



AOA

AUSTRALIAN  
ORTHOPAEDIC  
ASSOCIATION

National Program of Accredited Fellowships

Post-fellowship Education and Training

PFET SPINE

2011 Syllabus



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## **SECTION 1: Module Background**

The AOA seeks to formalise its long tradition of postgraduate training in spinal surgery through the elaboration of a specific training syllabus module. The AOA is the parent organisation of the Spine Society of Australia, a group of spinal surgeons and other interested parties who have as their undergraduate training either Orthopaedic or Neurological surgery. AOA seeks to provide a holistic syllabus in the training of spinal surgery, which has at its advantage a “drawing together” of the pertinent elements of both neurological and orthopaedic spinal surgery.

The aim of the PFET syllabus in spinal surgery is to provide advanced training to postgraduate surgeons, Fellows of the Royal College of Surgeons who meet the eligibility criteria and who are seeking to complete spinal surgical training to a level of competency commensurate with being able to undertake all forms of the sub-speciality area. To this end, PFET training includes elements of both orthopaedic and neurological surgery as derived from collaboration in training with the Spine Society of Australia.

## **SECTION 2: Eligibility**

The PFET training module in spinal surgery is available to those Fellows of the Royal Australian College of Surgeons or other appropriate bodies who have successfully completed a fellowship in orthopaedic or neurological surgery. Prerequisite clinical experience is by way of having undertaken ten procedures in spinal surgery either as primary surgeon or first assistant surgeon. Fellows undertaking this PFET program are not expected to have a detailed knowledge of operative technique in spinal surgery (including instrumentation techniques), but rather would be expected to have a working knowledge of spinal bio-mechanics and related basic science, and also of the pathogenesis and clinical manifestations of spinal conditions commensurate with their undergraduate experience of the area.

## **SECTION 3: PFET Syllabus Structure**

It is anticipated that postgraduate Fellows in spinal surgery will undertake both clinical and research activity during a period of at least twelve months tenure.

- Fellowships may be situated at more than one hospital in order for the trainee to obtain exposure to a wider range of spinal complaints (e.g. Adult, degenerative, scoliosis, paediatric, oncology, trauma, etc.)
- Whilst the trainee should have a primary supervisor, there may be secondary supervisors at other hospital sites. It is not necessary for the primary supervisor to work at all sites that the trainee attends, as long the trainee is supervised at all sites that he/she attends.
- Secondary supervisors must fulfil the same professional and educational requirements as primary supervisors
- Clinical activity should be in the form of supervised operating lists and outpatient session attendance. Operating lists may be supervised in the setting of private or public hospital practice and a combination of both is desirable.

- It is envisaged that a minimum of three operating sessions per week would be undertaken by Fellows, who would be involved as either of primary supervised surgeon or first assistant surgeon
- Exposure to a broad range of spinal surgical procedures and techniques is desirable and to this end a minimum of two supervising surgeons would be allocated to each PFET trainee over a twelve month period
- Access to adult and paediatric patient populations is desirable. Where possible exposure to neurosurgical and orthopaedic surgical techniques is to be encouraged although logistically may not be possible in every setting
- Clinical outpatient sessions should number at least two per week, preferably with a mix of both adult and paediatric outpatient management
- Research commitment is integral to the successful completion of post-fellowship training in spinal surgery and each trainee would be expected to complete and present one research project at national level and to have submitted the project for publication prior to completion of the Fellowship
- Teaching is also an integral aspect of advanced training and the PFET syllabus would include scheduled sessions of teaching to undergraduate SET trainees of the Australian Orthopaedic Association, junior medical officers in a hospital setting and/or undergraduate medical or physiotherapy students through a university-based curriculum
- Community-based education such as General Practitioner designed seminars and regional or national spine surgical courses are important mechanisms of teaching and should be included in the PFET educational program
- Participation in clinical auditing is a pre-requisite of successful completion of the Fellowship, as is satisfactory documentation of clinical cases through a recognised database as engaged by the clinical units involved in the Fellowship
- Clinical inpatient care, and particularly post surgical inpatient care, is a vital aspect of satisfactory surgical training and need be undertaken via regular ward rounding with both senior and junior medical staff

## **Specific Criteria**

### **Demonstrated need based on public benefit**

Post-fellowship training in orthopaedic spinal surgery is a mandatory element of safe practice. At present, SET training in orthopaedics is unable to deliver sufficient case mix in either the allocation of AOA-accredited training positions or the necessary period of training time to provide the necessary skill set to safely practice the subspecialty. The SET program delivers a holistic understanding of the practice of orthopaedics across the broad range of the craft and the limited number of accredited SET posts in orthopaedic spinal surgery nationally make the allocation of a spinal surgical rotation to every orthopaedic SET trainee a diminishing possibility. Safe practice dictates that PFET continue as the mainstay of specialist spinal surgical education and public benefit stems from a minimum defined standard of surgical education and experience as recognized by the existing members of the clinical peer group.

