



Standards for

Safe Working Hours

And Conditions for Fellows,
Surgical Trainees and
International Medical Graduates



Royal Australasian College of Surgeons

ROYAL AUSTRALASIAN COLLEGE OF SURGEONS

STANDARDS FOR SAFE WORKING HOURS AND CONDITIONS FOR FELLOWS, SURGICAL TRAINEES AND INTERNATIONAL MEDICAL GRADUATES

Position Statement

The Royal Australasian College of Surgeons is committed to ensuring the highest standard of safe and comprehensive surgical care for the community we serve through excellence in surgical education, training, professional development and support.

The College has developed a position statement on safe working hours and conditions for our Fellows, Trainees and International Medical Graduates in response to long standing concerns about the impact of shiftwork and extended hours. Fatigue and sleep deprivation creates risk for both the health and safety of the individual surgeon and for the quality of care afforded to patients.

The position statement addresses safe working hours and conditions, and provides guidelines for on-call and shift rostering, handover, and the responsible management of stress and fatigue. These guidelines set out a series of recommendations that the common experience of surgeons suggests are most likely to minimise the chance of impairment of decision-making or performance in surgery.

The position statement was developed by the Safe Hours Working Party, which included Dr Carolyn Cho FRACS, Mr John Graham FRACS, Mr Phil Truskett FRACS, Assoc Prof Bruce Waxman FRACS, and Dr Greg Wilson, Manager Fellowship Services. All Specialty Societies, Regional Committees, Training Boards and other key groups have had an opportunity to assist with development of the statement.

I encourage Fellows, Trainees and International Medical Graduate to review the position statement and discuss the importance of safe hours strategies with colleagues.



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Standards for Safe Working Hours and Conditions for Fellows, Surgical Trainees and International Medical Graduates

Purpose

The aim of this paper is to address the issues of fatigue and safety related to hours of work. These guidelines are intended to be a generic, bi-national and comprehensive guide to the Royal Australasian College of Surgeons' (RACS) position on safe hours of practice for doctors providing surgical services. These guidelines and recommendations may be referred to by Fellows, Trainees and International Medical Graduates as the College's statement on the issue of safety in hours of work and as such may be referred to in such instances as negotiating terms of employment at healthcare facilities and for developing employment policies which acknowledge fatigue in the workplace. It is important to recognise that these guidelines have been developed within the context of an ageing population as well as a surgical workforce which itself is changing in terms of its demographics and numbers (Birrell et al., 2003). Thus it is necessary that any such guidelines need to be realistically achievable, and that they can be implemented in a practical and reasonable manner and timeframe.

Access to healthcare facilities should be available on a 24 hour basis but not at the cost of burnout or risk to the health of those providing the service or the safety of their patients. The Royal Australasian College of Surgeons is committed to setting and helping maintain the highest standard of safe and comprehensive surgical care to the community. These guidelines further those commitments. In addition, the RACS aims to promote and uphold the values of professionalism, integrity, respect, compassion, commitment, diligence, collaboration and teamwork in surgical practice.

History of this Position Statement

The document "Standards for Rural Surgeons' Working and Recommendations for Staffing and Practice in Rural Departments of Health" was compiled by the Divisional Group of Rural Surgery and approved as policy by Council of RACS in June 2005. Underlying the document was the belief that "safety in surgical care is closely related to the issues of length of working hours, surgeon fatigue and the maintenance of a safe, properly staffed and equipped working environment". It was also recognised that surgeons working in rural locations in Australia and New Zealand were particularly exposed to the demands of long working hours, potentially arduous on-call and after-hours commitments, frequent on-call rostering and limited support.

The Safe Hours Working Party of the College was formed to develop a set of guidelines and recommendations on safe working hours and safe work practices for all surgeons and trainees whilst ensuring compliance with other RACS guidelines



and policies. The Australian Medical Association (2005) National Code of Practice is also important to the College, as the Australian Medical Council, in relation to its accreditation of the College to conduct surgical training, measures College performance and policies on safe hours against those AMA guidelines. The working party has also ensured that, where appropriate, these guidelines conform to the New Zealand Resident Doctors' Association and the Association of Salaried Medical Specialists' Multi-Employer Collective Agreements.

