

including agreed grievance procedures and proper investigation of complaints. The results of this study indicate that providing a positive work environment with appropriate attention to staff support structures may be an additional way to protect people's health and welfare.

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- 1 Manufacturing, Science and Finance. *How big is the problem of bullying at work? Report of a survey of MSF workplace representatives on their experiences and impressions of bullying at work.* London: MSF, 1995.
- 2 National Association of Schoolmasters and Union of Women Teachers. *Workplace bullying: report of NASUWT survey of members 1995.* Birmingham: NASUWT, 1995.
- 3 National Association of Schoolmasters and Union of Women Teachers. *No place to hide: confronting workplace bullies.* Birmingham: NASUWT, 1996.
- 4 Unison. *Violence at work: health service staff study.* London: Unison, 1995.
- 5 Crawford I. Bullying at work: a psychoanalytic perspective. *J Comm Appl Soc Psychol* 1997;7:219-25.
- 6 Rayner C. The incidence of workplace bullying. *J Comm Appl Soc Psychol* 1997;7:199-208.
- 7 Rayner C, Hoel H. A summary review of literature relating to workplace bullying. *J Comm Appl Soc Psychol* 1997;7:181-91.
- 8 Nield K. Mobbing and well-being: economic and personnel development implications. *Eur J Work Organizational Psychol* 1996;5:239-49.
- 9 Bjorkqvist K, Osterman K, Hjelt-Back M. Aggression among university employees. *Aggressive Behaviour* 1994;20:173-84.
- 10 Einarssen S, Skogstad A. Bullying at work: epidemiological findings in public and private organizations. *Eur J Work Organizational Psychol* 1996;5:185-201.
- 11 Einarssen S, Raknes BI, Mathiesen SB. Bullying and its relationship to

- work and environment quality: an exploratory study. *Eur J Work Organizational Psychol* 1994;4:381-401.
- 12 Vartia M. The sources of bullying: psychological work environment and organisational climate. *Eur J Work Organizational Psychol* 1996;5:203-14.
 - 13 Lyons R, Tivey H, Ball C. *Bullying at work: how to tackle it. A guide for MSF representatives and members.* London: MSF, 1995.
 - 14 Lockhart K. Experience from a staff support service. *J Comm Appl Soc Psychol* 1997;7:193-8.
 - 15 Randall P. *Adult bullying: perpetrators and victims.* London: Routledge, 1997.
 - 16 House RJ, Rizzo J. Role conflict and ambiguity as critical variables in a model of organisational behaviour. *Organisational Behaviour and Human Performance* 1972;7:467-505.
 - 17 Quinn RP, Staines GL. *The 1977 quality of employment survey.* Ann Arbor: Institute for Social Research, University of Michigan, 1979.
 - 18 Cammann C, Fichmann M, Jenkins D, Klesh J. *The Michigan organisational assessment questionnaire.* Ann Arbor: University of Michigan, 1979.
 - 19 Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand* 1983;67:361-70.
 - 20 Payne R. Demands, supports, constraints and psychological health. In: Mackay C, Cox T, editors. *Response to stress: occupational aspects.* London: IPC Business Press, 1979.
 - 21 Adams A. *Bullying at work: how to confront and overcome it.* London: Virago, 1992.
 - 22 Bassman E. *Abuse in the workplace.* New York: Quorum Books, 1992.
 - 23 Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Personality Soc Psychol* 1986;51:1173-82.
 - 24 Institute of Personnel and Development. *News release.* London: IPD House, 1996.
 - 25 Alderman C. Bullying in the workplace. *Nursing Standard* 1997;11(35):22-6.
 - 26 Cohen S, Hoberman H. Positive events and social support as buffers of life change stress. *J Appl Soc Psychol* 1983;13:99-125.
 - 27 Nachmias C, Nachmias D. *Research methods in the social sciences.* New York: St Martin's Press, 1981.
 - 28 Health and Safety Executive. *Stress at work: a guide for employees.* London: HMSO, 1995.