## **Justification on basis of specific knowledge base**

Spinal surgery has a long tradition within the broader practice of orthopaedic surgery. This is evidenced by the existence of the Spine Society of Australia (SSA), a subsidiary of AOA with varied membership encompassing all with an interest in the treatment of spinal disorders, however founded by orthopaedic spinal surgeons in 1972. SSA is the peak professional body in Australia concerning the treatment of spinal conditions. Although the era of orthopaedic subspecialisation has driven its practice progressively toward a smaller and more specialist group of orthopaedists, the fundamentals of the craft remain within the realm of orthopaedic surgery. Specifically,

- Spinal biomechanics, including of spinal instrumentation and reconstruction,
- Interaction between spinal conditions and disorders of the appendicular skeleton, and
- Management of both paediatric and adult deformity of the spine are, with few exceptions, exclusively within the remit of the orthopaedic spinal surgeon.

Any program of post-fellowship training which excludes specific educational requirements in these areas by mentors trained in these fields will be unable to deliver a minimum standard of safe practice in spinal surgery.

## **Evidence that the proposed program provides training that is more specialised than is currently available.**

Although integral to the orthopaedics along both traditional and practical lines, educational goals in spinal surgery are currently defined by the eLearning modules of the AOA SET program. The progressive subspecialisation of orthopaedic spinal practice has had the dual effect of not only increasing training quality within dedicated tertiary spinal services (via exposure to a more widely varied case mix) but at the same time reducing the available number of the training posts that teach spinal orthopaedics, making SET exposure for each orthopaedic trainee in this field difficult to achieve. Consequently, spinal training has become concentrated into fewer, more centralised institutions resulting in an enhanced level of specialisation ideal for PFET.

The Australian Orthopaedic Association has a well-established program of post-fellowship training in spinal surgery. Of longstanding spinal surgical clinicians who are members of AOA have developed and maintained a multicentred fellowship training program under the auspices of accreditation by the Fellowships Committee of AOA.

The structure of the current AOA Spinal Fellowship programs varies between clinical and research emphasis. All fellowships adhere to AOA's guide to post-fellowship training. An example of a weekly fellowship training schedule is attached (appendix A). Minimum weekly or fortnightly clinical training activities include:

- 2 days supervised operating or assisting
- 2 supervised spinal outpatient clinics
- After hours on-call care of emergency cases

Regularly scheduled theoretical educational and research opportunity includes:

- One or more weekly multidisciplinary clinical unit meetings
- One or more clinical meetings of the spinal orthopaedic community
- Quarantined opportunity for clinical or basic science research
- Regular teaching activities for the benefit of orthopaedic SET trainees, orthopaedic surgeons, allied health and nursing staff

**\* Appendix A. Example of a Fellowship training schedule in spinal orthopaedic surgery**

## **SECTION 4: Assessment**

### **Mechanism of in-training assessments**

Performance assessment of postgraduate trainees will be undertaken using assessment tools that closely reflect the mechanisms of assessment undertaken for SET training in orthopaedic surgery.

Assessment tools will include:

- direct observation of procedural skills (DOPS) completed on a three monthly basis and
- Quarterly Assessment Reports (QARs) to be completed on a three-monthly basis by surgical mentors.

Successful completion of a fellowship will require demonstrated competence in formative assessments.

### **Mechanism to confirm satisfactory completion of the program**

A final competency assessment at the completion of the fellowship will lead to ultimate accreditation. The latter will include non-clinical aspects of assessment including satisfactory research completion, teaching ability and participation in clinical documentation including auditing and database upkeep of clinical cases. Successful fellowship applicants will receive a certificate reflecting satisfactory standard acquisition. It is not proposed that an exit examination be conducted to assess the attainment of a satisfactory level of surgical skill.

### **Identify appropriate surgical supervisors and educators**

As noted, AOA has a long and well-established tradition of training spinal surgeons in Australia. There are currently 5 AOA-accredited fellowship posts throughout the nation, which vary in their period of establishment from between 5 and 20 years. The Spine Society of Australia comprises approximately 65 orthopaedic surgeons and 45 neurosurgeons with a major interest in the treatment of disorders of the spine. The Society has expressed great interest in collaborative training in spinal PFET and has the trainers immediately available to teach the full gamut of spinal surgical techniques. Within Australia, only SSA can provide this diversity of training.

