is brought into question. Therefore, the aim of this survey was to evaluate the application of the CISD process by using a simple feedback mechanism.

METHOD/ANALYSIS

A questionnaire using a format as suggested by the work of Dr Robyn Robinson was distributed to those individuals attending CISD sessions. The

questionnaire requested simple comments or answers to the following questions:.

- a) the individual's own perception of the value of the CISD process for themselves, and the other members of their group.
- b) the individual's own feeling of whether the CISD process following exposure to a "critical incident" should be mandatory, voluntary or whether it was required at all.
- c) what that individual felt they gained most from the CISD process.
- d) Whether the individual had been happy with their own performance during the critical incident.
- e) how much the individual felt the incident had impacted upon them at the time and then several days later.
- f) the length of time the individual had been involved in activities that could expose them to such incidents
- g) the symptoms experienced by the individual as a consequence of direct exposure to the incident.
- h) whether those symptoms had been experienced at the time of the incident, were still continuing, had lead to their recall of previous events, whether they had effected their relationship with their family and finally whether the CISD process had lead to any lessening of these symptoms, and
- i) finally whether the individual felt that the strict confidentiality within the CISD process would actually be maintained.

The questionnaires were distributed immediately following the formal CISD sessions and the completion and return of them was on a voluntary basis. Total numbers of those attending each session in relation to the incidents concerned were documented by the author, with a check being maintained on any requirement for long term follow up/counselling of any specific individual. Following receipt of the completed questionnaires, answers/comments were scanned by the author for similarity and differences. All results were recorded in tabular format as a percentage of those responding. Thus the analysis is a simple descriptive one.

RESULTS

TABLE ONE

DESCRIPTION OF INCIDENT	NUMBER
Aircraft accidents (B707, Tiger Moth)	2
Motor bike accident	1
Failed resuscitation	1
Drowning (Dragon Boat race)	1
TOTAL	5
<i>All involved traumatic death(s)</i>	

TABLE TWO

SUMMARY OF CISD ACTIVITIES	NUMBER
Sessions	8
Number debriefed	80
Groups sizes varied from	6-19
Survey responses	33 (41%)

TABLE THREE

VALUE OF CISD PROCESS	% OF RESPONDENTS
Self	
None	9
Moderate	46
Very	45
Group	
None	0
Moderate	55
Very	45
Required	100
Mandatory	64
Voluntary	36
Most important factors	
Communication	100
Reassurance	72
Happy with Self Performance	72

Note: No responses received from "cadets".

TABLE FOUR

INCIDENT IMPACT	% OF RESPONDENTS
At time	
None	0
Moderate	36
Very	64
Later	
None	9
Moderate	73
Great	18
Years of Service	
Average	14.4
Range	6-27

Note: No responses received from "cadets".

TABLE FIVE

• Anxiety	• Tension
• Tremor	• Anger
• Frustration	• Tearful
• Nausea	• Loss of Appetite
• Sleeplessness	• Concentration Lapses
• Concentration Unable	• Excessive Reflection
• Day Dreaming	• Not able to think clearly
• Poor Reaction Time	• Withdrawn-reduced socialisation
• Erratic Behaviour	• Difficulty switching off
• Strong identification with victim(s) (Secondary to uniform)	

TABLE SIX

SYMPTOMS EXPERIENCED	% OF RESPONDENTS
At time	80
Previous events recalled	80
Effect upon family	55
Lessened by CISD	80
Continuing	27

Note: No responses received from "cadets".

DISCUSSION

As shown in Table One all the events for which CISD sessions were provided involved traumatic deaths and on two occasions multiple deaths. In all cases the CISD intervention provided for emergency response and search and rescue personnel; and on three occasions senior management who had been involved in coordinating the responses, either participated or had their own specific session. In the case of the Boeing 707 accident a total of four separate CISD sessions were conducted due to the differing nature of the rescue and search tasks, the number of personnel involved and the quite separate time frames involved. The sessions were conducted in chronological order namely initial responders, first search team, second search team and finally at their request the activity coordination group. This approach ensured that the debriefing team maintained a sense of chronological order of events and allowed for the CISD intervention to be timed with the specific activity cessation. In all other incidents the time taken to complete the response and the number of personnel involved, was such that each event could be managed using one CISD session. In all cases the CISD Team conducting the sessions included a health professional experienced in managing group sessions as the team leader and one or two other members who were either an experienced medical officer or experienced nursing officer, a senior medical assistant and or a service chaplain. For the large group four team members were used.

Table Two shows the breakdown of the number of CISD sessions conducted. Of the eight CISD sessions conducted three followed requests for intervention from medical practitioners and five were at the request of senior management. All sessions were conducted in the time frame 24 to 72 hours post cessation of activities associated with the specific incident. Of the 80 attendees, some 25% were "Cadets" (Officer Cadets in case of RAAF and juveniles in the case of St John Ambulance). While the cadets all took an active part in their specific sessions, none returned a completed survey form. This to some extent explains the relatively poor response rate of 41% coupled with the fact that attendance at any one of the sessions was voluntary, including the completion of the survey form. This approach was taken as it was felt that any form of compulsion in either case, could result in resistance to the CISD process introduction. Indeed, it was this softly, softly approach that on two occasions, resulted in senior management seeking specific intervention on their own part. Positive comments on the process by attendees being mainly responsible. In

the case of the St John Ambulance Cadets (juveniles) their respective parents were all given a brief description of the CISD process their son or daughter had been involved with, immediately following the relevant CISD session.

Tables Three to Six inclusively show a summary of the respondent responses. From Table Three it can be seen that 91% of all respondents felt that the CISD intervention was moderately to very useful for themselves, but with all believing that the intervention helped the group as a whole. With respect to the question of whether the process should be provided in all such incidents the response in the affirmative was unanimous with two thirds believing that CISD intervention should be mandatory. Of especial importance were the comments provided without any form of solicitation; that the most important feature of the CISD process was the communication aspect, both in terms of filling in the gaps of individuals' understanding of the incident and the education received regarding normal responses/feelings to abnormal events. In general, most respondents (72%) were happy with their self performance, however the remainder felt they could have been better prepared through either more specific training and or exercising of response capabilities.

The impact of the specific incident upon the responders as shown in Table Four was considered to be moderate to great in all cases at the time of the event, with their being a general lessening of the impact over time. Approximately one week, based on the average time of receipt of the survey responses. As the respondents were generally reasonably experienced personnel, with an average length of service of 14.4 years (range 6-27 years), there remains some concern regarding the feelings and reactions of the non-respondents, who were generally younger and less experienced. Approximately half of the non-responders were the considerably less experienced "cadets". There concerns are further highlighted by the following occurrences. Before one of the CISD sessions, it was ascertained that one of the younger persons who had been involved, would benefit more from one on one counselling, due to their extreme reaction to the incident. Additionally, long term follow-up provision has identified one of the cadets who required further individual counselling. This latter case involved a juvenile and it was the post CISD session briefing of the parents that provided the source of identification.