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Observational study of defibrillation in theatre

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Prompt, safe defibrillation is the treatment most likely to improve survival after ventricular fibrillation.¹ Anaesthetists and surgeons need adequate skills to treat cardiac arrest.² This observational study, set in the operating department of an acute hospital, tested whether surgeons and anaesthetists could manage ventricular fibrillation in accordance with advanced life support protocols.³

Subjects, methods, and results

Over two separate days 23 surgeons and 25 anaesthetists were asked, without warning or apparent prior knowledge, to manage simulated ventricular fibrillation (Laerdal skill master, Laerdal Heartstim 2000, and Laerdal monitor interface, Laerdal Medical, Orpington, Kent). Candidates were randomised (by tossing a coin) to either the S&W defibrillator (Simonson and Weald DMS 930, Vickers Medical, Sidcup, Kent) or the Lifepack 9 (Physio Control Corporation, Redmond, WA, USA). Nineteen consultants, four staff grades, and 25 trainees (12 senior house officers and 13 registrars, senior registrars, and specialist registrars) were studied from initial assessment to the third defibrillation. Results were analysed with Mann-Whitney U test and Fisher's exact tests (Analyse-it for Microsoft Excel).

Of all the candidates, 83% (40/48) failed to defibrillate according to advanced life support protocols (table). The Lifepack 9 was easier to turn on

(median (range) 61 (11-113) seconds *v* 82 (14-196) seconds for the S&W; $P=0.03$; $n=44$), and the first shock was delivered more rapidly (72 (16-123) seconds *v* 102 (40-201) seconds; $P=0.006$; $n=44$). This was not significant, however, after three shocks (129 (33-218) seconds *v* 152.5 (85-278) seconds; $P=0.15$; $n=43$). Forty candidates failed to deliver the first shock within 60 seconds, 24 by 90 seconds (range 11-201; $n=44$). Four candidates failed to turn on the defibrillator, five candidates failed to deliver three shocks, and only four candidates delivered three shocks within 90 seconds; seven took over 180 seconds (range 33-278). Median (range) times to confirm arrest and call the arrest team were 10 (0-87) seconds and 10.5 (0-120) seconds, respectively.

All candidates were content with the method of testing and were happy to be tested in this manner in future.

Anaesthetists fared better than surgeons, although because of the small sample this was not significant (7/25 *v* 1/23; $P=0.06$). There was no difference between trainees and consultants (3/25 *v* 3/19; $P=0.71$).

Comment

Defibrillation skills are poor across a cross section of grades of anaesthetists and surgeons, the main reasons being lack of safety procedures and lack of knowledge.

Reasons for failure of staff to defibrillate in simulated setting in operating theatres

Reason for failure	No of subjects (n=48)
Safety:	
No warning call	7
No confirmation of arrest	22
Waiving paddles	21
Total No of failures	33
Knowledge:	
Incorrect placement of paddles	8
Wrong energy (100-400 J)	16
Interruption of shocks*	13
Total No of failures	30
Safety and knowledge combined	23

*By cardiopulmonary resuscitation in 11 and by administration of drugs in 6.

Operating theatres are often inaccessible to non-theatre staff, thus reliance on early arrival of the hospital resuscitation team may adversely affect outcome. This study confirms that the key advanced life support skill of defibrillation is still inadequate across a range of clinical experience, despite previous reports.^{4 5}

It is of some concern that 69% of attempts failed because of inadequate safety, replicating the findings of Bell et al.⁵ If used injudiciously, charged defibrillator paddles are dangerous to patients and staff. The 62% failure from lack of knowledge reflects inadequate training and skill retention. The absence of an initial pulse check to confirm arrest by 46% of candidates is worrying as interference from electrocardiographs in theatres may mimic ventricular fibrillation.