How to use this Position Statement

These guidelines set out a series of recommendations that the common experience of surgeons suggests are most likely to minimise the chance of impairment of decision-making or performance in surgery. Where appropriate they also include extensively researched and relevant background information. The College hopes this information, laid out as it is, will help surgeons to:

- Better understand their own work practices and be willing to modify them if working excessive hours
- Be aware when excessive working hours are causing fatigue to trainees and other staff
- Be aware of their rights and responsibilities in negotiating with employers
- Assist and understand each other when drawing up and sharing rosters.

Recommendations are contained in Sections 1 to 7 about safe work practices for doctors providing surgical services. Section 8 contains further information about the justification and reasons for these recommendations and guidelines.

These guidelines cannot be implemented without adequate resources and appropriately supportive Health Systems Safety and Quality standards. It is hoped that hospitals' administrations and jurisdictional representatives will see the advisability of working with the College in promoting safety in terms of managing and preventing fatigue in the workplace.

These guidelines should be read in relationship to other College policies, guidelines and activities. These include ensuring that Surgical Trainees fulfil their education and training requirements for Fellowship, that Fellows can and do participate in the Continuing Professional Development program, and that hospitals with approved training posts or seeking approval for training posts follow the *Accreditation of hospital and posts for surgical training* (Royal Australasian College of Surgeons and the Specialist Surgical Associations and Societies of Australia and New Zealand (October, 2005)).



Review of this Position Statement

These guidelines will be reviewed on a regular basis to take into account the changing demographics of the community and the surgical workforce, changes in surgical training and education, government policies, and feedback from surgeons and others about these guidelines.

Elements of the Surgical Workplace

An individual surgeon's professional workload and commitments vary widely and are influenced by a multitude of factors. The elements of a surgeon's practice also encompass a large number of responsibilities and activities that often differ from those of a hospital doctor (such as those for whom the AMA National Code of Practice 2005 was written). For these reasons, it is acknowledged that guidelines for safe working hours for surgeons will never fully cover individual surgical practices and the surgical subspecialties and hence they may differ from the AMA National Code of Practice.

It is also important to recognise that there must be an ethic of safe hours. Consideration should always be given to sustaining a responsible degree of general fitness and alertness during work hours. Doctors should keep themselves fit and able to serve their patients, and have a responsibility therefore not to partake of out-of-hours recreational and professional activities that will contribute to fatigue or affect efficiency and patient safety while on duty. Refer to the College's *Code of Conduct*, see:

http://www.surgeons.org/Content/ContentFolders/Policies/FES_PST_2021_P_Code_of_Conduct.pdf

The following are the main elements that make up a surgeon's practice. It is vital that in developing safe working practices for individual surgeons and trainees, these elements are taken into account:

A. Normal Working Hours

- Operating sessions. These occur in both public and private hospitals
- Patient rounds
- Consulting in rooms
- Outpatient clinics
- Clinical and multidisciplinary meetings
- Research
- Teaching, Training and Supervising. These commitments occur at various levels (registrars, junior doctors, other staff, medical students). This may involve formal teaching sessions or apprenticeship learning, for example, teaching during ward rounds or operating sessions.



- Other professional responsibilities including: continuing professional development activities, administrative duties, audit, RACS-associated regional and national activities, specialty-focused societies or associations.

Different surgeons have different workloads during working hours and the associated stress and fatigue related to “in-hours activities” will therefore vary accordingly. Operating sessions are generally more physically demanding than consulting sessions, and this also depends on the operative caseload, the surgical specialty/subspecialty, the quality of the associated staff, and whether the surgeon is required to teach junior staff/students concomitantly.

