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OCCUPATIONAL HEALTH

Contents

Police

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Introduction

This article emphasizes the occupational health needs of police officers and the (nonsworn) staff employed to support their activities from a predominantly UK point of view. Despite that perspective, the broad principles apply widely although the organization, extent, and resourcing of police functions vary throughout the world. In the UK, nearly all duties not requiring police powers – in general, the authority to pursue, arrest, charge, and detain suspects – are devolved to civilian or support staff. Examples include the search of scenes of crime and the desk officers or station assistants who are often the first contact for members of the public. In addition, police forces have many clerical and administrative employees.

The distinction between police officers and support staff has become blurred. Specialists in computer crime and forensic science, for instance, are integral to investigations requiring their skills. Some police officers find it difficult to concede high status to these experts. Such cultural attitudes contribute to the organizational stress prevalent within police forces. Unless this problem is firmly addressed, the aim of achieving and maintaining a healthier police service will not succeed. There is no reason to think this is solely a UK problem.

In the UK, doctors are subject to standards contained in the General Medical Council's *Good Medical Practice*. These standards apply in an occupational health setting, in which a careful balance has to be struck between the interests of management and those of the work force. An occupational health service for the police should be led (or overseen) by a physician whose ethical standards apply to all staff, whether clinical or administrative. Management must also acknowledge the obligations owed by the occupational health service to individuals, despite any expectation that force objectives will have priority. To add to their difficulties, occupational health professionals have a role as employer advisers.

For simplicity, the acronym OHU (occupational health unit) will be used both for the unit itself and for occupational health staff who, depending on contractual arrangements, may be employed by the police force or by an external provider.

Do Police Officers have Different Occupational Health Needs from Other Employees?

Police officers are expected always to be "on duty," to maintain a standard of behavior during leisure time that is quite at odds with the norms of society. Self-control exercised at work spills over into personal lives, often to the detriment of family relationships. It is easy to forget that the sudden deaths, injuries, and fatalities in road traffic accidents, deaths of young children, as well as criminal acts, are far beyond normal experience. There are psychological consequences for police and other emergency-service personnel. If the response of supervisors is that this is the job they were employed to do, such lack of understanding merely adds to the stress of these experiences. Similar attitudes are found in other enforcement agencies (prisons, customs and excise, and military) in which there is a hierarchical, regimented structure.

The prevalence of marital, addiction, and post-traumatic stress issues in police forces and similar

organizations is far higher than in other occupations. There is also a higher incidence of injury sustained on duty, and longer-term poor physical health is more common.

How Should Occupational Health Services be Supplied?

Nurses with occupational health qualifications fulfill the bulk of the day-to-day work, but an integrated OHU could usefully employ physiotherapy staff (physical therapists) and occupational therapists to provide treatment and speed return to work. Clinical psychologists, dentists, and dependency counselors are valuable resources. Circumspect referral of personnel to specialists such as psychiatrists, orthopedic surgeons, experts in physical medicine, or physicians is cost-effective. The work of welfare officers or of an employee-assistance program (EAP) is discussed later.

Economic and logistic factors determine the provision of services. A cost/benefit analysis should establish a total budget and how it is managed. In-house staff have the benefit of close cultural identification with police officers but may suffer greater management interference. A fully or partially contracted-out service at a fixed price assists overall budgeting.

Chemical, thermal, radiation, biological, or infective hazards concern occupational health in a conventional industrial context, but when police officers encounter these, they are more likely to do so unexpectedly or inadvertently rather than as part of their working environment. Police forces in the UK employ health and safety officers, who provide current guidance on hazards, but exposure to body fluids spilt in the course of assault or accident causes great anxiety. Questions are likely to devolve to the OHU. Bloodborne virus diseases are considered later. There is a need to maintain close liaison with external health providers because only the largest police organizations have the resources to cope in-house with the active management of emergencies.

A central issue for professional and administrative staff is confidentiality. Without reassurance of confidentiality, patients or clients will not avail themselves willingly of whatever services are provided. It is crucial that these services are not seen to be linked to management departments dealing with human resources or personnel. Whenever OHU believes there is a need to breach confidentiality in the interest of the individual, to comply with some legal obligation or (particularly in a police context) because of a criminal inquiry, the problem should be shared with colleagues. In any case, the desirability of disclosure will normally have been discussed with the patient/client.

Staff of an external EAP provider, being neither fellow employees nor agents of the police organization, have independence that increases their credibility with officers using their services. A disadvantage is that external providers sometimes do not have a good understanding of the police culture. This can lead to clients feeling misunderstood or that the counselor does not appreciate their working environment. A counselor may create an unrealistic expectation, for example, by suggesting that the client request a job where he or she never has to deal with death in any form! Subject to agreement with the client, direct liaison between the counselor and manager is to be preferred.

Working Conditions of Police Officers

The need for the police to provide 24-h service, ready to react to whatever incident presents, has become intensified within cities as entertainment and the consumption of alcohol continue well into the night. Wherever crowds gather, there is a duty (for reasons of public safety) to ensure an adequate police presence. To cope, officers must work a shift pattern to match patterns in both crime and public activity. Although some police officers relish the comparative freedom to pursue other interests, most find a rotating shift enervating due to both the adverse physiological effects and the spillover into family life and relationships. Prevalent working conditions make it difficult to maintain a fitness regime and to eat regular, balanced meals. Police premises should have at all reasonable times: sports or gymnasium facilities for use on or off duty; well-appointed changing rooms and hygienic bathrooms; facilities for the preparation of meals; and (in larger buildings) cafeterias that serve a range of nutritious food. The benefits for both staff and management need repetition and reinforcement.

The requirement to be on duty at hours outside the core working day results in: an increased risk to officers' health; a likelihood of disturbed sleep patterns; increased fatigue and impaired judgment; greater risk of accidents; an adverse effect on enjoyment of life. The manifestations of impaired sleep resulting from rotating shift patterns are well documented. The variation in tolerance to night work arises from a complex of commitment to the job, physical and psychological fitness, and daily habits.

From a physical standpoint, much of the work of a police officer is sedentary (at a desk or in a car), whatever the assigned duties. The demands for speed or stamina come without warning: there is no opportunity to warm up in preparation. A satisfactory level of athletic fitness is a requirement for officers working in an operational post.