Tables Five and Six show the range of symptoms experienced by all respondents during that first week post incident, both initially and in a continuing sense. Previous events were recalled by

80% of respondents with over half believing their involvement in the incident response, had had an indirect effect upon their family. In one case one respondent had considered cancelling their wedding plans as they had "shut out" their fiancé. In another, a husband and wife who were both involved with the same incident, saw the former shielding his wife from the more explicit details. This led to extreme anger in the wife. In this case the CISD process filled in the "gaps" of the wife's knowledge of the incident, with a consequent significant reduction in her anger.

CONCLUSION

The range of symptoms experienced by the respondents (Table Five) is similar to that reported in the general literature on the topic of Critical Incident Stress. If such symptoms were to remain unresolved then they are fairly likely to become precursors for the development of PTSD as described by the DSM III. Not all the symptoms were experienced by individual respondents, by a reasonable sample from the overall range was reported by all respondents. Those who reported some continuing symptoms indicated a considerable lessening following CISD, with 80% of all respondents indicating a lessening of their symptomatology. In general, the intervention of providing CISD was viewed with some scepticism but as the sessions unfolded, acceptance of the process became apparent. Previously successful sessions, led to word of mouth spread about the value of the process. No negative feedback, either written (survey) or verbal was received. Finally, when asked the question regarding the continuing specific confidentiality of the CISD session, 45% of respondents were not fully convinced that this was possible in a military or St John Ambulance environment. Thus, for the CISD process to remain credible, it is vital that the confidentiality of session specific details is maintained, along with management confidence in the process.

REFERENCES

- Kaplan I, Sadock B.S., *Synopsis of Psychiatry* (5th Edition, 1988; Williams and Wilkins, Baltimore.
- Mitchell J.T., *Stress; The History, Status and Future of Critical Incident Stress Debriefings*: JEMS Nov 1988 pages 47 to 52.
- Mitchell J.T.: *Stress; Development and Functions of a Critical Incident Stress Debriefing Team*: JEMS Dec 1988 pages 43 to 46.

Plague - A Review

Sue Sharpe

AETIOLOGY

Plague is caused by the bacterium *Yersinia pestis*, a small Gram negative, non-motile coccobacillus, which has a characteristic bipolar "safety-pin" appearance when stained.

Although this organism is non-spore-forming, it may remain viable for weeks in sputum at room temperature, for 2 to 30 days in water, for two weeks in moist grain, or for months if frozen (1,2). It can be destroyed quickly in sunlight, by boiling, or by exposure to dry heat (less than 72°C) or steam, or simple disinfectants, such as lysol or chloride of lime (2).

EPIDEMIOLOGY

Yersinia pestis is a natural pathogen of rats, squirrels, rabbits and cats, but will occasionally be transmitted to humans via the rat-flea. The flea acquires the pathogen from infected rodent blood, and bacterial proliferation causes an obstruction in the insect's gut. The flea is unable to feed, and will attack almost any other host (especially humans) in order to try to obtain blood. Bacteria, which are regurgitated by the feeding flea, are then able to infect the human (3). The flea may remain infective for months (4).

The pathogen may also be transmitted by inhalation of bacteria or by the bite or scratch of infected animals. Human-to-human transmission is possible, through inhalation of sputum aerosols, especially under favourable conditions, such as overcrowding (4).

Yersinia pestis is found in all continents except Australia. Recent sporadic outbreaks have occurred in Africa and South America. Plague is endemic in Indonesia, Burma and Vietnam.

PATHOLOGY

Antigenic Composition. *Y. pestis* possesses several important antigens (1,3,5) :

- a) **antigen** - a lipopolysaccharide-protein complex which is toxic for animals.
- b) **Capsular antigen** - a heat-labile antiphagocytic glycoprotein-lipoprotein known as fraction 1 (1,3).
- c) **V/W antigen** - comprised of a protein (V) and a lipoprotein (W), is an antiphagocytic virulence factor. These antigens are synthesised at 37°C. The V antigen is a cytoplasmic protein of molecular weight 37,000 Da. The W lipoprotein has a weight of 140,000 Da and is excreted. (5) The precise physiological roles of these proteins has not yet been elucidated (5).
- d) **Proteinaceous murine toxin** - found in the cell envelope, it is released when cell autolysis occurs. It is comprised of either five or ten subunits of 24,000 Da. This protein is highly toxic to mice and rats. The mode of action is believed to be as an adrenaline blocker (6)
- e) **Pesticin 1 and Pesticin 11** - bacteriocins which inhibit strains of *Y. enterocolitica* and *Y. pseudotuberculosis*.
- f) **Plasmid-coded outer membrane proteins (POMPS)** - these are produced during the infection.
- g) **Lipopolysaccharide endotoxin** - very little information is available about this antigen.

Virulence factors. A 72 kb plasmid codes for the V and W antigens, PONTs (only during infection), and is responsible for the pathogen's cytotoxicity in macrophages and resistance to phagocytosis by macrophages. It also stipulates a requirement of Ca for the bacteria at 37°C (7). Loss of this plasmid induces a profound loss of virulence (1). The precise reason for the requirement for calcium has not yet been elucidated, but it may be necessary for the adoption of the pathogen to a higher temperature environment.

A 9 kb plasmid is necessary for the synthesis of pesticin, coagulase, and fibrinolysin. The absence of this plasmid results in a major reduction of virulence.

Another plasmid, of about 100 kb, is also important in the pathogenicity of the microorganism. It codes for the murine toxins.

The synthesis of the capsular antigen, and the ability of the organism to accumulate exogenous haemin (by a pigment-binding surface component (Pgm)) and use it as a source of iron, are controlled by genes on the chromosome. Bacteria which are Pgm- are avirulent.

Pathogenic sequence. At 28°C (flea body temperature), *Yersinia pestis* does not possess the glycoprotein capsular antigen or the V/W antigen. When bacteria enter the dermal lymphatics of the human they are phagocytised by polymorphonuclear lymphocytes (PMNs), which, in most cases, leads to the death of the bacteria. If pathogens do survive, the capsular and V/W antigens are produced in the macrophage (3).

They are then carried to the regional lymph nodes. Bacteria which persist are then able to proliferate in the lymph nodes, which become inflamed and enlarged (buboes). This form of the disease is known as bubonic plague, and has a mortality of about 75% in untreated patients.