It is also recognised that in particular sub-specialities, certain elective operations will routinely take many hours to complete. In these cases, the demands on the surgeon will be increased due to the prolonged procedure, the technical difficulties involved and the lack of breaks during this period.

Prolonged and technically difficult elective procedures will also affect the trainees involved. Although this will increase their fatigue level significantly, the involvement of trainees in these types of surgical procedures is vital to their operative experience, as exposure to such operations may be infrequent. Hence such operations provide experience that would otherwise be difficult to obtain.

Other important factors include: whether the surgeon is in a group or solo practice; the physical location of the practice i.e. rural or metropolitan; and the number of locations to which a surgeon has to travel. Practicalities such as needing to travel to multiple hospitals to make rounds, traffic jams, travelling large distances and having multiple commitments at different sites during the day all contribute significantly to stress and fatigue levels.

B. After-hours

- On-call duties
- Other activities: for example, teaching sessions may occur after-hours for logistical reasons, and surgeons often need to complete paperwork and administrative matters after-hours.

On-call duties are perhaps the single area of a surgeon’s workload where there is the greatest variance throughout Australia and New Zealand. This relates to the fact that the type of on-call will differ depending on the type and location of the hospital to which the surgeon is on-call, the specialty involved; and the level of registrar and junior staff support available. The **immediacy** of the on-call required varies greatly between specialties, hospitals and locations. During the on-call period, surgeons are required to be available to give advice and/or to respond promptly to a call to assess a patient. If the **urgency** of the call is potentially high, then the surgeon has a responsibility to ensure that he/she is available within a reasonable distance of the hospital. In addition to this, whether or not a surgeon



must operate after-hours, and the type of surgery performed will also contribute to fatigue. Thus the **method** of call and the percentage of the call period which is spent “on site” at the hospital will alter the level of fatigue associated with on-call periods.

Surgical sub-specialities can also pose other logistical difficulties in rostering and staffing simply because the number of surgeons per sub-speciality in a particular region or town is often only one or two. Thus further concessions are needed for on-call arrangements within sub-specialities, particularly the smaller craft groups.

C. Handover

Within all periods of a surgeon’s workload, there needs to be adequate time allocated for handover of patients to ensure continuity of care. This applies to all doctors at all levels of training and experience. A patient’s care must be formally handed over to the next colleague whenever there is a change of on-call period or shift. This is particularly important when transferring the care of patients to and from locum surgeons and other locum staff and during holiday periods. There are also times when, for various reasons, a surgeon may be unable to leave a critically sick patient. In this situation, the surgeon (or trainee) has an ethical obligation and duty of care to remain with this patient until such time that handover can be performed safely or the crisis is resolved.



RECOMMENDATIONS

1. Recommendations - Standards for Safe Working Hours and Rostering for Fellows

The number of hours in a 24-hour period a surgeon works is highly variable, and the associated stresses and fatigue levels will depend on his/her daily workload as described above. For example, the on-call load in a 24 hour period will differ greatly in a major metropolitan trauma centre compared to a regional centre, where there are likely to be fewer surgeons participating in on-call rosters but the amount of after-hours operating may be less. It is also important to note that factors that cause fatigue are cumulative and multifactorial.

It is recognised that continuous working periods greater than 14 hours and the lack of sufficient breaks during and between periods will increase the risk of fatigue (Divisional Group of Rural Surgery, 2005). Surgeons need to be aware of when the safe working hours' limits are being reached in their own practice. The surgeon will then be able to take steps to alter his or her working schedule, to reduce the clinical workload.

- 1.1. Individual surgeons should be aware of the number of hours they are working per week, including on-call periods, in order to identify at-risk work practices that may need modification.
- 1.2. There should be cooperation and negotiation between all parties involved in the provision of surgery.
- 1.3. Surgeons should be aware of the cumulative hazard of sleep and rest deprivation and take measures to avoid this. The AMA National Code of Practice defines hazardous working behaviour as:
 - Continuous work periods greater than 14 hours;
 - Less than 10 continuous hours break per 24-hour period;
 - Inadequate rest periods during work;
 - Less than 24 continuous hours per week where the surgeon is not working.
- 1.4. Sufficient time should be allocated during the week to allow:
 - Effective handover and the implementation of robust communication networks to ensure continuity of care
 - Audit and Peer Review
 - Education, Training and Research
 - Recreational leave



- 1.5. These guidelines also have implications for operations performed out of daytime hours, that is, between the times of 17:00 hrs and 08:00 hrs, but particularly between 22:00 and 08:00 hrs.