Safety obligations come with the everyday activity of driving, but particular responsibilities fall on professional drivers, who include police officers, and their supervisors. Sleep-related vehicular accidents (SRVAs) account for up to one-fifth of road traffic accidents, with peaks occurring in early morning (mainly affecting young male drivers) and mid-afternoon (older males). Sleep deprivation due to rotating shifts puts police officers at increased risk during the clusters of SRVAs; in addition, many have to drive home after their shift, when their attention span is reduced. The problem of excessive daytime sleepiness is compounded if the officer is attending court during the day, has family commitments keeping him or her from adequate rest, or has a second occupation.

Confrontation leading to a physical struggle puts an officer at risk of injury, as does involvement in crowd disorder. Instruction and training emphasize techniques designed to help the officer defuse a situation and preserve "personal space." Even with the use of protective equipment such as batons, CS, or pepper sprays, conflict cannot always be avoided. Neither Tasers (Taser International Inc.) designed to deliver a disabling electric charge, nor firearms guarantee safety. The protective, armored vests commonly worn may impede movement. During a struggle, all types of injury may be sustained, blood is likely to be spilt, and some of those resisting arrest will attempt to intimidate officers by spitting into their eyes or mouth potentially infected sputum.

At incidents, or following an arrest, officers may be required to move vehicles or equipment or to lift and carry those they have arrested or injured people. In the heat of the moment, it is easy to forget the danger of suffering a handling injury.

Recruitment

The traditional aim in assessing candidates has been to exclude those who are "unfit" and those, such as diabetics, thought to be at increased risk of becoming unfit in the future. The question is, "fitness for what?" The physical and mental attributes demanded of officers have changed radically: medical advice must be pragmatic. OHU should help promote programs encouraging recruits to maintain, or even improve, the standard of physical fitness they possess on entry. Again, positive cultural influences (especially support from immediate supervisors and older colleagues) are important.

Standards

An effective recruiting department will state clearly in its literature the standards demanded, with a list of potentially disqualifying disorders. These standards require medical guidance. Some candidates may challenge published exclusions, but it is fair to intimate that the job requires some fixed level of fitness (mental, physical, and emotional) as well as educational achievement. The evidential basis for standards has proved difficult to establish. Both male and female officers are expected to engage in the same level of physical activity, but most females are slighter and shorter than their male counterparts. The effort not to discriminate unfairly between males and females has resulted in the acceptable height for male recruits being reduced. Similarly, many more males than females have impaired color vision: to reject on the basis of defective color vision would adversely affect more males than females (unless it can be shown that perfect color vision is essential to accomplish police duties). In essence, these considerations are societal, not medical, but doctors are likely to have to manage them on behalf of the police force.

For these reasons, the standards set out in Table 1 are merely advisory. With age and seniority, athleticism is required less because fewer operational demands are made on officers in promoted posts.

Disability Discrimination Legislation

The UK Disability Discrimination Act of 1995 exempted police recruitment procedures, but this protection is coming to an end. The Department of Work and Pensions calculates that the disability level in the working population is approximately 9% and assumes the comparable figure for the police to be 7% (there are about 166 000 police officers). The recruitment of disabled police officers is likely to increase that figure to 8%. Of course, during their career, some police officers will develop disability but be retained in office due to their skill and experience. A more general recruitment of the disabled may result in unfairness to other officers because blocks on redeployment seem inevitable.

Special Categories

The ability to drive a car is an almost universal requirement. Police officers are "professional" drivers for whom the UK authorities prescribe medical screening to exclude a wide variety of potentially disabling conditions.

Additional standards apply when officers take specialist posts, for instance, as divers, aircrew, and in mounted detachments.

Physical Health

Force management, representative organizations (police trade unions), and OHU have roles to play

Table 1 Standards for recruits[a]

System	*Reject*	*Consider carefully*	*Comments*
Eyes	Squint	Latent squint	Laser surgery under review
	History of detached retina	Lens implant	
	History of glaucoma	Corneal graft with good uncorrected visual acuity	
	Radial keratoplasty		
	Laser corneal correction		
Visual acuity (unaided)	Worse than 8/18 in either eye (binocular worse than 6/6 requires correction)	Consider effects of age on acuity	An independent specialist's eye opinion may be helpful, especially when higher standards are demanded
Color vision	Failure on City University Test	Failure on Ishihara Test	City University Test: 7 of 10 correct within normal limits
Ears	Hearing aid	Any chronic ear, nose, and throat condition	
	Active chronic suppurative otitis media		
	Current perforation		
Hearing	>average of 20 db loss over range 500–4000 Hz	Consider effects of age on acuity	Audiometry routine at preemployment assessment, using a soundproof booth
Cardiovascular	Hypertension requiring treatment	Hypertension >140/90	
	Severe varicose veins	Minor varicose veins	Defer until treated
	Uncorrected congenital heart disease	Hemorrhoids	Defer until treated
	History of coronary artery disease	Cardiac surgery in childhood	Routine ECG not required
	Cardiac surgery, adult		
Neurological	Any proven epileptic seizure after 5 years of age	Any episode of altered consciousness after 5 years of age	
		History of migraine	
	Degenerative neurological disease	History of brain surgery	
		Any significant head injury	
Metabolic	Diabetes mellitus	History of thyroid or any other metabolic disorder	Well-controlled diabetic may merit consideration
		BMI between 25 and 30	
		BMI <19	
Weight	BMI >30	BMI between 25 and 30	
		BMI <19	
Body fat		Percentage greater than Male, 21 Female, 30	
Gastrointestinal	Peptic ulcer	Occasional dyspepsia	
	Hiatus hernia	Hernia	Defer until treated
	Crohn's disease		
	Ulcerative colitis		
	Irritable bowel syndrome		
Respiratory	Nonasthmatic chronic respiratory disorders	Sinusitis, chronic URTI, hay fever	Routine chest X-ray not required
	Asthma currently on treatment (including inhalers)	Past history of asthma	Routine spirometry required