If haemorrhagic necrosis of the inflamed lymph nodes occurs, and the pathogen is able to disseminate via the blood stream, it may infect many sites, especially the liver, spleen and CNS. Haemorrhagic parenchymatous lesions may form, which may cause disseminated intravascular coagulation. Blocking of blood vessels to the organs may occur, leading to death and scarring of tissue. If the disease spreads to the respiratory system (10%-20% of cases), pneumonic plague may result. This is associated with almost 100% mortality if not treated promptly (3).

Primary pneumonic plague occurs when patients inhale aerosolized sputum from other pneumonic plague sufferers.

CLINICAL MANIFESTATIONS

Bubonic plague. Within a few (1-6) days of infection, the patient will usually show an abrupt onset of fever, tachycardia, general malaise, and aching extremities and back (1). Lymph nodes will become extremely tender, and shortly after, painful buboes will form in the armpits, groin, or neck. There is often a pronounced oedema of the lymphatic area. The

surrounding skin will exhibit dark blotches (hence "black death") from bleeding into the skin.

If the disease becomes bacteraemic, the patient will show signs of prostration, shock, delirium, and will usually die within 3-5 days from the onset of these symptoms (1).

Septicaemic infections may show characteristics similar to gastrointestinal infections, and swelling of the lymph nodes may not be as prominent. In these cases, nausea, vomiting, diarrhoea, and abdominal pain are more symptomatic. Initial symptoms may also include pharyngitis, coughing of frothy or bloody sputum, shortness of breath, and meningitis. Death will usually occur within 48 hours.

Pneumonic plague. Primary pneumonic plague from inhalation of aerosolized infectious sputum usually has a short incubation period - symptoms normally appear within 24 hours. There is an explosive onset of high fever, tachycardia, restlessness, tachypnoea, intense headache and prostration. A persistent cough, with profuse watery, blood tinged sputum, will develop. Rales can usually be noted, and respiratory distress follows.

Gross haemorrhaging of the lung tissue, and exudation of watery sputum are common physical symptoms of this disease.

If untreated, most patients will die within three days (8).

Pulmonary signs may be lacking until the final day (1). In the first few days, there may often be a marked contrast between the extreme prostration of the patient, and the negligible physical symptoms in the chest.

DIAGNOSIS

Laboratory diagnosis. Positive identification is usually made by isolation of the pathogen from lymph nodes, blood or sputum, or by fluorescent antibody assays of clinical smears. Although weakly Gram-negative, the characteristic "safety-pin" appearance is best achieved with Giemsa or Wayson's stains. However, isolation of bacteria is not usually possible until 48 - 96 hours after infection, by which time the patient will either have died, or be beyond antibiotic treatment. Therefore, diagnosis must be made on clinical grounds - laboratory diagnosis is only used as confirmation.

Differential diagnosis. These include staphylococcal, streptococcal, or pasteurella lymphadenitis and sepsis, tularaemia, bacterial sepsis, or anthrax. Plague pneumonia and anthrax pneumonia have similar symptoms, although plague

patients have pulmonary infiltrates, which are normally absent in anthrax (9).

TREATMENT

Streptomycin, gentamycin, tetracycline, chloramphenicol are all effective antibiotics. Streptomycin given intramuscularly (4-8 g/day) appears to produce good results, as does chloramphenicol given intravenously for the first 48 hours.

Recommended Therapy. The recommended therapy is:

- 7.5 mg-15 mg /kg of streptomycin intramuscularly every 12 hours; and 5 mg-10 mg /kg of tetracycline intravenously every 6 hours given concurrently. Streptomycin therapy can be discontinued when the patient becomes afebrile. Tetracycline should be continued for at least 3-4 days after the disappearance of fever.
- Patients with suspected CNS infiltration should be given 12.5 mg-25 mg /kg of chloramphenicol either orally or intravenously every 6 hours instead of tetracycline.
- If streptomycin-resistant strains are suspected, gentamycin is an effective substituted.

Patients must be strictly isolated until at least 3 days after the completion of successful antibiotic therapy (4). People in contact with patients should be quarantined, given concurrent antibiotic prophylaxis (tetracycline or trimethoprim-sulfamethoxazole), and surveyed for 7 days.

It must be noted that unless specific antibiotic therapy is instigated within 15 hours of the onset of symptoms, the course of the infection will not be altered. Ideally, therapy should be started within 8-24 hours of infection (4).

After a favourable response to antibiotic therapy, it is not uncommon for patients to suffer a brief, febrile, self-limiting illness.

Supportive care may include oxygen therapy and tracheostomy.

The surrounding environment should be disinfected as much as possible.

SUSCEPTIBILITY OF POPULATION

The susceptibility of the general population appears to be high. Even vaccinated individuals may not have permanent or solid immunity. Secondary spread is possible unless strict quarantine precautions are observed. Immunity following an infection is relative - it may not be adequate against a large challenge (4).

PREVENTION

Several vaccines are available:

- a) **Attenuated/formalin killed vaccine.** Currently given to medical personnel and others considered to be at risk. However, boosters need to be given every 6 months. Tetracycline or trimethoprim-sulfamethoxazole prophylaxis may also be administered concurrently.
- b) **Avirulent living plague bacilli.** Very little information is available.

POTENTIAL AS A BW AGENT

A BW attack would probably be via aerosol, so plague pneumonia would be the most likely outcome. This disease has a short incubation period, with initial symptoms being non-specific and hard to diagnose, and, unless diagnosis is made early, and antibiotic therapy initiated rapidly, mortality would be high.

The disease has a high infectivity (as few as 1000 organisms inhaled can cause illness) and is able to be spread from person to person. Unless quarantine procedures were implemented promptly, large numbers of personnel could become infected.

Antibiotic therapy needs to be aggressive, both for patients and those under surveillance. This could lead to a drain on medical personnel and resources. Strict isolation programmes may also severely drain effective manpower.

Although vaccines do exist, they only provide temporary immunity, and boosters need to be given regularly.

The use of antibiotic-resistant strains of *E. pestis* is a possibility. Antibiotic resistance can be cultivated in the laboratory, and both tetracycline and streptomycin-resistant strains have been isolated from clinical specimens.

Although the organism has a moderately high persistence in moist environments, it does not survive well in dry conditions, and would probably not remain viable for long periods of time in aerosol form.

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Medical Negligence - A Review

A.G. Robertson

"A little neglect may breed mischief "
Benjamin Franklin (1758)

Medical negligence law in Australia is based on United Kingdom common law. In recent years, certain aspects of these laws, particularly the Bolam test, have come in for criticism in both British and Australian courts. Cassidy, in his article on medical negligence (1), submits that both Lord Scarman's and the Australian criticisms of the Bolam test are misplaced. He then asserts that the Bolam tests are the 'only proper test of the breach by a professional of his duty of care'. In this paper, the criticisms of the Bolam test and Cassidy's criticisms will be reviewed, in the light of current medical law.