During night shifts, surgery should be performed on life-, limb- or organ-threatening emergencies only.

Other surgical non-elective cases are best performed during daytime hours and many hospitals already run “sub-acute” theatre lists for this purpose. It is acknowledged that stringent safe-hours rules would impact most on public hospitals. As such, cooperation and negotiation between all parties are mandatory to ensure a safe working environment and infrastructure alterations and extra resources may be necessary to facilitate non-urgent surgery being performed in daylight.

2. Recommendations – On-call

On-call workloads and the number of participating surgeons on the on-call roster vary widely throughout Australia and New Zealand. It would be impossible to apply a single formula that would be applicable to every surgical department.

- 2.1. The most frequent on-call roster should be a 1 in 4 on-call rotation. That is, one on-call period in four. For some specialties, such as general surgery, this would generally mean one day in four on-call during the week, and one weekend on-call in four. For other specialties with less onerous on-call periods, this may entail one week on-call in four. However, for smaller sub-specialties, this is impossible to achieve and concessions are required, such as more frequent on-call periods. In practical terms, this may entail being on-call one week in two, although this needs to be done with caution (see 2.2). On-call rosters should be calculated after taking into account the leave requirements (described below) of individual surgeons participating in the roster.
- 2.2. On-call rosters more frequent than described in 2.1 are not ideal and should only be undertaken if the workload during these times does not impact on the well-being of the surgeon and does not lead to the surgeon becoming fatigued.
- 2.3. On-call at more than one hospital at the same time should only occur if it can be safely managed. Being on-call on consecutive working days (excluding weekends) at separate hospitals may contribute to fatigue, and ought to be avoided. This needs to be determined on a region-by-region basis. Some hospitals include Friday as part of the weekend, and this should also be taken into account if on-call at different hospitals is to occur.



- 2.4. The filling of “roster gaps” by surgeons such that they are forced to work excessive hours should be avoided. Where such gaps occur beyond the control of the surgeons, it should be the responsibility of the hospital administration, in cooperation with the surgeons, to resolve the shortfall, and locums may be required. Filling such gaps should not simply be an added burden imposed upon other surgeons.
- 2.5. There should be mechanisms in place to enable a fatigued surgeon to be able to hand-over his or her clinical responsibilities if no adequate rest has been taken. An example would be during a weekend of on-call which was unexpectedly busy and entailed a large number of hours operating on a Saturday night, leaving the doctor extremely fatigued on the Sunday morning and unable to continue. Continuing work while fatigued constitutes a medico-legal risk, which needs to be recognized and dealt with immediately.
- 2.6. If hospitals are unable to meet the above recommendations, then there needs to be adequate compensation to surgeons and hospitals need to make alternative allowances to avoid surgeon fatigue. This applies to trainees as well.

3. Recommendations - Leave

- 3.1. The following minimum, annually-based leave requirements are based on those recommended by the Divisional Group of Rural Surgery:
 - Recreational leave 4 weeks
 - Study leave 2 weeks
 - Administrative leave 1 week

These times do not include public holidays and festivals such as Easter and Christmas/New Year. Other leave may be negotiated on an individual basis, including sick leave and research. Surgeons also have a responsibility to communicate and negotiate amongst themselves and with hospitals to facilitate the development of acceptable rosters.

Hospitals should not expect that absences will be automatically covered by surgeons who are not on leave. The workload or on-call for the surgeon who is going on leave should not be compensated for by the surgeon working extra hours before or after taking leave.