Continued

Table 1 Continued

System	*Reject*	*Consider carefully*	*Comments*
	Spontaneous pneumothorax on two or more occasions	Spontaneous pneumothorax on one occasion	
	FEV_1 or FVC >2 SD below predicted norm	FEV_1 <75%	
Musculoskeletal	History of back disorder requiring hospital treatment	History of minor back disorder	
	History of laminectomy	History of arthroscopy, including partial meniscectomy	
	History of major knee surgery, including open meniscectomy	Isolated dislocation of any joint	
	Recurrent dislocation of major joint	History of knee injuries not requiring surgery; significant fracture	
	Major foot deformities	Major soft tissue injury	
	Muscle wasting, effects of cerebral palsy	Chondromalacia patellae	
	Chronic orthopedic condition		
Psychiatric	Psychotic illness	History of isolated reactive depression	
	Most neurotic or stress-related psychiatric disorder		
	History of drug abuse		
	History of alcoholism		
	History of eating disorder		
	History of sociopathic behavior		
Genitourinary	Chronic genitourinary disorders	Any significant disorder of reproductive system	
Skin		Severe eczema, psoriasis, pustular acne	
Reticuloendothelial	All reticuloendothelial disorders		

[a]Adapted from McLay WDS (ed.) *Clinical Forensic Medicine*, 2nd edn. London: Greenwich Medical Media. Data published courtesy of FGI World.

in maintaining officers' physical fitness. The first need is to imbue staff with enthusiasm. Exhortation, example, publicity, and competitive sport all help, but so do facilities. The force may provide these, but the representative organizations often operate sports clubs. Good working relationships between officers' representatives and the OHU are worth all the effort expended to achieve them. Sports carry the probability of injury. The force must endure the consequent absences from duty. Certainly, in the UK and Canada, community services cannot cope with sporting injuries effectively, but there are many excellent sports-injury clinics that offer immediate treatment. Concession rates can often be negotiated for police officers or even provided as part of a benefits package.

Similarly, the delay in health service care for minor and chronic injuries suggests that police forces should consider the legitimacy of spending public money on private provision, either on a case-by-case basis or as part of overall medical and dental care.

Training in Techniques

The medical implications of such training are of interest to OHU. Instruction in combat and self-defense has the potential for injury during training as well in operational use. Two examples are self-injury during the deployment of CS spray (when particles strike the officer's face or contaminate clothing) and when attempting awkward lifts (e.g., when arresting a drunk). For the latter, direct input by a physical therapist on posture and back care is likely to be appreciated.

Injury

Recording of injuries that officers sustain on duty is essential. The financial consequences to the officer and to the force are major if the injuries are, or become, disabling. The UK Police Pensions Regulations 1987 defines a qualifying injury as one received in the execution of that person's duty as a constable;

while on duty; or while on a journey necessary in order to report for duty or return home after duty; or received because he or she was known to be a constable. These simple words are a rich source of litigation. Is an officer injured on duty if he/she twists his/her knee when rising from a chair? What about a defective chair? At the end of the day, these are legal, not medical, decisions.

Mental Health

The force must put in place a mechanism that is easily accessible to officers who face welfare problems, including debt, marital disharmony, discrimination, and anxiety about duties. The remit will vary, but welfare officers are usually employed directly. They will be less effective (and less trusted) if they report to central management. Many forces have contracted out the work to an EAP. Table 2 provides information on the economics of using such a provider in Ontario, Canada, based on average utilization of 7%; in 2002, police utilization was 9.4%.

Critical Incident Stress Management

It is common for forces to have peer support programs to help officers deal with distress or emotional "highs" provoked by traumatic events. In some forces, debriefings are carried out by a mental health professional together with one of the peers as part of critical incident stress management (CISM). Such an arrangement allows the mental health professional to help in training and assessment of peer facilitators. Some explanation of the concepts underlying these procedures is necessary because they have become controversial.

Trauma can be provoked by a wide range of events, from child death to all sorts of catastrophe and brutality. The core feature of the officers' reaction is that some may begin to question their own security and the safety of family and friends. Actual bodily injury does not need to have been sustained: the essence is an existential doubt. Anyone who believes life has been in danger, who has seen death and destruction, is likely to be distressed, irritable, and perhaps irrational, but these feelings subside in hours or days. The purpose of debriefing or defusing is to demonstrate to members of a team that such feelings are expected, that they are "normal," and will probably diminish rapidly. An opportunity is given within a safe environment for members of the team to question themselves and their colleagues about what happened and why, about the outcome, and about what other steps they might have taken together. (This is not to be confused with operational debriefing, in which blame may fall on individuals.) The process allows them to appreciate their own vulnerability, to put it into a context with which they can come to terms. Such a session may become quite heated but needs to be led by properly trained facilitators. Their role includes the responsibility to provide information on further services available and to be sensitive to those participants exhibiting warning signs of distress beyond the level anticipated. Promises of help must be given only where skilled support is in place.

Controversy arises over claims that these procedures cause harm rather than benefit. Readers are referred to the extensive literature on the topic but should bear in mind that the studies reviewed frequently do not relate to emergency personnel in their role as helpers and are often conducted by a single counselor (not a trained colleague) with individual patients who have suffered injury. CISM is a supportive technique, not a treatment. Adequate records and any follow-up should allow audit of the process to ensure that no harm results. The mechanism for ensuring assessment by a mental health professional when signs of distress are exhibited, or when participants request it, must be watertight. Voluntary follow-up also helps to ensure that individuals do not fall through the cracks.

Organizational Stress

Psychological distress does not result predominantly from traumatic incidents. OHU has a duty to bring resolutely to the attention of senior management patterns of behavior giving rise to organizational sources of stress, such as conflict, bullying, and discrimination. It is the duty of representative bodies, not OHU, to act as an officer's advocate. The doctor or nurse cannot undertake the inquiries necessary to establish facts. Nevertheless, good liaison with all levels of management allows beneficial input, supporting officers in achieving reasonable hours, family time, manageable workloads, some control over one's career, and a sense of security at work as well as being valued by management. Extensive studies throughout the world confirm that the lack of such factors influences the psychological ill-health contribution to sickness absence.

The force will have a policy toward sickness absence, probably involving some form of return-to-work interview by supervisors. It is crucial that the supportive purpose of such an interview is understood, otherwise it will fail. Training requires regular reinforcement. The interview gives a valuable opportunity for supervisors to assess colleagues, to understand undercurrents, and to refer for skilled assistance. Such skilled assistance may require counseling techniques but often no more than a listening ear or the institution of practical supportive measures.