THE BOLAM TESTS

The Bolam Tests derive from *Bolam v Friern Hospital Management Committee* [1957] 1 WLR 582. The first test outlines the duty of care of the ordinary skilled man. The second test asserts that a doctor is not negligent, if he is acting in accordance with such a practice, merely because there is a body of practice which takes a contrary view' (2).

CRITICISMS OF THE BOLAM TESTS

The Bolam tests have been generally accepted and applied by English law in cases of alleged procedural negligence, alleged negligent diagnosis, and failure to warn (2). In the *Sidaway v The Board of Governors of the Bethlem Royal Hospital and the Maudsley Hospital* ([1985] 1 AC 871) case, however, Lord Scarman dissented. Whilst accepting the second Bolam test in diagnosis or treatment, he did not feel that this extended to the duty to warn (1).

This dissenting view has gained support in Australian and other nations' laws. In *F v R* [1983] 33 SASR 189, the Supreme Court of South Australia stressed the requirement for reasonable professional disclosure and noted that the court would not ultimately delegate its power to determine reasonableness to medical practitioners (3). Similarly, in *Rogers v Whitaker* (4), Handley JA noted that 'the distinction between diagnosis and treatment on the one hand and warning of risks on the other, is a real one'.

CASSIDY'S CRITICISMS

Cassidy submits that the Australian criticisms of the Bolam tests are misplaced as they would 'reserve to the courts, in all professional negligence cases, the decision whether an established practice in the profession is reasonable'. Cassidy then argues that the Bolam test is the 'proper test of the breach by a professional of his duty of care' (1).

The first premise, that the courts will establish what is reasonable practice, has been illustrated in a number of recent Australian cases in respect to treatment (*Goode v Nash* [1979] 21 SASR 419), failure to refer (*Albrighton v Royal Prince Alfred Hospital and Ors* [1980] 2 NSWLR 542) (5), and failure to warn (*Rogers v Whitaker*) (4). However, the Courts, whilst recognising the need for making sure that 'professional practices ... accord with the standard of reasonableness imposed by the law' (*F v R*) (2), usually accept those practices with reputable professional support. Interestingly, the Bolam test has had tacit support in a number of cases (*Petrunic v Barnes* [1988] ATR 80-147; *Hart v Herron and FHCH Pty Ltd*, ATR 80 - 201) (6,7).

Why is Cassidy's premise not supported? His premise is predicated on the assumption that common practice is not negligent. However, 'the mere fact that a defendant follows common practice does not necessarily show that he is not negligent a common practice may be shown by evidence to be itself negligent' (*Mercer v Commissioner for Road Transport and Tramways (NSW)* [1936] 56 CLR 580) (4). This principle, supported in the Australian appellate courts in the *Goode*, *Albrighton* and *F v R* cases, rejects the view that 'responsible medical practice determines the standard of care required of a medical practitioner' (4). Fundamentally, a medical practice, be it diagnosis, treatment or advice, may be negligent even if it is carried out by the majority of doctors, and the law should impose its view of what is 'the proper standard of care regardless of the technical complexity of the issue at stake' (2). This, however, should not be done in a vacuum and a court may not be justified in disregarding expert opinions and forming conclusions based on views other than those provided by experts (*Anderson v Chasney* [1949] 4 DLR 71) (2).

Moving to Scarman, Cassidy claims that there are two major flaws in Scarman's reasoning. Firstly, he alleges that Scarman, by tracing the source of a duty to care 'to the right of the patient in the integrity of his body' (1), has confused trespass and negligence. This allegation is not supported by the current rulings. In Australia, Canada and England, actions for trespass have been confined to cases where no consent at all has been given (5). In *Reibl v Hughes* [1980] 114 DLR (3d), the Supreme Court stated that 'unless there has been misrepresentation a failure to disclose the attendant risks, however serious, should go to negligence rather than battery' (2).

Similarly, in *Chatterton v Gerson* [1981] QB 432, Bristow J stated that once a patient is informed in broad terms, then action in case of failure is for negligence, not trespass (2). This principle has recently been reaffirmed by Samuels J in *Ellis v Wallsend District Hospital* (8). Scarman has explored the legal principles of 'self-determination', not in the intentional tort of trespass, because consent has been given in broader terms, but in negligence. His right of 'self-determination' is 'no more and no less than the right of a patient to determine for himself whether he will or will not accept the doctor's advice' (2). Consequently, if the patient has not been adequately warned then the doctor may be in breach of his or her duty of care.

The second major flaw, that Cassidy alludes to, is that the breach of duty of care, as dictated by the Bolam tests, is a question of fact and as such can only be determined on the evidence (1). As such, if a doctor is measured against his colleagues, the Bolam tests must apply. This is an interesting premise but is based on fallacies of its own. Firstly, the patient has the right to choose whether they will have the procedure or not ('self-determination') and if this right is abrogated by a failure to warn, then the doctor can no longer rely on the Bolam test premise that this was a reasonable practice. This has recently been confirmed in *Rogers v Whitaker* where Handley JA found the appellant negligent in failing to warn the plaintiff, in response to her questions, of a remote but serious risk (4). There are, however, restrictions on this principle. A subjective test

applies, in Australian law, by which the plaintiff must prove they would not have undergone the procedure if fully informed of the risks (5). Additionally, the knowledge must have been reasonably available to the defendant at the time (1).

Secondly, a practice may be fundamentally wrong, proven to be so, and widely advised against. Cochrane notes numerous medical practices, once supported, have now fortunately disappeared (9). If a doctor persists with such practices, in the light of marked and commonly available evidence to the contrary, then, regardless of whether that person has the support of peers, the court has the 'obligation to scrutinise such practice' and see whether they conform to the standard of reasonable care demanded by law (King CJ in *F v R*) (1). This principle was highlighted in the appellate court in *Goode v Nash* (5).

CONCLUSION

In this paper, Cassidy's criticism of both the Australian and Lord Scarman's challenges to the Bolam tests have been reviewed. Whilst Cassidy is correct in his assertions that the Australian challenges are reserving the courts the right to identify what is 'reasonable' practice, his assertions that the courts must be bound by the Bolam tests are not supported. Indeed, the courts should not be bound by the Bolam tests where the practice, though supported, is wrong.

With regard to Lord Scarman, the accusation that he was delving in trespass, and not negligence, is not borne out by current Commonwealth law. Additionally, the factual nature of the breach of duty, as applied in the Bolam tests, disregards the principles of 'self-determination' and the fundamental unreasonableness of a practice.