Current AOA accredited training centres include:

<b>State</b>	<b>Hospital</b>	<b>Mentors</b>	<b>Training</b>
South Australia	Royal Adelaide	Prof. Robert Fraser Dr David Hall	Orthopaedic Spine
South Australia	Royal Adelaide	Dr Orso Osti	Orthopaedic Spine
Queensland	Princess Alexandra	Dr Richard Williams	Orthopaedic Spine
Queensland	Mater Children's	Dr Geoff Askin	Paediatric Spine
New South Wales	Royal North Shore	Dr Andrew Cree	Orthopaedic and Paediatric Spine

These fellowships are of minimum 12 months duration and four have been in existence for longer than 7 years, with at least two in existence for more than 10 years. An example of fellowship post instructions to post-fellowship trainees is provided (attachment 2)

With formalisation of spinal PFET, including contribution from both orthopaedic and neurosurgical trainers, future fellowship post accreditation will follow Section 2 of the Guidelines proposed by AOA. The AOA Fellowships Committee in accordance with the regulations will undertake assessment:

### **SECTION 5: Criteria for accreditation of a fellowship**

- Fellows engage in research. Facilities for clinical, laboratory or comparable basic research must be available to enable such research to be undertaken by Fellows.
- Fellows must be attached to either a public or private hospital accredited by the Australian Council of Hospital Standards (ACHS) or approved by the AOA Fellowships Committee. Conjoint appointments in both spheres of medical practice are permitted.
- The Regional Training Committee must indicate that the proposed fellowship will not adversely affect the operation of the SET Program in Orthopaedic Surgery provided by AOA in that region.
- The Chief Supervisor must be a Fellow of AOA, have current specialist registration in Australia as an orthopaedic surgeon, and have evidence of full CPD compliance.

### **Administrative support funded by program fees**

At this stage no application or training fees are proposed. The current structure of PFET in orthopaedic spinal surgery is of fellowship positions being under the supervision and administration of individual members of AOA. Administrative requirements and Fellows' salaries are funded through a variety of means depending on:

- Mix of public and private hospital-based clinical activity
- "in-kind" hospital administrative support
- External sources of sponsorship

- Fellows' capacity for self funding

It is anticipated that the provision of an integrated PFET program will enable the construction of a more unified model of administration and funding.

### **Consider workforce issues and impact**

Workforce in orthopaedic spinal surgery has been in steady decline due to a variety of factors, which include:

- The increasing tendency toward orthopaedic subspecialisation into a wide range of areas reducing the number of general orthopaedists who may have undertaken spinal surgery within a broad range of procedures.
- Reduced willingness of the few remaining general orthopaedists to engage in the care of spinal conditions for various reasons including matters of indemnity
- Resurgent neurosurgical interest in the treatment of spinal disorders, and
- The self-fulfilling prophecy of reduced orthopaedic spinal presence leading to reduced SET trainee exposure to the craft and diminishing future take-up of spinal surgery as a subspecialist interest

A further account of current workforce shortages in orthopaedic spinal surgery is provided in attachment 3.

It is fervently believed by representatives of AOA that formalisation of PFET in spinal surgery, including integration with neurosurgical spinal techniques, will help to re-invigorate the subspecialty leading to increased SET trainee interest in the craft thereby increasing future specialist numbers and improving SET training opportunities in the area.

### **CPD**

- The supervisor must be CPD compliant with his/her training authority
- The trainee must be allowed time to take part in appropriate CPD activities.

### **The impact of Spine PFET program on SET training**

Formalised PFET in orthopaedic spinal surgery will, in all likelihood, further engage SET trainees in orthopaedics and enhance SET training in this area. The overall effect of improved recognition of the subspecialty by PFET program accreditation will increase SET trainee exposure to spinal surgery case mix and, hopefully, increase the stream of graduate orthopaedic surgeons into the subspecialty.

The very recent AOA Board decision to formulate a Spinal Surgery Education Committee further enhances SET training in the field by addressing the issues described above in an integrated approach to both SET and PFET training, exploring ways in which SET trainees interested in spinal surgery might stream at an earlier stage of the SET course allowing tuition in both orthopaedic and neurosurgical aspects of the craft **during** SET training, in the hope of increasing the rate of conversion of "spinally interested registrars" to postgraduate Fellows.