- 3.2. Hospitals should cover absences using locums or by finding other alternative service providers, and should not provide cover by increasing beyond safe limits the workload of surgeons remaining on duty.



- 3.3. Hospitals should not expect the workload or on-call to be compensated for by asking the surgeon who is going on leave to work extra hours before or after taking that leave.

4. Recommendations – Illness, Injury or Pregnancy

From time to time Fellows and trainee surgeons may be at higher risk of fatigue due to factors such as illness, injury or pregnancy. Surgeons and trainees should ensure that they are conscious of the need to ensure their own well-being and, in the case of pregnancy, that of the child.

- 4.1 In circumstances of illness, injury or pregnancy, where a doctor has concerns that working patterns may exacerbate risk, he/she should undertake an assessment to identify particular risk factors. Where appropriate, he/she should consult with their treating doctor. Steps should then be taken to eliminate these risk factors or mitigate their impact.
- 4.2 Surgeons and trainees should ensure that they take reasonable steps to comply with any recommendations regarding their ongoing medical care, routine examinations and follow up.

5. Recommendations - Flexibility

It is important that surgeons, trainees IMGs and healthcare facilities acknowledge that flexibility in rosters is required to cope with unexpected events and that there may be times when surgeons and trainees are required to work longer hours than recommended. An example is emergency situations such as natural disasters or bushfires, where there is a sudden and unexpected increase in the clinical workload. However, when increased workload is predictable, hospitals must plan ahead to deal with those increases. It is the responsibility of the healthcare facility to recognise that these times have the potential to increase the surgical workload and to provide adequate staffing support. This may entail the use of locum services and an increase in staffing in other departments in the hospital.

Hospitals cannot assume that employment of a surgeon guarantees continuous surgical cover by that surgeon. In negotiating contracts, it should be clear that the surgeon will participate in the on-call roster within the safe hours guidelines. This should be negotiated taking into account the number of surgeons, the needs of the local community and the location of the hospital, whether rural, regional or metropolitan.



- 5.1. Regular breaches of safe working hours should not occur due to expected periods of high workload such as sporting events or high tourist season in seaside resorts, where there is a predictable increase in the local population.
- 5.2. Contracts should be negotiated taking into account that the surgeon will only participate in the on-call roster within these safe-hours guidelines, taking into account the number of surgeons, the needs of the local community and other local circumstances.

6. Recommendations - Working hours and rostering for Trainees

Surgical Trainees are usually employees of a hospital, and are required to fulfil the terms of their employment contract regarding to the number of working weeks per year and the amount of holiday and study leave permitted. Surgical Trainees usually have a more formalised working schedule, set out by hospitals, in relation to overtime shifts and daily working hours. The number of working hours for which a trainee is rostered will depend on whether the work occurs mainly during the day or at night. They are also required to fulfil the minimum training requirements of the Surgical Education and Training program of the RACS, and hospitals must recognise this requirement and facilitate completion of the training programme. As such, close negotiation with the hospital is required to ensure that both employment and training obligations can be fulfilled within the context of a working environment that is safe for the patients, the trainees, and their colleagues.

The following guidelines are those recommended by the AMA in 1999 (and endorsed by the RACS) for safe working hours for hospital doctors:

- 6.1. The total number of working hours should be 70 hours or less per week.

The following recommendations should apply to day shifts:

- 6.2. Day shifts should be a maximum of 14 hours long.
- 6.3. Day shifts longer than 10 hours should be minimized.
- 6.4. Regular breaks should be taken during day shifts.
- 6.5. There should be a minimum of 8 hours continuous sleep per 24 hours.
- 6.6. There should be a break of 24 hours of free time in each 7 day period worked.