The laws of negligence in Australia continue to evolve through case law. The direction of this evolution, based on current cases, is likely to be towards more reasonable practice, especially with regard to duty to warn. Indeed, as Benjamin Franklin notes, a little neglect may breed mischief.

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Conference Reports

Mosquito Control Association of Australia (MCAA) Inaugural Conference 14-16 September 1994

Brett Wood

The inaugural Mosquito Control Association of Australia (MCAA) conference was held at the Ocean Blue Resort on the Gold Coast on 14 - 16 Sep 94. This was a very worthwhile conference which looked at a number of diseases of concern, control methodology, pesticide resistance and training.

DISEASES OF CONCERN

Barmah Forest Virus is becoming more prevalent in south east Queensland although the current status as an arbovirus of concern needs to be further investigated. The main (but not the only) vector for the virus appears to be *Aedes* (Ae) *Vigilax* or the salt marsh mosquito.

Arbovirus Studies by the NSW Department of Health (conducted by trapping, sentinel program, case investigation and evaluation of ELISA tests and environmental variables) indicates the presence of a number of diseases including Kunjin Virus (KUN) in the Darling, Murray/Darling and Murrumbidgee River areas, an increase in the prevalence of Barmah Forest Virus (BFV), Ross River Virus (RR) in coastal areas, Sindbus Virus (SIN) and some Gan Gan (GG) isolates. *Culex* (Cx.) *Annulirostris* has been implicated as the vector for Murray Valley Encephalitis (MVE), KUN and RR in inland regions while Ae. *Vigilax* has been suggested as the vector for RR and GG in coastal regions. Trapping for the NSW studies was undertaken during the period Nov to May. In QLD, the RR and BFV isolates are usually not distinguished in published figures.

It was suggested during the conference that Ae. *Vigilax*, the vector for RR and BFV, populations are seasonal and that the disease carried should not persist. Studies indicated that Ae. *Notoscriptus* could be a winter carrier of the diseases thus indicating the survivability from season to season. Studies are continuing into the ability of other mosquito species in carrying disease in the off season.

Mosquito Groups

The most common mosquito groups in Victoria were Ae. *Camptorhynchus* and Cx. *Australis* (coastal), Cx. *Annulirostris*, Cx. *Annulipes* and Cx. *Pipiens* (inland), Ae. *Camptorhynchus* in the Gippsland area, Cx. *Annulirostris* and Cx. *Australicus* in the Murray

Valley area. In Western Australia (WA), the main vector for RR and BFV is Ae. *Camptorhynchus*. The main control in use in WA is VectoBac, a granular Bti, applied by air.

Dengue Fever

A paper was presented on the prevalence of Dengue fever (DF) in the world giving indications that of the 40 - 60 million cases each year for the period 1986 to 1990 there were an average of 234 000 cases per year of the haemorrhagic strain (DHF). This is an increase from the 1956 to 1980 period where an average of 28 611 cases per year were DHF. Regular outbreaks of DF are experienced in the area covering just north of Cairns to just south of Townsville and as far west as Charters Towers. Copepods (*Cycloides* Spp.) were found to be a good larvacidal control method in wells with a recorded 100% survival rate (only 13% in smaller rain water tanks).

CONTROL METHODOLOGY

Temephos

The use of Temephos (ABATE) for larvacidal control is still very large in Australia although some resistance has been observed in the SE QLD area and is being studied. Based on comments made during the conference, application rates for ABATE appear to be made in some instances on an educated guess. It may also be necessary to review alternative larvicide agents should resistance be observed. Alternative products include ALTOSID, ALTOSAND, SkeetalTM (liquid Bti), BactimosTM (Granule and powder Bti) and VectoBac[®] (granular Bti).

Runnelling

The use of runnelling, or the creation of drainage ditches in wet lowlands and salt marshes to assist drainage and reduce breeding areas, appeared to be the main environment modifier to control mosquito breeding sites. Minor discussion was included on damming an area to reduce the breeding site, however, it is an alternative method and well practiced in some areas such as the Gold Coast. The effects of runnelling on environmental management was discussed and it would appear that there is little or no adverse affect on fragile salt marsh

environments. As a consequence of the environment adjustment techniques it may be of value to evaluate existing Integrated Pest Management (IPM) techniques espoused by the US Armed Forces to see if there are any similarities.

Biting Midge Control

A control method presented at the conference related to the excavation of a sand bar for biting midge control. This method seemed a little excessive but was undertaken in conjunction with another environment strategy to increase a bird breeding area while reducing the midge problem. Raking the sands used by biting midges for breeding purposes has been shown to be partially effective. The use of *Bacillus Thuringiensis israeliensis* (Bti) is the main chemical control of choice while Malathion at 500g/ha, aerial application, has been found to reduce midge populations by 97%. Temephos is also used at 1.25kg/ha aerial application. The use of Methoprene (brand name ALTOSAND) is also proving to be very effective in biting midge control. The use of ABATE for midge control is no longer permitted and has been removed from the product label. The reason for this change has not been confirmed but is suggested as insect resistance. Truck traps were used to catch biting midge for survey purposes and proved to be more effective than light traps as the wing length is less than 1mm.

Sentinel Chickens

The use of sentinel chicken programs in Florida was discussed as being useful, albeit somewhat time consuming and manpower intensive. Sentinel programs are in use in QLD, NSW and VIC to supplement existing light trapping programs.

Permethrin Treatment of Mosquito Nets

A paper was presented on the treatment of mosquito nets with Permethrin and its affect on malaria transmission in the Solomon Islands. The target vector was *Anopheles (An.) Farauti*. Permethrin treatment was at 0.5g/m² and was compared to a DDT spray at a rate of 2g/m². The study showed that permethrin treatment of mosquito nets alone will help reduce the survival rate of the *Anopheles* mosquito vector.

Remote Sensing

Remote sensing using satellites and aircraft are currently being trialed in QLD to determine possible breeding sites based on statistical data of property observations. While interesting to local government authorities with a long term management problem it is also a tool that could be readily used by Defence for fixed establishment management.

INSECTICIDE RESISTANCE

Temephos

The use of Temephos (ABATE) for larvacidal control is very large in Australia although some resistance has been observed in the SE QLD area and is being studied by most of the larger tertiary institutions particularly UQ Gatton. A number of studies were presented on the trials of alternatives. The alternatives included ALTOSID, ALTOSAND, Skeetal™ (liquid Bti), Bactimos™ (Granule and powder Bti) and VectoBac® (granular Bti). Most of these products are formulations of Bti or Methoprene. The use of ABATE for midge control is no longer permitted and has been removed from the product label. The reason for this change has not been confirmed but is suggested as insect resistance.