## SECTION 6: Educational Objectives

### 1. General

- Successful postgraduate trainees will be able to take a comprehensive clinical history of spinal disorders and to undertake a wide range of appropriate examination techniques in order to elucidate a diagnosis of any spinal disorder in any region of the spine
- Successful trainees will be able to critically analyse published research works for their scientific validity, including an assessment of study design, statistical power and methodology
- Successful trainees will be able to apply knowledge of the existing spinal surgical literature to the assessment of patients, their surgical or non surgical treatment and their post operative care
- Successful candidates will have a clear appreciation of rehabilitation techniques employed to enhance the outcome of surgery and to non-operatively manage conditions by way of directed physical therapy, multi-disciplinary including cognitive rehabilitation and the appropriate prescription of specific spinal orthotics
- PFET trainees will have a clear understanding of the mechanics and application of orthotic devices used in the treatment of acute and longstanding conditions of the spine including their application to the settings of spinal trauma and post operative care
- Post-fellowship trainees need demonstrate strategies of risk management including timeout procedures, identification of correct side and correct site surgery as per the dictates of the Royal Australian College of Surgeons
- Spinal PFET trainees will have a clear knowledge of safe practice techniques in order to minimise cross contamination between patient and surgeon by way of the use of universal precautions and through their minimisation of field contamination by blood products
- PFET trainees will have a clear understanding of the development of communication skills for use in a clinical team environment and also in the broader sense of educational applications through teaching and research presentation. The latter includes the use of technological tools through digital slide presentation and the use of multimedia
- PFET trainees will have a clear understanding of the importance of maintenance of the clinical record, its application to the controlled clinical setting and to the individual episode of care
- PFET trainees need avail themselves of self-directed learning opportunities through attendance at key spinal surgical educational meetings and courses and through regular appraisal of published literature in spinal surgery using a set journal club format as a vehicle
- PFET trainees need have a comprehensive understanding of the cost of spinal surgery to the community, minimisation of excessive expenditure and

critical evaluation of the role of technological advances in an appropriate setting of data collection for clinical trialling or following satisfactory establishment of clinical usefulness through published literature

- Each PFET trainee must demonstrate a clear working knowledge of infrastructural requirements of spinal surgery including a thorough working knowledge of safe patient positioning, adequate illumination and magnification, adequate access to blood products and intensive care as well as ancillary surgical specialties including a service of vascular surgery

## 2. Basic Science of the Spine

- PFET trainees will gain an advanced understanding of spinal biomechanics as it applies to the functional spinal unit, and its application to daily clinical practice including the use of orthotics, spinal surgical procedures including instrumentation and non surgical therapies which include activity modification
- Trainees will use their working knowledge of spinal biomechanics to advise patients on the nature of the aggravating and alleviating factors of their conditions
- A thorough working knowledge of the concepts of the naturally occurring spinal stabilising influences is required
- Advanced post-fellowship trainees will gain an advanced knowledge of degenerative processes involving the functional spinal unit and a working knowledge of the natural history of degenerative conditions of the spine as related to published theory of the pathogenesis of relevant disorders
- A thorough knowledge of the pathogenesis of both primary and secondary spinal sepsis and appropriate antimicrobial treatment – both operative and non-operative will be obtained
- The functional anatomy of the spine will be studied in detail and include a knowledge of safe surgical approaches to all levels of the spine taking into account key structures at risk and their preservation
- PFET trainees will gain an in-depth understanding of posture including coronal and sagittal alignment and the sequelae of imbalance
- The biology of bone growth including concepts of osteoconductivity, osteoinductivity and osteogenesis as applied to techniques of spinal fusion is required
- PFET trainees must demonstrate a detailed knowledge of the blood supply and intrinsic anatomy of the spinal cord

## 3. Degenerative Conditions

- PFET trainees will have a detailed understanding of adjunctive radiological examination of the spine in respect of degenerative conditions, the limitations of radiological investigations in identifying a painful stimulus and the use of interventional radiological procedures as diagnostic aids