The following recommendations should apply to night shifts:

- 6.7.** Night shifts should be a maximum of 12 hours long
- 6.8.** There should be a maximum of 60 hours per week of night shifts
- 6.9.** Progression to night shifts should be in a “forward shift rotation” i.e. the doctor should progress from day to evening to night shifts, to minimize disturbance of circadian rhythms
- 6.10.** Continuous periods of 1 to 2 weeks of night shifts should be rostered for, resulting in better adjustment of circadian rhythms compared with only a few days at a time
- 6.11.** Longer breaks after night shifts should be planned to allow recovery of the sleep debt and body rhythms

The following recommendations indicate that working schedules for trainees should allocate time for:

- 6.12.** Adequate handover between shifts to ensure continuity of care
- 6.13.** Educational and research activities
- 6.14.** Access to and participation in clinical meetings such as multidisciplinary meetings and mortality and morbidity reviews.
- 6.15.** Concessions and allowances need to be made for surgical trainees in small sub-specialties. In order to obtain sufficient clinical and operative experience, these trainees may be involved in prolonged elective procedures which will increase their working hours.

It is noted that the on-call requirements of surgical trainees vary greatly depending on the specialty involved. The after-hours workload and the resultant potential for fatigue will differ for the same reasons discussed in the section above on surgeons’ workloads. Some Surgical Trainees have on-call rosters rather than overtime shifts, which permit them to leave the hospital during the on-call period.

- 6.16.** The frequency of trainees’ on-call rosters should follow the standards described above for surgeons (see Section 2).

The healthcare facility should have adequate mechanisms for compensating for doctors who are not able to continue with their clinical duties due to an



unexpectedly demanding or extended period of work. For example, a registrar who has worked a 24 hour shift where he/she was required to perform emergency surgery for most of the period with minimal rest breaks is unlikely to be able to complete routine tasks the following day, in a safe or capable manner.

- 6.17.** Healthcare facilities should have adequate mechanisms for compensating for doctors who are not able to continue with their clinical duties due to an unexpectedly demanding or extended period of work.
- 6.18.** Trainees require the following minimum, annually based leave. These times do not include public holidays and festivals such as Easter and Christmas/New Year. Other leave may be negotiated on an individual basis, including sick leave, parental leave and vocational training:

- Recreational leave 4 weeks
- Study leave 2 weeks

Doctors who become ill, injured or pregnant should notify their employer as soon as practicable to give hospitals as much notice as possible to plan for additional staffing when the doctor is on leave (including sick leave, maternity or paternity leave).

- 6.19.** The same principles described for ill, injured or pregnant surgeons (see Section 4 above) should apply.

It is the role of surgeons and hospital administrators to identify trainees who are having difficulties in fulfilling their work commitments or who are working excessive hours, at the very least to prevent tragic or fatal consequences, and to be flexible in finding and negotiating solutions and alternatives.

- 6.20.** There needs to be flexibility within the hospital system to allow stressed and/or fatigued trainees to be relieved immediately.

7. Recommendations - Safe Working Hours for International Medical Graduates

The level of entry of International Medical Graduates (IMGs) into the Australian and New Zealand surgical workforce will vary according to the level of qualifications gained overseas. International Medical Graduates who fulfil the eligibility criteria may apply for surgical training through the RACS Surgical Education and Training Programme. In addition, IMGs who have overseas specialist surgical training qualifications can also apply to practice in Australia after specialist assessment by the RACS or via the Area of Need assessment by the Australian Medical Council (AMC) and the RACS. Other IMGs may enter the medical workforce as hospital



residents or doctors in the community, provided they fulfil the AMC criteria. IMGs applying to work in New Zealand do so through the Medical Council of New Zealand (MCNZ). The MCNZ considers advice from the College when registering IMGs.

As the terms and conditions of work for IMGs will vary greatly between individuals, the following guidelines are recommended.

- 7.1. IMGs who are providing surgical services as independent practitioners should follow the standards for safe working hours outlined for Fellows of the RACS.
- 7.2. IMGs who are working as employees within a hospital system need to fulfil their contractual obligations. They should follow the Standards for Safe Working Hours and Conditions recommended for surgical trainees and the AMA National Code of Practice for hospital doctors (Australian Medical Association, 2005).