Optimum effect from defibrillation occurs within 90 seconds of onset of ventricular fibrillation¹; only half of the candidates achieved this. Defibrillators are used

infrequently and thus need to be "self explanatory." The covers and position of the buttons on the S&W defibrillator resulted in a significant delay. Unnecessary breaks between shocks for administration of drugs and cardiac massage caused further delay. Training and the use of (semi) automatic defibrillators might improve this.

All doctors in theatre who might operate alone should be competent in advanced life support. Such training is time consuming, and resources are not available to retest with sufficient frequency. The 100% positive response suggests there should be further study of the efficacy of random testing and use of "mock arrests" on maintenance of skills in advanced life support techniques.

This research was carried out before the publication of the 1997 guidelines from the Advanced Life Support Working Party of the European Resuscitation Council.

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Conflict of interest: None.

1 Advanced Life Support Working Party of the European Resuscitation Council. Guidelines for advanced life support. *Resuscitation* 1992;24: 111-22.

2 Alderson K. Family sue over death after operation. *Times* 1996 March 23;cols 1-3.

3 Resuscitation Council UK. *Advanced life support handbook*. 2nd ed. London: Resuscitation Council UK, 1994.

4 Tham KY, Evans RJ, Rubythion EJ, Kinnaird TD. Management of ventricular fibrillation by doctors in cardiac arrest teams. *BMJ* 1994; 309:1408-9.

5 Bell JH, Harrison DA, Carr B. Resuscitation skills of trainee anaesthetists. *Anaesthesia* 1995;50:692-4.

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A memorable patient Long term follow up

In 1968, although an obstetrician by training, I was appointed as general surgeon to a mobile surgical team embarked in the aircraft carrier *Eagle* to provide cover for the naval task group covering the withdrawal from Aden.

This eccentric appointment arose from a temporary shortage of available surgical specialists and was a cause of some amusement on board and some concern on my part. I was not reassured to hear that, in the second world war, the United States marine corps had recruited several obstetricians who were unwanted by the other services and found them to have the best battlefield mortality figures, since they were well used to working fast in a welter of blood. A further complication was that for operational reasons we would spend long periods at sea and would have no access to shoreside facilities. It was decided that, in addition to emergencies, we should carry out routine, relatively minor surgical procedures on board since we had the facilities.

The subject of this follow up was a seaman in one of the frigates who suffered the classic seaman's injury when, during a jackstay transfer—between two ships—he stepped back into the bight of a rope and was dragged up to the pulley block, almost completely avulsing his foot at the ankle joint. First aid was given in his ship and he was then transferred by helicopter to us. No attempt could be made to save the foot; there was too much tissue loss and an adequate stump could be fashioned only at mid calf level.

On waking, the patient complained that he had missed his tot; he asked what we had done with the limb and seemed reassured to hear that it had been thrown over the side. He seemed to think

that this added a suitably Nelsonian touch. His behaviour following the operation impressed everyone; he was unfailingly cheerful, never complained, and showed none of the anxiety he should have had for his future. Some of the credit for this must go to the excellent chief petty officer in charge of the theatre and ward, who looked after him with skill and humour as only sailors can. We were able to evacuate him by helicopter to Gan Island after five days and thence by air to Britain. On the tenth day he set off on crutches for sick leave at home. I heard nothing further of him but continued to worry that I might not have given him an adequate stump.

In 1996, long after I had left the service, I received a letter addressed to me by name, forwarded by the navy's medical department with the cryptic note, "I do hope you'll be able to go." It was from the sailor's wife inviting me to his surprise retirement party after 23 years in the wine trade; apparently he had often said that he would like to meet me again. My former chief petty officer and I both attended; I half expected to be assaulted for the damage I had wreaked but it was an emotional reunion. He walked without a limp and his retirement present was a bag of golf clubs. I was dying to look at the stump but didn't like to ask.

It is not often in surgical practice that you get the chance of such long term follow up. I hope I do not get invitations to the retirement parties of my failures. My thanks are due to the patient and to the medical director general of the navy for permission to publish this memoir.

Roger Doherty, *retired consultant obstetrician, Portsmouth*