- PFET trainees will demonstrate a clear understanding of the epidemiology of spinal pain and its relationship to cultural and environmental influences
- Trainees will develop a deep understanding of the non operative management of degenerative lumbar and cervical pain, including a detailed knowledge of non-operative treatment modalities including activity modification, pharmacological treatments cardiovascular conditioning and be able to convey consistent and reasonable advice accordingly in the clinical setting
- PFET trainees will have a clear understanding of the indications for spinal surgery in degenerative conditions insofar as those these relate to prolapsed intervertebral lumbar, thoracic or cervical disc, cervical or lumbar spinal stenosis and degenerative spinal instability, for example as manifest by degenerative lumbar spondylolisthesis
- A clear understanding of the operative indications for, and operative limitations of, surgery for axial lumbar and cervical spinal pain will be an essential requirement of the program
- A clear working knowledge of the applications and limitations of spinal implants as used in degenerative conditions will be required. This will include a knowledge of the biomechanical principles underpinning the use of rigid fixation to augment spinal fusion surgery and the use of total disc arthroplasty of the cervical or lumbar spines
- A clear knowledge of surgical outcomes for degenerative conditions such as cervical disc prolapse and spinal stenosis with or without lumbar fusion will be required
- Knowledge of the implications of adult degenerative deformity will be required. This will include an appraisal of patient comorbidity and suitability for surgical intervention, indications for surgical intervention and expected patient outcomes following surgery as well as the capacity to communicate the latter effectively in the clinical setting
- A working knowledge of the clinical manifestations of lumbar hypolordotic and kyphotic deformity and corrective surgical techniques including pitfalls and likely surgical outcomes will be required. An effective mechanism of communication of the latter in the clinical setting will also be required
- A capacity for diagnosis of kyphotic deformity of the spine through appropriate radiological investigation will underpin the application of corrective surgical procedures in selected patients
- A clear understanding of community expectation in respect of the cost of spinal surgical procedures and associated implantation will be required of each trainee as well as strategy to minimise excessive cost in degenerative spinal surgery will be assessable
- Knowledge of the approaches to, and clinical management of, symptomatic thoracic intervertebral disc prolapse will be required
- A clear understanding of the pathogenesis of cervical myelopathy, its clinical manifestations and treatment will be required

- Management of cervical and lumbar disc prolapse by a variety of surgical approaches will be understood, including by posterior approach to cervical disc prolapse
- Alleviation of multi-segment cervical and/or lumbar stenosis by laminoplasty techniques will be understood by each trainee
- A working knowledge of the influence of degenerative lower limb joint conditions on the degenerative spine will be required
- Each PFET trainee will have a detailed knowledge of internal fixation and spinal stabilisation options in complex revision of cervical, thoracic and lumbar fusion surgery

#### 4. Metabolic and Inflammatory Conditions

- A detailed knowledge of the epidemiology and pathogenesis of osteoporosis will be required including techniques of diagnosis and monitoring of the condition
- Management principles of osteoporosis by way of pharmaceutical and interventional procedures will be understood in depth
- Trainees will require a detailed knowledge of the surgical management of conditions affecting the unstable or neurocompressive osteoporotic spine
- PFET trainees must be able to demonstrate techniques of enhanced implantation rigidity in the osteoporotic spine
- The roles and limitations of vertebroplasty as a treatment modality will be considered and based on familiarity and understanding of related literature
- The role of vertebroplasty in settings outside of osteoporosis should be known and understood
- The principles of treatment of spinal conditions arising in inflammatory conditions such as ankylosing spondylitis will be understood and the principles of treatment of secondary conditions such as corrective osteotomy in kyphosis will be studied
- A working knowledge of the treatment of ankylosing spondylitis-related spondylodiscitis and trauma is required
- Principles of treatment in spinal disorders affecting patients who suffer rheumatoid arthritis will be researched and understood
- Complications of surgery in patients suffering rheumatoid arthritis must be known and communicated effectively in the clinical setting
- Special conditions affecting patients who suffer rheumatoid arthritis in respect of preoperative assessment of cervical instability need be comprehensibly understood, as will be the pharmaceutical treatment of arthritis and its potential adverse effect on spinal surgical outcome

- A clear knowledge of the pathogenesis and clinical manifestations of ossification of the posterior longitudinal ligament including racial variation and differentiation from other ankylosing spinal conditions as well as surgical treatment of the condition will be understood by all trainees
- PFET trainees will become familiar with the occurrence and treatment of osteomalacia as a cause of spinal conditions
- The trainee must be familiar with the adverse effects of various metabolic conditions including diabetes mellitus as a cause of possible complication or sub-optimal outcome in spinal surgery

## 5. Developmental and Paediatric Spinal Surgery

- The trainee need have a clear understanding of the classification of spondylolisthesis including its relevance in clinical presentation, epidemiology, treatment requirements and techniques
- Each PFET trainee requires a detailed knowledge of the operative treatment of high-grade lumbosacral spondylolisthesis including management of dysplastic variants and techniques of operative reduction of lumbosacral deformity
- The trainee requires a working knowledge of the manifestations and natural history of Scheuermann's disease including patient education, factors associated with progression and treatment modalities including specific orthotics and/or surgical intervention
- Familiarity with the range of corrective and assistive spinal orthoses including indication for, and construction requirements of customised bracing, orthotic nomenclature and relevant material science will be required
- The trainee must have a deep understanding of the occurrence and natural history of paediatric low back pain, its relationship to growth and the biomechanical influences involved
- The PFET trainee must have a deep and working knowledge of paediatric deformity including scoliosis in all its forms including those relating to congenital variation, neuromuscular conditions and adolescence
- Trainees will have a clear understanding of parent counseling in congenital scoliosis including a knowledge of the natural history of congenital vertebral anomalies, their embryologic causation, requirement for, and urgency of treatment.
- A clear understanding of the natural history of idiopathic scoliosis ranging from the early onset to adolescent variants, including a detailed knowledge of published literature regarding natural history and factors associated with progression, and requirement for various forms of treatment varying from observation to bracing and surgical intervention is required
- An understanding of rare complex paediatric syndromes affecting the spine including thoracic hypoplasia and options for corrective treatment is required