Table 2 Economics of using an employee assistance program[a]

Estimated return on productivity	
Assumes: 10% workforce distressed 20% productivity loss for distressed staff 65% success through EAP counseling	
Costs without EAP	
A. Number of employees in the plan	1000
B. Number of troubled employees (A × 0.10)	100
C. Average annual wage/benefits to troubled employees	$40 000
D. Wages to troubled employees (B × C)	$4 000 000
E. Cost of reduced productivity without EAP (D × 0.20)	$800 000
Costs with EAP	
F. Number of troubled employees contacting EAP (B × 0.08)	80
G. Number of troubled employees who contact EAP and reach goal (assume 65% success) (F × 0.65)	52
H. Number of employees who contact EAP and do not reach goal as well as those who are assumed to be distressed and do not contact EAP (B − G)	48
I. Cost of reduced productivity for employees ''H'' (H × C × 0.20)	$384 000
J. Cost of reduced productivity for employees ''G'' (assumes that even those who are successful in EAP require time to return to productivity) (G × C × 0.20 × 0.167)	$69 500
K. Cost of EAP	$45 000
L. Cost of reduced productivity with EAP (I + J + K)	$498 500
Savings with EAP	
M. (E − L)	$301 500
Return on investment	
N. (M ÷ K)	6.7:1
Estimated return on supervisory time	
Assumes: 10% workforce distressed 9 h of additional supervisory time, beyond that typically provided, is required to manage the troubled employee (reduced productivity, impact on other employees, etc.) 6.88% EAP utilization rates 65% success through EAP counseling	
Cost of supervisory time without EAP	
A. Number of employees in the plan	3300
B. Number of troubled employees (assumes 10% of workforce is distressed) (A × 0.10)	330
C. Number of supervisory hours per troubled employee per year above normal supervision	9
D. Cost of supervisory time per troubled employee without EAP (assume supervisory rate of $25/h) (B × C × $25)	$74 250
Cost of supervisory time with EAP	
E. Number of EAP users (A × 0.685)	226
F. Number of EAP users who reach successful goal (E × 0.65)	147
G. Number of EAP users who do not reach successful goal (E − F)	79
H. Cost of supervisory time for employees who did not use EAP and those who did but were unsuccessful [(B − E + G) × C × $25]	$41 175
I. Cost of supervisory time for those employees in ''F'' (assume that employees in EAP require at least 3 h of supervisory time until issues are resolved and return to productivity) (F × 3 × $25)	$11 025
J. Cost of supervisory time with EAP (H + I)	$52 200
Savings on supervisory time with EAP	
L. (D − J)	$11 700
Employee turnover	
Assumes: 6.88% usage rate 5% of users are at ''high risk'' to leave job $60 000 in replacement costs (assumes $40 000 wage/benefits × 1.5 replacement costs; Conference Board of Canada, 1994) 65% success rate through EAP counseling	
A. Number of employees in plan	3300
B. Number of EAP users (A × 0.07)	226
C. High-risk (5% of EAP users at high risk for turnover (B × 0.05)	11
D. Success rate in EAP (i.e., number of high-risk employees who do not leave) (C × 0.65)	7
E. EAP users who do leave (C − D)	4

Continued

Table 2 Continued

Savings on employee turnover with EAP	
F. (D × $60 000)	$420 000
Cost of employee turnover with EAP	
G. (E × $60 000)	$120 000
Net savings	
H. (F − G)	$180 000
Estimated savings on short-term disability costs	
Assumes: 3% of employee population will go on STD leave 6.88% usage rate in EAP 65% success in counseling $8400 average cost of STD case (assumes $200 per day × 28 day absence × 1.5 salary for replacement costs)	
A. Number of employees	3300
B. Number of employees at risk of STD (A × 0.03)	99
C. Number of employees at risk of STD who use EAP (B × 0.07)	7
D. Number of high-risk employees who reach goal and do not utilize STD benefit (C × 0.65)	4
E. (D × $8400)	$33 600
Summary	
Estimated return on productivity	$821 688
Estimated return on supervisory time	$22 050
Employee turnover	$180 000
Estimated saving on STD costs	$33 600
Total cost savings for EAP	$1 057 338

[a]Data published courtesy of FGI World.
Abbreviations used: EAP, employee assistance plan; STD, short-term disability.

Vulnerable Groups

Among officers requiring routine psychological support are: those working on major criminal enquiries undercover; those dealing with vice, pornography, and sex offenders; liaison officers with families during lengthy murder enquiries; and officers using deadly weapons.

Chemical Dependency

Substance abuse (the nontherapeutic use of alcohol, prescription drugs, over-the-counter drugs, illicit drugs, and solvents/inhalants) may affect as many as one in five persons in a work force, with one-fourth of these addicted to alcohol. A police officer's job demands the exercise of judgment but is performed very much under public scrutiny. Violent crime is often alcohol-related, petty crime supports a drug habit, and drug trafficking is the root cause of much major crime. Officers with a "habit" are therefore in an especially invidious position. Their vulnerability to loss of position increases their need for concealment of the problem and the difficulty in seeking help.

Awareness of an officer's chemical dependency presents OHU with a dilemma because the rules of confidentiality are liable to put them at odds with management where strict disciplinary rules apply to officers who have consumed alcohol. Before any form of remedial action is taken, an unambiguous contract with the officer must make clear what is demanded of both sides. The force policy on alcohol and drug abuse must be well publicized to all personnel. It should warn of the consequences of alcohol and its effects on work, but it must also make clear how help is accessed. The response of colleagues is often to collude with the drinker, a course likely to prolong and worsen the problem.

Rehabilitation and Return to Work

One purpose of any management return-to-work interview is the detection and assessment of underlying problems, particularly if a pattern indicative of excessive drinking, family problems, disaffection, or malingering is established. The danger for both participants is that the interview can become confrontational rather than supportive. OHU may be able to resolve some of these problems and also facilitate negotiations for a program of, for example, parttime or light duties or reassignment to another department.

An arrangement of this kind is often necessary as an officer recovers from childbirth, bereavement, or some psychological crisis; it may be employed in association with continuing therapy. It is easier for managers to accept the need for a program following injury, particularly when physical or occupational

therapy is in progress. Acceptance is particularly difficult when the need arises due to dependency on alcohol or drugs. If a timetable is not applied, these arrangements become open-ended, causing dissatisfaction for management, loss of OHU credibility, and ultimately, a disservice to the client. Regular monitoring is essential.