8. Background and Justification for these Standards

8.1 Maintaining standards of care

Minimising fatigue and its consequences ensures that Fellows, Trainees and International Medical Graduates are able to deliver a high standard of surgical services. However, it is essential that fatigue minimization be done without compromising the quality of patient care and the quality of education and training. Surveys of residents and surgeons show that reduced work hours improve the quality of life and reduce medical errors. There is however, a risk that reduced shifts could worsen the quality of patient care, result in decreased continuity of care and reduce the quality of the doctor-patient relationship (Barden et al, 2002; Hutter et al, 2006; Zuckerman et al, 2005). The preservation of surgery as a profession and avoiding the development of a shift worker mentality is vital.

The education of Fellows, Trainees and IMGs is an important issue and it is known that fatigue can adversely affect learning ability (Basu et al, 2004). Surgical education remains a balance between apprenticeship learning and structured formal learning. Learning includes self-directed activities such as the acquisition and practice of skills in computer or other simulations and the use of library and online resources, for example texts and journals. Formal learning activities include: access to general educational activities in a hospital such as Grand Rounds; regular learning experiences including imaging and multidisciplinary meetings, morbidity and mortality meetings and journal clubs; formal tutorials for trainees; research activities. All doctors require negotiated access to external educational activities such as obligatory RACS and specialty courses (Royal Australasian College of Surgeons and the Specialist Surgical Associations and Societies of Australia and New Zealand, 2005).



Trainees are also required to fulfil minimum training hours and compulsory activities in accordance with the Surgical Education and Training Program of the RACS while working safe hours. This raises concerns that a reduction in work hours may result in a reduction in operative case volume and operative experience as well as a decrease in the time a trainee is available for such formal learning sessions (Jarman et al, 2004; Ferguson et al, 2005; Basu et al, 2004; Sawyer et al, 1999).

It is essential that guidelines on safe working hours take these issues into account – that the education of Fellows and trainees remains a priority and that the implementation of safe working hours does not have a detrimental effect on standards of care.

8.2 Fatigue and its consequences

The effects of fatigue on many professional groups are well documented. The onset of fatigue can be due to a number of causes which are cumulative. Fatigue has its most serious consequences in those occupations where fatigue-related errors lead to death or serious morbidity.

The physiological determinants of alertness and performance can be divided into four categories. The number of consecutive hours a person is awake is sometimes referred to as the sleep homeostat. Performance has been shown to decrease with the number of hours that a person remains awake. The nightly duration of sleep is also important, as a reduction in the number of hours of sleep a person naturally requires results in an accumulated “sleep debt”. The circadian rhythm is regulated biologically by an endogenous pacemaker in the suprachiasmatic nuclei of the hypothalamus and this runs in a cycle of approximately 24 hours. Disruptions to this rhythm or “forced desynchrony” both reduce performance and sleep quality. In particular, forced waking in the 1-3 hours before the natural waking time has the greatest detrimental effect on performance. Finally, a reduction in alertness and performance also occurs in the period immediately after waking, also known as sleep inertia (Landrigan, 2006). Both disruptions to the circadian rhythm and sleep inertia are particularly relevant to doctors on call who are woken and often required to attend patients or perform operations after hours.

Fatigue in pilots affects manual skills, cognitive performance and personality. Many problems have been detected, including increased reaction times, reduced visual perception, impaired flying skills, impaired judgment and decision making and reduced concentration on multiple tasks with short term memory loss (Strauss, 2006). Interestingly, one study has shown that 26% of pilots compared with 70% of surgeons perceived that fatigue adversely affected their performance (Sexton et al, 2000). Total flying time and pilot shifts are strictly regulated by aviation authorities (Strauss, 2006).



Driver related fatigue is implicated in 30% of fatal motor vehicle accidents and 15% of accidents resulting in serious injuries. It is associated with both muscle fatigue and mental fatigue, and the time of greatest risk is between the hours of midnight and 6am (Australian Transport and Safety Bureau, 2004). Clearly this has implications for emergency surgery that is performed during this time period.