- A thorough working knowledge of paediatric syndromes associated with spinal deformity is required, including an assessment of the natural history of spinal deformity in each of the associated conditions as well as a working knowledge of congenital multisystem involvement where the spine is deformed.
- PFET trainees require detailed knowledge of the procedure of anterior apical kyphectomy for congenital and acquired conditions causing progressive spinal cord compression with growth
- PFET trainees must have a detailed working knowledge of techniques of intraoperative spinal cord monitoring, the relevant electrophysiological findings and a detailed knowledge of the sensitivity and specificity of the available techniques
- Each trainee must be able to demonstrate a working knowledge of the classification and surgical treatment options in syringomyelia, tethered spinal cord syndrome and other neurological manifestations of spinal dysraphism
- Each PFET trainee must have a clear understanding of surgical treatment options available in the management of chiari malformation
- PFET trainees must demonstrate a knowledge of the diagnosis of, and indications for treatment of upper cervical instability in association with os odontoideum as well as surgical options for treatment including transoral resection of the odontoid peg
- PFET trainees must be able to demonstrate treatment methods employed in the management of tethered spinal cord

## 6. Adult Deformity

- A thorough knowledge of concepts of sagittal rebalancing in adult deformity using pedicle subtraction, Smith-Petersen or Ponte osteotomy is required
- Treatment options in the management of adult scoliosis including spinopelvic fixation is required
- A thorough knowledge of the roles and limitations of staged corrective surgery including pitfalls and surgical complications is required
- A familiarity with other techniques of adult deformity correction are required including treatment of post-traumatic spinal deformity, anterior cervical-thoracic strut grafting via median sternotomy and the management of post-radiation deformity in the spine

## 7. Trauma

- The PFET trainee must demonstrate a thorough knowledge of the radiological and clinical assessment of the patient suffering vertebral or spinal cord injury and must be aware of the clinical signs of spinal cord trauma including those relating to prognosis
- Relative and patient counselling using a thorough working knowledge of prognostic variables is necessary

- A clear and working knowledge of vertebral injuries is required as related to non operative management including orthotic usage and to spinal procedures appropriate to the nature of the injury which demonstrate a knowledge of the mechanistic forces involved
- A thorough working knowledge of classifications of spinal injury for the purposes of accurate communication and documentation is required
- The special issues in relation to the care of patients who suffer spinal cord injury is required, including early advice and communication with outlying primary care centres, management in transport and evidence for and application of pharmaceutical neuroprotective agents
- A knowledge of the care of the spinal cord injured patient in the acute phase is required. This includes a thorough knowledge of complications associated with prolonged recumbency, neural effects on cardiovascular status and medical complications of neural trauma
- A knowledge of the management of late paraplegia and tetraplegia forms an integral part of the fellowship. Management including assistive aids to sitting balance in orthoses including wheelchairs and a knowledge of the relationship between the hip joints, pelvic inclination and the spine in the paraplegic patient is required
- Treatment of conditions affecting the adult and pediatric paralytic spine including progressive deformity and charcot-type instability is required
- Management of specific vertebral instability syndromes including those occurring at the occipitocervical junction, the atlantoaxial articulation and the lumbosacral articulation need be considered and known in detail
- A thorough knowledge of issues affecting trauma which occurs at the spinal junctional zones including the cervicothoracic, thoracolumbar and lumbosacral levels including peculiarities of fixation requirements of these levels will be obtained
- The PFET trainee will require a deep working knowledge of the indications for specific radiological imaging in the traumatised patient with a neurologic deficit including an understanding of the indications for and timing of MRI examination in the presence of spinal cord trauma
- The PFET trainee will require a deep knowledge of closed reduction manoeuvres and other mechanisms of spinal realignment in the acute care of patients with a spinal injury
- The PFET trainee requires a clear understanding of the role of surgical intervention and its timing in the care of patients with spinal cord injury
- The PFET trainee will require a detailed knowledge of the indications for either of anterior or posterior operative approach to cervical, lumbar or thoracolumbar fractures demonstrating clear reasoning for clinical preference