Infectious Disease

Wherever there is intravenous drug abuse and sexual promiscuity, there will be a pool of bloodborne viruses in the community. Operational officers need to be protected against hepatitis B by adequate immunization. There is a much greater fear of human immunodeficiency/acquired immunodeficiency syndrome (HIV/AIDS), and a lesser fear of hepatitis C, although these attitudes do not reflect actual risk. Priorities include:

- awareness of the dangers officers face
- sound hygienic practice
- use of rubber gloves
- covering broken skin
- use of heavy-duty gloves when handling broken glass at a road accident
- use of a device to perform mouth-to-mouth resuscitation
- thorough washing after the incident
- reporting any possible contamination via a wound.

Postexposure harm can be mitigated by antiviral therapy, following a proper protocol. Such treatment carries its own risks, and officers must be made aware of these.

Discharge from Service

Discharge is likely when an officer is unable, due to infirmity of body or mind, to perform the ordinary duties of a member of the force. To be "permanent," there must be no reasonable prospect of recovery in the foreseeable future. The UK regulations further define an injury on duty as one received without the officer's default in the execution of duty. Doctors have been left to perform a financial assessment, for the regulations link degree of disability with loss of earnings, not with medical loss of capacity. The inequities of the system have been widely accepted for many years, but governments have failed to implement necessary reforms.

See Also

Professional Bodies: United Kingdom; Rest of the World; **Professional Bodies, France – Forensic, Medical and Scientific Training**

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Autopsy

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Introduction

The Occupational Safety and Health Act in the USA (1970) and the Safety at Work Act in the UK (1974) are legal codes with broad influence throughout the industrialized world. They mandate employer recognition of work hazards with the goal of ensuring a safe work environment for employees. Each act has been followed by relevant codes that address safety issues in numerous work settings, including

healthcare. In the USA, such codes include the well-known Bloodborne Pathogens Standard. In the UK, a guide has been published entitled *Safe Working and the Prevention of Infection in the Clinical Laboratories*, among many others.

These laws and regulations recognize that healthcare professionals at all levels are vulnerable to diverse work-related hazards. These include exposure to microorganisms in fluids or air, exposure to radiation or toxic materials, performance of ergonomically incorrect manual tasks, and psychological effects of the healthcare work environment. Although autopsy workers perform only one medical procedure, they are confronted by a similar constellation of occupational health issues.

The Autopsy as a Medical Procedure

An autopsy consists of a detailed external and internal examination of a dead body. Aside from the comprehensive visual examination, there are common additional studies including histology (microscopic examination of body tissues), microbiology (laboratory cultures of fluids and/or tissues for microorganisms), and toxicology examinations (analysis of fluids and/or tissues for drugs). The objectives of an autopsy are to: (1) confirm all features of the body that are structurally within normal limits and (2) describe and characterize all developmental, disease, and injury-related abnormalities. Synthesis of autopsy observations allows one to offer an opinion on cause of death, and will often facilitate interpretation of circumstances of death.

Autopsies are performed by physicians who have specialized in anatomic pathology (and often forensic pathology). Others present at an autopsy may include autopsy assistants, attending and resident physicians in pathology and other specialties, medical students, and law enforcement officers. Autopsies usually require long periods (hours) of uninterrupted standing and concentration on the part of pathologists and assistants. Most autopsies are performed in dedicated space in a hospital, a medical examiner's office, or a coroner's office. Fewer autopsies are performed in funeral homes. Autopsy tools include the spectrum of common surgical instruments: scalpels, scissors, forceps, and oscillating saws. Large knives and rib shears are other instruments more specific to the autopsy procedure.

The Autopsy and Occupational Health Issues

The occupational health challenges of the autopsy procedure may be subdivided into:

- exposure to infectious, toxic, radioactive, and other external agents
- facilities' design effects on autopsy workers
- ergonomics
- psychological effects of autopsy work.

While these areas will be discussed separately, they should be considered in aggregate as the dominant issues of autopsy safety. In the healthcare setting, employers must recognize and remedy a vast array of potential hazards, including those most pertinent to an institution's autopsy service. These employer obligations extend beyond reactive problem-solving and include proactive strategies such as availability of occupational health medical specialists.

Potential Transmission of Infectious and Other External Agents

The internal portion of an autopsy consists of examination of contents of the head, neck, chest, abdomen, and pelvis. Opening body cavities, cutting blood vessels, and subsequent direct examination of dissected organs release a large volume of blood and other body fluids. Contemporary autopsy techniques are essentially unchanged from those employed by the great anatomists of the eighteenth century (Morgagni) and nineteenth century (Rokitansky and Virchow). Sharp instruments (scalpels, scissors, and knives) and blunt dissection were and are low-tech mainstays of the dissection procedure. The orthopedic oscillating saw has replaced the traditional handsaw for removal of the skullcap. The oscillating saw may also be used to remove the chest plate. Needles and syringes are used to collect fluids from the eyes, heart, urinary bladder, and femoral area. Running water is used to rinse organs during dissection.

Percutaneous transmission Scalpels, scissors, knives, and needles carry an obvious risk of percutaneous injury. There is near-continuous handling of or proximity to sharp instruments during an autopsy, as well as potential exposure to fractured or cut ends of bone, broken glass, and other sharp objects. Virtually all internal areas of the body and eviscerated organs are bathed in body fluids, especially blood.

A bloodborne pathogen is a disease-causing organism that may be transmitted from one person (or body) to another person via exposure to infected blood. While the list of bloodborne pathogens covers the spectrum of bacteria, viruses, fungi, spirochetes, and prions, a few viral diseases are common (especially in the forensic autopsy population) and may be transmitted via skin injury. These are the hepatitis B and C viruses (HBV and HCV) and the human immunodeficiency virus (HIV).

Worldwide, an estimated 350 million people have chronic HBV infection. Chronic HCV infection affects 170 million individuals worldwide. HIV infection is an expanding global epidemic, with an estimated 42 million affected individuals. In most cases transmission is via body fluids. Chronic HBV and HCV infections may evolve to hepatic cirrhosis and cancer of the liver. HIV infection may progress to the acquired immunodeficiency syndrome (AIDS), an often fatal compromise of the immune system.

There is an effective HBV vaccine. Postexposure therapy in the unvaccinated consists of the dual strategy of hepatitis B immunoglobulin and initiation of the vaccination series. This regimen is effective in the large majority of cases. HCV and HIV vaccines are not yet available. For HIV, postexposure antiretroviral drug regimens are used. Although probably effective in most cases, this has not been adequately studied. Effective treatment of a percutaneous HCV exposure is not yet available.