Insecticide Resistance is increasing on a world wide basis. In 1984 there were 17 species of insect that were resistant to all insecticide classes being; DDT, cyclodienes, organophosphates, carbamates and pyrethroids. In 1994 the number has increased to 504 Species. Temephos (ABATE), Fenthion, Chlorpyrifos and Diazinon have some known resistance in various parts of the world. Preventive resistance management rather than curative resistance management techniques were favoured.

Discussions on the value of mixing chemical formulations versus the rotation of chemicals proved interesting. Mixtures of chemical insecticides will only work where the initial resistance to an insecticide is relatively low, and where the persistence of the mixed chemicals is equal. The development of cross resistance is of major concern when using mixed insecticides. The rotation of chemicals has fewer disadvantages although there is still some concern that sub-lethal doses will increase resistance as will the use of long residual pyrethroids. There are also some doubts as the frequency required in rotating the insecticides. Any overuse of an insecticide is likely to cause resistance. Resistance to insecticides is NOT reversible in an affected insect population.

To overcome the problems with resistance the EPA recommend alternative non-chemical methods of mosquito / vector control. In this regard further study of the US Armed Forces IPM methodologies may be required.

GENERAL COMMENTS

Research

The University of Queensland have a research facility at Gatton in QLD on vector related disease and mosquitos. This facility could be used by Defence to undertake resistance studies or provide Defence with relevant data on the North of Australia.

Training

For effective pest control operations it is necessary to have 'the right amount of insecticide and the right insecticide being applied in the right place at the right time'. This comment would indicate that there are many variables to consider in a vector control program. Personnel requiring operational vector control capabilities can be trained through the Queensland University of Technology (QUT), training currently being utilised by RAAF. Defence members with operational vector control currency and experience may benefit from attendance at the QUT Advanced Mosquito Control Course.

Comparative Studies

Comparative studies of *Ae. Tancharinchus* in Florida USA have been compared with Australian studies on *Ae. Vigilax*. with similar results. The south Florida coast-line is very similar to the QLD coastline in many respects making the studies worthy of note.

Publications

A number of publications were on display at the conference. Two publications of particular interest to ADF operators would be 'Mosquito Control to Fit Your Town' by Robert D. Sjorgen and available through Biorational Resources (cost to be negotiated) and 'Mosquitos and Mosquito-borne Disease in Southeastern Australia' by Richard Russell, University of Sydney at \$45.00 per copy. Both publications provide good survey and control strategies in a simple and appropriate format.

About the Author

Squadron Leader Brett Wood is currently the Staff Officer Two Environmental Health in the Office of Surgeon General Australian Defence Force. One of his many roles is the development of policy on the use of pesticides within the Australian Defence Forces.

AMMA Conference

Melbourne 22-24 July 1994.

James Ross, President

For those who were unable to attend the 3rd annual conference in July, I can report, from an admittedly biased viewpoint, that it exceeded my already high expectations. 46 papers were offered for presentation, with a massive increase in 'unsolicited' papers. The desire to keep the program to a Friday afternoon/Saturday/Sunday morning format meant that some papers could not be accommodated. While disappointing in one way, as there were some potentially valuable and stimulating papers rejected, it was pleasing that the response was sufficient to cause such a dilemma. The result was a very crowded program, such that the Saturday started at 0800 and finished at 1730.

For those able to go the distance, they were rewarded with a range and quality of presentation (the testamur is being developed - soon to be adopted by council).

Vivian Bullwinkel's evocative, deeply personal and deeply felt experiences from her years as a POW in Japanese SE Asian camps was for most the highlight of the conference. Vivian was unable to attend last year's conference, so we were indeed fortunate to lure her this year.

At short notice a briefing on the then still not approved Rwanda UN mission by ADF health services was provided. This was followed by an intensive few hours of operational focus, looking at experiences in places such as Western Sahara and Vietnam.

Dr. John Guillebaud, from the UK, of world renown as an expert on contraceptive methods, detailed current and future family planning methods. He returned to give "The stork is the bird of war" demonstrating the stark consequences of continued population increase, with increasing competition for resources leading to armed conflict.

The great breadth of coverage was demonstrated by presentations on training, alcohol misuse and addiction, critical incidence stress management and consent.

The last was given by Rowan Story during the conference dinner. A difficult subject, especially for a dinner speaker, and carried off extremely well.

There were eight trade displays this year, up from four in 1993. I expect this aspect will also continue to grow, given the level of interest from delegates and satisfaction from the trade.

Biased or not, I challenge anyone to show me a better conference, in academic, social and financial terms than AMMA '94.

The challenge is there for those not present to come to **AMMA '95, SYDNEY, SEPTEMBER 1-3**. I expect, given the continuing growth in the program, that we will need at least a few parallel sessions to enable expansion, within the Friday to Sunday timeframe. Give some thought to a presentation also!

Book Review

James Adams. The New Spies, Hutchinson Press, London 1994, 380pp, bibliography, index, hardback, rrp \$40.00

Reviewed by Andy Robertson

This is a well written and extremely thoroughly researched review of the major intelligence services and their activities in the 1990's. The book covers the current status of the American, Russian and British intelligence organisations, the challenges posed by terrorism, drugs, economic espionage and the proliferation of NBC weapons, and what the intelligence agent of the future might be. The book is revealing with some specific information published in the open literature for the first time.

The book is sensibly structured, readable and well indexed. The author knows and understands his subject and is able to convey this to the reader. The book is not comprehensive, however, and concentrates on the North American and European intelligence agencies. Given that restriction, it does cover activities round the world. In particular, the Russian Biological Warfare programme, nuclear proliferation in Iran and the procurement of equipment for the construction of NBC weapons are well covered. This book is a useful addition to the libraries of any military health practitioner or intelligence officer. It may, however, take some finding as it is not readily available in Australia.

Abstracts From The Literature

Submitted by James Ross

Clark DA, et al. 1994. The West Point Study: 40 Years Of Follow-Up. *Aviat. Space Environ. Med.*; 65(5, suppl): A71-74.

Completion of cardiac evaluations of 387 members marked the end of 40 years of follow-up in the West Point Study. Coronary artery disease (CAD) caused 4 cases of sudden death, 14 cases of myocardial infarction (MI), 13 cases of angina, and 17 cases of silent CAD. Using risk factors (serum cholesterol, estimated HDL-cholesterol, systolic blood pressure and smoking status) measured before age 28, we derived a multivariate regression formula for predicting which members of the study, had they been pilots, would have been grounded for CAD before age 55. This derivation used data from only those subjects with CAD or with no evidence of CAD. We then used the formula to compute a risk-related score for each member of the study. In the tertile group with the highest risk-related scores, 17% manifested CAD by age 55 and the first event occurred at age 39. In the tertile group of lowest scores, 2% experienced CAD by age 55 and the first event occurred at age 51. We conclude that it is possible to select pilot candidates with the lowest risk for CAD.