- The PFET trainee will require a clear knowledge of the indications for surgical management of thoracolumbar spinal injuries including the expected clinical outcomes and possible complications whilst being mindful of community cost
- A clear working knowledge of the management of associated traumatic conditions such as post-traumatic deformity and revision fixation procedures will be required including issues of risk management, possible complications of surgery and expected clinical outcomes
- PFET trainees require a detailed knowledge of the techniques and role of skeletal spinal traction in the management of cervical spine injuries
- Each PFET trainee requires a detailed knowledge of the timing of spinal trauma surgery in the setting of multiple musculoskeletal and other multisystem trauma

## 8. Tumour Surgery

- The PFET program requires a detailed knowledge of the pathology of primary and secondary bone tumours affecting the spine
- Scoring systems which suggest prognosis and treatment outcomes in secondary spinal malignancy must be known in detail and applied in the clinical setting
- A knowledge of the role of adjuvant oncology in the treatment of spinal malignancy is required
- Techniques of vertebral biopsy ranging from procedural radiology to percutaneous procedures must be known in detail
- The management of secondary spinal malignancy including operative treatment by palliation or extirpation must be known in detail
- Resectional and reconstructive techniques for primary neoplasms of the spine which include *en bloc* resection of vertebral neoplasia whilst maintaining function of the spinal cord should be known including indications and operative complication rate
- Techniques of bone tumour localisation using techniques of radioisotopy should be known
- Each PFET trainee must be able to demonstrate microsurgical technique for removal of intrinsic spinal cord tumours
- PFET trainees must be specifically able to manage the setting of spinal cord compression and neurologic compromise in association with spinal tumour presentation
- Each PFET trainee must have a detailed knowledge of techniques available for the resection of sacral malignancy, the use of a multi-disciplinary approach to spinal tumour resection and reconstructive techniques including spinopelvic options

- PFET trainees must have a clear knowledge of the management of intramedullary and intradural extramedullary spinal cord tumours
- Each PFET trainee must demonstrate a clear understanding of the techniques of preoperative evaluation and staging including the techniques of tumour resection as determined by the *Enneking* classification
- PFET trainees must be familiar with the techniques of minimisation of blood loss through preoperative interventional radiology such as tumour embolisation

#### 9. Infection

- Each PFET trainee must demonstrate a knowledge of risk factors for the development of spinal sepsis, both of a primary and secondary nature
- Each PFET trainee must have a thorough knowledge of the epidemiology of various presentations of sepsis of the spine including epidural abscess, infective discitis and non purulent infective conditions including tuberculosis
- Each spinal PFET trainee must have a thorough working knowledge of appropriate antibiotics and duration of treatment for each infective etiology
- Spinal PFET trainees must have a clear understanding of the indications for surgical intervention in spinal sepsis and the principles of surgical management and postoperative care
- PFET trainees must demonstrate a clear understanding of the role of patient comorbidity in dealing with septic conditions of the spine
- A knowledge of the principles of management of evolving neurological compromise due to septic spinal deformity, including tuberculosis, need be clearly understood

#### 10. Spinal Implantation and Fusion

- PFET trainees must demonstrate a thorough working knowledge of biological augmentation of spinal fusion and related costs
- PFET trainees must demonstrate a clear understanding of biomechanical principles underpinning use of selected implants and likely modes to failure
- PFET trainees must demonstrate a superior knowledge of biomaterials including flexibility, strength and biocompatibility insofar as this applies to spinal implantation
- PFET trainees must be able to differentiate the principles of osteoconductivity, osteoinductivity and osteogenesis as these apply to available biomaterials in the augmentation of spinal fusion
- PFET trainees must be able to demonstrate a strategy for stabilisation of any spinal segment, demonstrating a clear knowledge of the options of surgical approach and the relative merits of individual implantation devices

- PFET trainees must be able to demonstrate a clear knowledge of failure of spinal fusion by radiological and/or clinical means and be able to offer strategy for revision procedures if required
- PFET trainees must be able to differentiate between different segmental implants and their evolution along historical lines leading up to current concepts in segmental spinal stabilisation
- PFET trainees must be familiar with the relative advantages and disadvantages of mobile segment spinal implantation including disc arthroplasty and “non fusion” devices
- PFET trainees must be able to discuss the relative merits of minimal access surgery versus open implantation techniques, published outcomes of surgery of either variety and relative cost as well as patient outcomes
- PFET trainees must be familiar with the surgical approaches employed for anterior, thoracic and lumbar fusion techniques along with the complications of surgery and their management
- PFET trainees must be familiar with mechanisms of reducing blood loss through the use of cell salvage and pharmacological agents as well as techniques such as haemodilution and controlled intra-operative hypotension

#### 11. Vascular Conditions Affecting the Spine

- PFET trainees must demonstrate a clear knowledge of spinal vascular malformations including classification, clinical findings and ancillary investigation
- PFET trainees must have a clear knowledge of the use of spinal angiography as it relates to diagnosis in spinal vascular malformations
- PFET trainees must be able to describe management techniques in the treatment of spinal arteriovenous malformation including the use of interventional neuroradiological procedures
- PFET trainees must have a detailed knowledge of the clinical findings and treatment of spontaneous epidural haematoma

### **Section 7: Recommended Reading List**

Herkowitz and Bell, The lumbar Spine – The Textbook of the International Society for the Study of the Lumbar Spine.