These viral infections are fairly common but the prevalences underestimate the exposure risk for autopsy workers. Autopsies are infrequently performed in the contemporary western world except for cases that are in the jurisdiction of a medical examiner or coroner (ME/C). ME/C cases have higher prevalences of HCV, HBV, and HIV than in the general population. In some areas, 90% of intravenous drug abusers may have chronic HCV infection (and people in this group are likely to be examined by the ME/C in case of death). A study of the medical examiner autopsy population of Baltimore, Maryland, revealed seroprevalence of HBV at 23.2%, HCV at 19.1%, and HIV at 5.6%. Due to the frequency of sharp injuries at autopsy, these high prevalences are a significant safety issue.

Studies have shown that: (1) pathologists and pathology resident physicians sustained a sharp injury in 1 of 55 and 1 of 11 autopsies, respectively, and that (2) 8% of gloves are punctured during an autopsy without underlying incision or puncture of skin. In the first study, cutting injuries such as from a scalpel blade outnumbered needle puncture injuries. In the second study, one-third of glove punctures were undetected by the autopsy pathologist at the time of injury, resulting in prolonged bathing of skin in blood from another individual. Most pathologists would agree that both studies likely underreport the true prevalence of skin and glove injuries. The risk of sharp injury during an autopsy, even when performed by experienced hands, is ever present.

Given that infected individuals are commonly autopsied and that sharp injuries in autopsy workers are not uncommon, it is fortunate that most percutaneous occupational exposures to these viruses do not result in transmission. Among these three viruses, HBV transmission is most likely, at a rate of 30% per exposure in the unvaccinated. Previous HBV vaccination effectively eliminates transmission of infection. HCV transmission occurs in 1.8% of exposures. Transmission of HIV is even less common at 0.3% of exposures. Although percutaneous transmission is infrequent, it does occur in healthcare and autopsy workers.

Airborne transmission An airborne pathogen may be transmitted from both living and dead patients via aerosols or droplets. With a living infected patient, coughing and sneezing transfer infectious material to air around the patient. Another person in nearby space may inhale the suspended infectious material. In the case of a deceased patient, manipulation of infected organs (especially the lungs) and use of an oscillating saw aerosolize potentially infectious material. This phenomenon is an ever-present specter for autopsy workers, and is amply demonstrated by examination of one's face shield after an autopsy. Even gentle application of water to organs from a hose creates aerosols and droplets. Manual manipulation of organs may also produce aerosols and droplets. Oscillating saws produce an extraordinary concentration of aerosolized particles. HIV has been identified in aerosolized blood.

Tuberculosis (caused by *Mycobacterium tuberculosis*) is a disease that illustrates the principles of airborne transmission. Lung disease is most common. Transmission is airborne via coughing or sneezing by infected individuals (transmission is rarely percutaneous). The suspended infectious material may be inhaled by nearby individuals, thereby initiating a new cycle of lung disease in a previously uninfected person. A healthy individual usually does not develop active tuberculosis, although latent bacteria may persist in the lungs for many years or a lifetime. Onset of active disease in the previously infected person is usually associated with a compromised immune system. HIV co-infection – in which there is suppressed cellular immunity – is the classical setting that allows activation of latent tuberculosis bacteria.

Tuberculosis is the most common severe infectious disease in the world. Approximately one-third of the global population harbors the infection. Millions die annually of tuberculosis. The disease is far more prevalent in developing countries of Asia, Africa, the Middle East, and Latin America. Tuberculosis is usually treatable with medicines but there are drug-resistant tuberculosis bacteria. Tuberculosis vaccine is derived from a bacterial strain closely related to *M. tuberculosis*. It is variably effective and used

predominantly in areas of high tuberculosis prevalence (usually developing countries).

Contemporary healthcare workers, especially autopsy workers, are at high risk for tuberculosis infection. Sobering research indicates that tuberculosis infection in pathologists (10%) exceeds the infection rate in pulmonologists (4%) and other clinicians (1%).

The recently recognized severe acute respiratory syndrome (SARS) is a viral disease of the lungs. Severity ranges from mild respiratory illness to death. Like tuberculosis, the coronavirus that causes SARS demonstrates classical airborne transmission. Coughing and sneezing by infected individuals produce infectious airborne particles that may be inhaled by close contacts. Neither a vaccine nor specific medical therapies are available for SARS.

ARS amply demonstrates the efficiency of airborne transmission of an infectious disease. SARS was first recognized in Asia in February 2003. The disease spread rapidly worldwide and infection was documented in 8000 individuals through July and August 2003, at which time SARS was considered contained. The mortality rate of the 2003 outbreak was 10%. Most deaths occurred in China, Taiwan, Singapore, and Canada. Healthcare workers were affected and there were fatalities in this group.

Risk management for percutaneous and airborne transmission Risk management in autopsy pathology consists of:

- assessing the risk of transmission of a known or unrecognized infectious disease from a dead body to an autopsy worker
- recognizing inherent hazards of the autopsy procedure
- modification or elimination of known hazards.

As noted, potentially transmissible infectious diseases are common and frequently undiagnosed at the time of death. One should approach each autopsy case as if it presents a potential threat. Preautopsy risk assessment strategies include careful review of medical records and other provided behavioral history (if known), external examination of the body for possible indicators of an underlying infectious disease or risk factors, and rapid HIV and hepatitis serological testing. These procedures are generally inadequate to assess risk due to possible incomplete medical records, occult disease without external stigmata, and technical limitations of serology testing of postmortem blood. Risk assessment is therefore somewhat moot (one should consider all bodies infected). Instead, one must recognize and modify hazards inherent to every autopsy procedure.

Strategies to reduce autopsy hazards relative to infectious disease transmission may be grouped into:

- personal protective equipment (PPE) and vaccinations
- techniques and procedures
- facility design.

Personal protection is barrier protection, including use of airway "barriers." Barrier protection to protect skin, eyes, and mucous membranes consists of surgical scrub shirt and pants, a fluid-impervious gown with full coverage of the arms and legs, a surgical cap, eye protection (preferably a face shield that provides more coverage than eyeglasses), a face mask, and shoe covers. Barrier protection may be enhanced by waterproof rubber boots that cover at least the ankle and mid-calf. The fluid-impervious gown should descend below the top of the rubber boots (Figure 1).