Comment: Fine conclusion, but grounding pilots in the military before age 55 is not necessarily a major problem. The vast majority will not be flying military aircraft by 55 anyway.

Travis TW, et al. 1994. US Air Force Positive Pressure Breathing Anti-G System (PBG): Subjective Health Effects and Acceptance by Pilots. *Aviat. Space Environ. Med.*; 65(5, suppl): A75-79.

Current high performance fighter aircraft subject pilots to acceleration forces that can adversely effect performance and induce unconsciousness in flight. The main strategies to help the fighter pilot sustain +Gz include a pressurized anti-G garment (G-suit), the anti-G straining manoeuvre, and centrifuge training to optimize this effective, but very fatiguing, manoeuvre. To improve anti-G support for aircrew, a positive-pressure breathing anti-G system (PBG) has been developed in the COMBAT EDGE program. In order to determine if any acute adverse health effects are occurring from the use of PBG, a survey of 241 (F-15 and F-16) pilots (49 using PBG and 192 using

standard methods) was conducted. Questions were asked regarding acute health effects and the impact of PBG on mission accomplishment. With the exception of dry cough, no significant increases in adverse events were found, and acceptance in the F-16 was much greater than in the F-15.

Comment: Part of the recent advances in improved G-tolerance for pilots: better G-suits and positive pressure breathing.

Col W. Ramsey. 1994. Politics and the Management of Change - A Case Study from the Australian Army Health Service. *Australian Defence Force Journal*; No 107 (July-Aug): 13-17.

Discusses the amalgamation of two Army units to create the new 1st field hospital. The reasons for the reorganization, including financial restraint, emphasis on the field Army, community attitudes to social issues, increased emphasis on the military ethos and increased bureaucratic control. The article deals with the military method of managing change, problems that may be encountered with such an approach, and conflict management.

Helmkamp JC. 1994. United States Military Casualty Comparisons During The Persian Gulf War. *J. Occup. Med.*; 36(6): 609-615.

The United States undertook an extensive mobilization of military forces in Southwest Asia after the invasion of Kuwait by Iraq in August 1990. With this massive buildup and the short duration of the Persian Gulf War, an epidemiological comparison of military casualties was of interest. Information extracted from the Worldwide Casualty System maintained by the Department of Defence was used to describe the casualties. Of the 219 (212 men and 7 women) US casualties, 154 were killed in battle and 65 died from nonbattle causes. Thirty-five of the battle deaths were a result of friendly fire. Eighty-three percent of all casualties were white and the mean age at death for all casualties was 26.9 years. The Army had the highest proportion of both battle (58%) and nonbattle (71%) casualties and the Marine Corps had the highest battle casualty rate (0.52 per 1000 personnel) and nonbattle casualty rate (0.31).

Comment: Casualty figures, but no illness figures. Casualty rates only a few percent of those in past major wars of the 20th century.

Thomas SR. 1994. Aircrew Laser Eye Protection: Visual Consequences And Mission Performance. *Aviat. Space Environ. Med.*; 65(5, Suppl): A108-115

Battlefield laser proliferation poses a mounting risk to aircrew and ground personnel. Laser eye protection (LEP) based on current mature, mass-producible technologies absorbs visible light and can impact visual performance and colour identification. These visual consequences account for many of the mission incompatibilities associated with LEP. Laboratory experiments and field investigations that examined the effects of LEP on visual performance and mission compatibility are reviewed. Laboratory experiments assessed the ability of subjects to correctly read and identify the colour of head-down display symbology and tactical pilotage charts (TPC's) with three prototype LEP visors. Field investigations included Weapons Systems Training (WST), ground, and flight tests of the LEP visors. Recommendations for modifying aviation lighting systems to improve LEP compatibility are proposed. Issues concerning flight safety when using LEP during air operations are discussed.

McKinley RL et al. 1994. 3-Dimensional Auditory Displays: Development, Applications And Performance. *Aviat. Space Environ. Med.*; 65(5, Suppl): A31-38.

Virtual or 3-D audio display technology has become a reality. This type of system has the capability of synthesizing signals presented over headphones that give the user the illusion that the sound is emanating from some external location. The development of this technology, its applications, and its performance in both laboratory and flight test situations are presented. Potential fighter aircraft applications include threat location warning, wingman location indication, spatially separated multi-channel communications, and audio target location indications. The laboratory performance data show an average localization error in azimuth of approximately 5°, a minimum audible angle of approximately 5°, and a speech intelligibility improvement of up to 28%. Flight test results demonstrated successful audio cued target acquisition, a subjective decrease in target acquisition times, a subjective increase in situational awareness, and a subjective decrease in pilot workload. A summary of both laboratory and flight test results is

presented in addition to recommendations for future research.

Comment: Having had a practical demonstration of 3-D auditory displays, I can reinforce the great potential of this technology.

Regan EC, Price BA. 1994. The Frequency Of Occurrence And Severity Of Side-Effects Of Immersion Virtual Reality. *Aviat Space Environ. Med.*; 65: 527-530.

Virtual reality (VR) has become increasingly well-known over the last few years. However, little is known about the side-effects of prolonged immersion in VR. This study set out to investigate the frequency of occurrence and severity of side-effects of using an immersion VR system. Out of 146 subjects, 61% reported symptoms of malaise at some point during a 20-min immersion and 10-min post-immersion period. These ranged from symptoms such as dizziness, stomach awareness, headaches, eyestrain and lightheadedness to severe nausea. These symptoms caused 5% of the subjects to withdraw from the experiment before completing their 20-min immersion period. Further research needs to be conducted that attempts to identify those factors that play a causative role in the side-effects of the VR system, and that looks for methods of reducing these side-effects.

Comment: Somehow VR-sickness doesn't surprise me. The great visual reality coupled with the lack of labyrinthine stimulation is bound to be a potent emetic.

Submitted by Andy Robertson

Burnett JW, Williamson JA, Fenner PJ. 1994. Mononeuritis multiplex after coelenterate sting. Medical Journal of Australia; 161(5): 320-322.

Comment: Mononeuritis multiplex is a dysfunction of several individual peripheral nerves, sometimes in unrelated parts of the body. Burnett et al. have described two cases of mononeuritis multiplex from coelenterate stings. Military physicians need to be aware of this syndrome during diving operations. In addition to these case studies, the condition has been described after both jellyfish and fire coral intoxications.