The effects of working continuously for 18 hours is equivalent to a blood alcohol concentration (BAC) of 0.05g/% and that of 24 hours to a BAC of 0.10g/% (Australian Transport and Safety Bureau, 2004; Arnedt et al, 2005; Gawande, 2003). Approximately 33% of surgical errors are attributed to fatigue or an excessive workload, and fatigue has wide-ranging effects on learning and cognition, task performance and the quality of life. These effects include reduced alertness and vigilance, increased errors with repetitive or routine tasks, reduced short term memory and reduced manual dexterity. An example of the latter is an increase in technical errors occurring during laparoscopic surgery (Arnedt, 2005; Gawande, 2003; Eastridge et al, 2003; Samkoff & Jacques, 1991; Saxena & George, 2005; Papp et al 2004).

The short term effects of fatigue on health are most commonly alterations in gastrointestinal function, while long-term effects include an increased risk of cardiovascular disease (Arnedt, 2005; Gawande, 2003; Australian Medical Association, 2001, 2005). Another common consequence is that the doctor often drives home after a long shift or on-call attendance, placing him or her at an increased risk of motor vehicle accidents as well, and posing an immediate risk to the community (Barger et al, 2005). Medical trainees with sleep deprivation or who have worked extended shifts have also been shown to have three times the risk of needle stick injuries and injuries related to sharp instruments and devices (Fisman et al., 2007; Ayas et al 2006).

Fatigue in pregnancy has been shown to increase the incidence of miscarriage, premature labour, pre-eclampsia, intrauterine growth retardation and low birth weight (Cross, 2006; Spinillo et al, 1996; Mozurkewich et al, 2000; Pompeii et al, 2005; Ceron-Mireles et al, 1996). Overwork and fatigue may also lead to reduced fertility (Tuntiseranee et al, 1998).

An Australian workforce survey performed in 2001 has shown that many doctors fall into a high risk category where intervention is required to prevent fatigue related errors and for the health of the worker. Surgeons and in particular registrars are at particularly high risk, working an average of 85 hours per week. 87% of surgical registrars in Australia fall into this group. By specialty, 65% of general surgical trainees, 54% of orthopaedic and 44% of plastic surgery registrars are included in the high-risk category. 45% of RACS trainees work more than 100 hours per week (Australian Medical Association, 2001). The recent publication of the AMA 2006 safe hours audit also reveals that surgeons and surgical trainees continue to be over-represented in the high risk category specialists working hours. The AMA also



points out that surgery is the only discipline for which working hours have not improved for surgeons or trainees since the last AMA survey in 2001 (Australian Medical Association, 2006).

In 2005, a survey of New Zealand resident medical officers (RMOs) showed that 13% worked more than 70 hours per week (current RDA MECA allows for a maximum of 72 hours to be worked per week). In addition, 42% of RMOs could recall having fallen asleep while driving home from work at some stage in their working life. 65% remembered making a medical error related to fatigue during their career (Gander et al., 2005).

In the United States, the 2003 Accreditation Council on Graduate Medical Education Work Hours Duty Policy limited resident hours to 80 hours per week. This includes a 24-hour continuous period of rest per 7 days and a maximum continuous duty of 24 consecutive hours (Hutter et al, 2006). The European Parliament and Council directive of 2000 also limited the weekly hours of work per week to 58 hours for doctors in training, aiming for a maximum of 48 hours per week in 2009 (Directive 200/34/EC of the European Parliament and Council, 2001). Similarly the Australian Medical Association has published guidelines on working hours for hospital doctors (Australian Medical Association, 2005) and the Divisional Group of Rural Surgery of the RACS has released a position statement on the working hours of rural surgeons (Divisional Group of Rural Surgery, 2005). With these precedents in mind, the RACS guidelines are intended to have particular relevance to Australasian Surgical Fellows, Trainees and International Medical Graduates working in Australia and New Zealand.



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