Barrier protection of the hands consists of two latex gloves with an interposed cut-resistant synthetic mesh glove (Figure 2). This strategy should be used on both hands. Both the dominant and nondominant hands are vulnerable to sharp injury from bone or bullet fragments and cutting instruments. Cut-resistant gloves will not protect against needle

Figure 1 Personal protection for autopsies, consisting of skin and airway barriers.

Figure 2 Three-layer barrier protection for the hands, including cut-resistant gloves.

punctures. With experience, triple gloving does not impair sensation or dexterity.

Aerosolized pathogens present additional challenges. Use of the N-95 respirator mask is the least intrusive method to reduce inhalation of airborne pathogens substantially, including the bacterium that causes tuberculosis. Airborne transmission of viral particles may require further filtration of inhaled air via a powered air-purifying respirator (PAPR) equipped with a high-efficiency particulate air (HEPA) filter. This device is cumbersome and consists of a battery-powered respirator attached to the waist. Through a tube, the respirator provides positive-pressure filtered air in a hood covering at least the head and shoulders.

There is an effective vaccine directed against HBV. Due to extensive fluid exposure by autopsy workers, HBV immunization should be a mandatory condition of employment. A tuberculosis vaccine (bacille Calmette-Guérin, BCG) is widely used in the UK, although it is rarely used in the USA. Vaccines specific for HIV and HCV are not currently available.

Techniques and procedures to reduce surface and inhalation exposure to pathogens encompass a wide range of work practices. In general terms, all autopsy workers must have training that sufficiently emphasizes the hazards of the autopsy procedure and the autopsy suite environment. It is assumed that autopsy pathologists and physicians-in-training understand the transmission and biology of infectious diseases. It is equally important for the autopsy assistant to possess a broad science background appropriate to the task of daily autopsy work. This is particularly important as it pertains to his/her consistent recognition of and response to the varied hazards of the autopsy suite.

Every autopsy contaminates surfaces and air in the autopsy suite. All autopsy workers and visitors must be diligent in maintaining separation of contaminated and "clean" areas of an autopsy facility. There should be a high level of confidence that surfaces and air in "clean" areas are relatively uncontaminated by biological materials produced by an autopsy.

Any maneuver related to handling a body and eviscerated organs may contaminate the autopsy area. The goal is to minimize exposure to pathogens. All contaminated objects must be handled with care, anticipating splash and/or aerosol generation as two or more objects or surfaces impact each other. These activities are as diverse as movement of a bloody body surface from a gurney to the autopsy table, handling of individual moist organs during dissection on a wet dissection surface, and placement of autopsy instruments on a wet/bloody surface at the edge of the dissection area. Each of these activities, if performed carelessly, may cause a significant splash. As noted, application of running water on dissected organs has high splash and aerosol generation potential. Management of aerosols generated by an oscillating saw is a significant challenge. A plastic bag may be applied to enclose the head during use of the saw. The head of the oscillating saw may be modified to accept a vacuum attachment. The autopsy table may be equipped with downdraft ventilation. Gloves or other surfaces of PPE should be considered "dirty" even if not visibly contaminated. A PPE item in use should never touch areas of an autopsy suite that are considered "clean." These "clean" areas include a dry work surface used for writing notes, a telephone, and a door handle.

All autopsy instruments and work surfaces must be thoroughly cleaned and disinfected between autopsies. While there is great emphasis on safe work practices during an autopsy, adequate cleaning of all areas after an autopsy is no less important to minimize exposure. Additionally, autopsy workers must correctly dispose of sharp tools (needles, scalpels, and disposable knife blades). Housekeeping and biosafety disposal staff depend on autopsy personnel to dispose safely of any potentially sharp materials used during the autopsy.

Proper facility design is essential for safe performance of autopsies. There must be clear designation

of clean (administrative) and contaminated (autopsy) areas of an autopsy facility. Movement of personnel between the two areas should be through a passageway or anteroom that, by nature of the physical design, establishes a definite transition between clean space and administrative space. An anteroom (not a changing room) between the clean and contaminated areas provides space for dressing in PPE and shedding of PPE when moving between clean and contaminated areas. Within the autopsy room itself, locations of door(s), autopsy table(s), dissection area(s), counters, storage areas, and photographic equipment should facilitate movement and flow of autopsy workers, bodies, and biological materials.

Strategies have been previously discussed to control dissemination of aerosols produced by the autopsy procedure and minimize inhalation of aerosolized pathogens. On a larger scale, rooms in which autopsies are performed should adhere to a standard of at least 12 air exchanges per hour. Optimally, air is drawn from clean to contaminated areas of an autopsy room, then directly vented outside the facility. Negative pressure in the autopsy rooms is essential in order to eliminate dissemination of aerosols from the autopsy area to the administrative area, and potentially beyond. Inadequate facility ventilation has resulted in well-publicized outbreaks of tuberculosis infection among administrative staff in a few medical examiner offices.

The size of the autopsy and administrative space must satisfy both employee and workload needs of the facility. Crowding, from too little space per person or too much work for a given amount of space, has an impact on morale, productivity, and safety. The autopsy is a complex procedure requiring numerous sequential technical and medical decisions. To this end, an autopsy facility in which there is a high density of workers, visitors, bodies, and equipment will be prone to inefficiency, accidents, and errors in judgment. While individual personalities and style may compensate for some measure of crowding, the overall mission of an autopsy service (hospital-based or medicolegal) can be compromised in the setting of a facility with inadequate space.

Exposure to Toxic and Radioactive Materials, Defibrillators, and Foreign Bodies

Poisonings from cyanide and other chemicals are widely popularized in the nonmedical media, but one poison is truly ubiquitous in the practice of autopsy pathology: formaldehyde. Formaldehyde (called formalin in the dilute form) is a clear liquid used in large volumes to preserve tissues. The funeral industry also uses formaldehyde as a tissue preservative. It is a volatile compound that irritates skin, mucous membranes, and the eyes through direct exposure to body surfaces and inhalation. An increased risk of cancer is associated with long-term inhalation exposure. Periodic monitoring of 15-min and 8-h cumulative exposure to formalin allows early detection of potentially dangerous exposure.

Other poisons intentionally or unknowingly ingested by humans include cyanide (metal industries), metallic phosphides (rodenticides), and organophosphates (pesticides). With each material, the primary danger to autopsy workers is exposure to gastric contents. Each compound reacts with gastric acid to produce poisonous gas. A well-ventilated autopsy suite is essential but the autopsy facility must be further equipped with a chemical fume hood in which the stomach can be opened.