Szabo EA, Pemberton JM, Desmarchelier PM. 1993. Detection of the genes encoding botulinum neurotoxin types A to E by the polymerase chain reaction. Applied Environmental Microbiology; 59(9): 3011-20.

The polymerase chain reaction (PCR) was used as the basis for the development of highly sensitive and specific diagnostic tests for organisms harbouring botulinum neurotoxin type A through E genes. Synthetic DNA primers were selected from nucleic acid sequence data for *Clostridium botulinum* neurotoxins. Individual components of the PCR for each serotype (serotypes A through E) were adjusted for optimal amplification of the target fragment. Each PCR assay was tested with organisms expressing each of the botulinum neurotoxin types (types A through G), *Clostridium tetani*, genetically related nontoxigenic organisms, and unrelated strains. Each assay was specific for the intended target. The PCR reliably identified multiple strains having the same neurotoxin type. The sensitivity of the test was determined with different concentrations of genomic DNA from strains producing each toxin type. As little as 10 fg of DNA (approximately three clostridial cells) was detected. *C. botulinum* neurotoxin types A, B, and E, which are most commonly associated with human botulism, could be amplified from crude DNA extracts, from vegetative cells, and from spore preparations. This suggests that there is great potential for the PCR in the identification and detection of botulinum neurotoxin-producing strains.

Comment: PCR may have a useful role in confirming the use of biological warfare agents.

Endean R, Monks SA, Cameron AM. 1993. Toxins from the box-jellyfish *Chironex fleckeri*.

***Toxicon*; 31(4): 397-410.**

Two myotoxins (T1 and T2) with mol. wts of approximately 600,000 and 150,000, respectively, and a haemolysin (T3) with a mol. wt of approximately 70,000 were isolated from the crude nematocyst venom of *C. fleckeri* by the use of Sephadex G-200 chromatography. A neurotoxic fraction (T4) and a haemolytic fraction (T5) containing proteins with apparent mol. wts of approximately 150,000 and 70,000, respectively, were also isolated by Sephadex chromatography from crude extracts of tentacular material from which nematocysts had been removed. The three nematocyst toxins and the two toxic fractions from tentacle extracts were lethal to mice on i.v. injection. After SDS-PAGE the myotoxins T1 and T2 yielded similar major bands corresponding with mol. wts different from those yielded by T3 and the toxic tentacle fractions. T1 and T2 appeared to be comprised of aggregations of subunits with mol. wts of approximately 18,000. On HPLC, crude nematocyst venom and the nematocyst toxins T1 and T2 lost their myotoxic properties. The need for thorough removal of extraneous tentacular material from isolated nematocysts, the need for effective rupture of nematocysts, the need to counter the lability of the nematocyst venom and the need to use myotoxicity as a criterion of venom activity if the active components of the venom are to be purified and characterized are emphasized.

Comment: The toxins involved in box jellyfish stings are extremely potent. Medical personnel supporting diving and amphibious operations in northern Australian waters should consider these jellyfish in their planning.

Doucet I. 1994. Desert Storm Syndrome: Sick Soldiers and Dead Children. Medicine and War; 10: 183-194.

Ill-health has been reported by many soldiers and others deployed in the Persian Gulf during the Gulf War of 1991. Iraqi children have also been reported as suffering from an undiagnosed wasting disease. Little conclusive information has come to light; this paper reviews what is known at present, largely from anecdotal reports. Symptoms reported differ from post-traumatic stress syndrome as reported after previous conflicts; some are suggestive of a direct effect on the immune system. Various possible causes are examined, including post-traumatic stress

disorder, infection, prophylactic medication, exposure to chemical and biological warfare agents, exposures resulting from oil spills and fires, and exposure to depleted uranium ammunition. The latter was used extensively for the first time in the Gulf War, and is manufactured and test-fired in Britain. The passive role of the British government in following up such reports is noted, in contrast with the more active official responses in the United States. It is suggested that Desert Storm Syndrome is one example of multiple assault upon the body's immune system.

Comment: This is a very disappointing review of the Desert Storm Syndrome. It relies mainly on reports in the media, often sensationalist, and does not attempt to address any of the scientific or clinical issues involved.

Suter K. 1994. British Atomic Tests in Australia. Medicine and War: 10: 195-206.

The United Kingdom and Australia have reached agreement on the British payment for cleaning up the Maralinga (South Australia) site at which the UK tested some of its atomic weapons in the 1960s. The tests were conducted amid great secrecy and only in recent years has the truth about the health hazards fully emerged. The peace movement opposed the tests and its stand has been vindicated. Also vindicated have been the claims by Aborigines that more damage was done by the tests than was earlier admitted.

Comment: This is a good review of the history of the British atomic tests in Australia and subsequent attempts to gain compensation.

Brook I, Walker RI, Ledney GD. 1994. Quinolone therapy for infection after irradiation. Medical Corps International; 9(1): 4.

Accidental or war-related exposure to radiation poses significant danger to military or civilian personnel. Ionizing radiation depresses normal host defences and enhances the susceptibility of the immunocompromised host to local and systemic bacterial infections

Comment: This is a useful commentary paper on the benefits of quinolones in combination with penicillin for the treatment of mixed infections post irradiation.

News & Views

Conference & Meeting Calendar

Date	Conference	Venue
13-18 November 1994	AMSUS Conference	Orange County, Orlando, Florida
21-23 February 1995	Health Effects of Radiofrequency Fields	Auckland, New Zealand
01-04 March 1994	ANZAOMS Biennial Conference	Sydney
06-11 March 1995	Wilderness Medical Society	Keystone, Colorado
07-09 March 1995	Ninth International Simulant Workshop	Aberdeen, Maryland
18-22 March 1995	Australian Dental Congress	Hobart
20-23 March 1995	Managing Occupational and Environmental Health Hazards	Helsinki, Finland
May 1995	SPUMS	Fiji
07-11 May 1995	Aerospace Medicine Association	Anaheim, California
01-04 June 1995	International Academy of Peridontology	Monaco
22-26 June 1995	RACP and Faculties	Gold Coast
06-12 August 1995	Wilderness Medical Society	Aspen, Colorado
01-03 September 1995	AMMA Conference	Sydney
07-10 September 1995	AMSANZ	Adelaide
22-26 October 1995	International Congress of Aviation Space Medicine	London
19-23 January 1996	Asian Pacific Dental Congress	Bombay, India

New Members

The AMMA would like to welcome the following new members:

Major Clarence Brown

Medical Treatment, Linton Military Camp, Linton.
New Zealand.

Lt. Stanley Papastamatis

Adelaide Station Pharmacy, South Australia

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If yes, Permanent / Reserve / Navy / Army / Air Force			

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