Some diagnostic and therapeutic procedures rely on localization of injected radioactive material in specific organs or areas of the body. These nuclear medicine procedures create a radioactive depot in the body of a patient. Technetium-99m is commonly used because of its short half-life (6 h) and versatility in combining with a variety of carrier molecules. A related procedure in nuclear medicine – brachytherapy – consists of implantation of a sealed radioactive source in or near a tumor. The therapeutic design dictates the duration of implantation and the type of radiation.

These materials present a potential radiation exposure hazard to autopsy workers. One must notify the institution's radiation safety department if there is a history of brachytherapy or injected radioactive material. In consultation with radiation safety experts, autopsy workers must use strategies for personal protection against radiation and appropriate techniques for the recovery and disposal of brachytherapy devices.

The implantable cardioverter defibrillator (ICD) detects potentially fatal heart rhythms and immediately delivers a shock intended to return the heart to normal rhythm. An ICD may discharge in a dead body. The electrical discharge ranges from 25 to 40 J, 1 million times more than a pacemaker's electrical discharge. Discharge of an ICD in a dead body may be precipitated by handling or cutting of the detection lead during the autopsy. Autopsy workers must stop the procedure upon detection of an ICD. Manufacturers' representatives are generally willing promptly to assist autopsy staff in inactivation of an ICD. Further, interrogation of the device may provide invaluable information about the decedent's perimortem cardiac function.

Foreign bodies or sharp internal structures may be encountered during an autopsy. These include bullets, broken knife ends, metal filters, fractured or cut rib

ends, and irregular calcification of the aorta or cardiac valves. Advance knowledge of one or more of these items is often not available, hence preautopsy radiographs are prudent in selected cases that may harbor a dangerous foreign body. There is no specific technique to eliminate these hazards. As is usual when considering a possible percutaneous injury, risk is markedly reduced by appropriate personal protection and careful manual technique.

Ergonomics

Ergonomics is a multidisciplinary area that studies the physical interactions between humans and work. It exists in large part to recognize and study how work practices and tools may injure workers, and to provide solutions. Routine autopsy suite functions include activities that are well-recognized ergonomic challenges. These consist of pushing and pulling heavy loads and prolonged standing.

Although procedures will vary somewhat between hospitals and medical examiner/coroner (ME/C) offices based on how an autopsy suite is equipped, there will be at least two (and possibly more) transfers of a dead body between carts and a separate dedicated autopsy table or customized autopsy cart. Sometimes, the transfer is further complicated because the two surfaces are of unequal height. These transfers are physically demanding maneuvers that include sudden loading and significant static exertion over a long distance between the spine and hands. Performed once or repetitively over time, an autopsy worker may sustain injuries of the hands, arms, neck, shoulders, or back. Pushing a heavy load, as when moving a loaded cart, is a similarly demanding procedure.

Performance of a routine autopsy requires prolonged standing adjacent to a body as the evisceration is performed and subsequent prolonged standing adjacent to the dissection surface as the individual organs are examined. The posture assumed by autopsy workers is very similar to that seen in surgeons and other surgical personnel: prolonged static standing with slight flexion of the neck and back. This position increases the likelihood of a chronic musculoskeletal injury, especially low-back pain.

Simple solutions to these ergonomic issues are elusive. Regarding body transfers, there are mobile lifts designed to move bodies from surface to surface. They are expensive and cumbersome. They require additional floor space and, often, customized carts. There are much simpler devices that somewhat reduce the resistance of a body sliding between a cart and an autopsy surface. Although somewhat reducing muscular work effort, these devices have seen little acceptance.

Body posture of autopsy workers, especially pathologists, may be partially addressed by use of chairs. Sitting is possible during much of the individual organ dissection if the dissection area is appropriately designed, somewhat like an elevated desktop.

Psychological Effects

Physical health and mental health are intimately linked areas of occupational health. Physical workplace challenges (i.e., risk of an inadvertent needle puncture) lend themselves to quantitative evaluations and similarly structured solutions. Psychological workplace challenges are much less amenable to discrete, packaged descriptions yet are ever present and perhaps more pervasive than the physical aspects of occupational health.

Stress is a body's adaptive response to stressors. Stressors are those poorly characterized demands of life and work that motivate individuals to care for self and family and to interact productively with others in the course of personal and professional lives. Low stress is associated with inertia and low productivity. Moderate stress is normal and stimulates people to engage in the usual activities of life and profession, which are inherently productive. High stress yields high production in the short term but prolonged high stress precipitates exhaustion and low productivity (burnout).

A major genesis of stress among healthcare workers is the recurring direct or indirect interaction with patients (and their families) who are ill, vulnerable, and potentially very demanding. This occurs in the setting of significant competing stressors from the highly structured bureaucracy and hierarchy of the modern western healthcare complex. Stressors more specific to autopsy workers include: (1) daily exposure to death as the healthcare and/or behavioral outcome; (2) regular interactions with bereaved family members; and (3) intense involvement in institutional quality assurance and quality improvement efforts through evaluation of autopsy findings. An individual's response to these diverse stressors is evident through measurable work product and less tangible behavioral and physical manifestations.

There are no simple solutions to the psychological challenges of autopsy and general healthcare work. Institutional acknowledgment of stress and its potential adverse effects must form the foundation of realistic, sensitive, and confidential procedures that emphasize employee mental health as a high priority. Prevention, recognition, and treatment of stress-related illnesses should be a core function of the occupational health clinic in every healthcare system.

Conclusion

The autopsy procedure and the autopsy suite are inherently hazardous. Infectious diseases such as AIDS, viral hepatitis, and tuberculosis are present in many decedents coming to autopsy. Foreign bodies, radiation, electrical devices, and toxins may be present. Foreknowledge of these details of an individual case may not be available to autopsy workers. The physical maneuvers of body handling and autopsy performance are ergonomically unsatisfactory. In the setting of sharp autopsy instruments, a very large amount of liberated body fluids, and an oscillating saw that aerosolizes biological materials, there must be strict adherence to strategies of personal protection, procedures that minimize risk of injury or contamination, and thoughtful facility design that further reduces the likelihood of injury or exposure. Lastly, healthcare work, including autopsy work, is inherently stressful. Daily interactions with death, families of decedents, and objective quality of care issues associated with each patient's death are significant stressors for all autopsy workers.

See Also

Autopsy: Medico-legal Considerations; Pediatric; Adult

Further Reading

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