Aebi, Arlet and Webb, AOSpine Manual Volume 1 and 2

Vaccaro and Albert – Spine Surgery, Tricks of the Trade

## **APPENDIX A:**

### **Example spinal fellowship guidelines at Princess Alexandra Hospital**

Assoc. Prof. Richard Williams Dec 2009

#### **Background**

The Princess Alexandra Orthopaedic Spinal fellowship is a 12 month, AOA-accredited clinical fellowship available to Australian and International postgraduate surgeons in Orthopaedics or Neurosurgery which offers advanced training in adult and paediatric spinal disorders encompassing deformity, trauma, tumour, septic and degenerative conditions and which also includes a commitment to both clinical and basic science research utilizing the facilities of the School of Biomedical Engineering of the Queensland University of Technology. The fellowship is also accredited and promoted internationally through the AOSpine organization.

The orthopaedic Spinal Fellows number 2 per 12 month period (from July 1 to June 30) and each rotate through 6 months primarily under the direction of Dr Richard Williams at PAH and 6 months under the direction of Dr Geoff Askin at Mater Children's Hospital. Each Fellow has on-call commitments for the entire 12 month period for acute service provision to the PAH in a 1-in-3 roster shared with 1 person from the Department of Neurosurgery. On call service is provided in one week periods. Consultant after hours service is provided in a 1-in-5 roster and is also "week about" to maximize continuity of care.

These two 12-month accredited clinical fellowships are distinct from and should not be considered as similar to clinical observerships. The latter involve visits to the PAH spinal surgery service by international spinal surgeons for finite periods of clinical attachment (ranging from 4 to 12 weeks). These clinicians are sponsored by AOSpine International and attend the hospital in a purely observational capacity – they are not registered in any capacity by the Medical Board of Queensland and are not permitted to participate in any form of patient care. For the purposes of observing procedures only, they are permitted to enter the sterile environment if supervised by a registered surgeon, however, are not permitted to actively participate in operative procedures in any way.

#### **Fellowship Responsibilities**

Clinical Spinal Fellows (PAH term) are required to:

1. Attend mandatory teaching sessions including:
  - a. Wednesday am weekly Spinal Unit Meeting (PAH SIU 730-830)
  - b. Monday am weekly Orthopaedic Department Meeting (PAH 700-830)
  - c. Friday am fortnightly AOSpine meeting (BPH 700-800)
  
2. Attend Orthopaedic Spine OPD
  - a. Tuesday pm (Williams)
  - b. Monday am (review)
  - c. Monday pm (Gatehouse/Albietz)
  
3. Attend Scheduled OT Lists
  - a. Wed all day fortnightly (Williams)
  - b. Friday all day fortnightly (Gatehouse/Albietz)

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4. Provide after hours acute services PAH (as above)
5. Provide Formal Teaching
  - a. Physiotherapy course UQ
  - b. Junior Medical and Nursing Staff as required
6. Participate in Clinical and Basic Science Research
  - a. Produce at least 1 paper in each of the above to the standard of national presentation and peer reviewed publication
  - b. Assist/Mentor advanced trainees in their research endeavours

### **Fellowship Interactions and Service Delivery**

Clinical Fellows are primarily concerned with maximizing their experience of the decision-making processes and other treatment aspects of patients suffering disorders of the spine. An important aspect of this experience is in dealing with acute spinal disorders, the latter being one of the main attractions for international surgeons in applying for postgraduate attachment to the PAH given the unique setting of our on-campus spinal injuries rehabilitation facility and the large volume of cases of spinal trauma managed at the hospital.

Aside from the value to overall training experience stemming from the high number of referred emergency cases is the need to provide prompt treatment and advice in the management of the spinally injured patient to the emergency service providers of the hospital.

The educational needs of Advanced Trainees in orthopaedic surgery are also of paramount importance. Training requirements in spinal surgery include an ability to accurately assess and provide emergency care to the patient with a spinal injury and to maintain a reasonable understanding of the process of decision-making which leading to a plan of definitive care.

To this end the interaction between consultant surgeons, Fellows and advanced trainees of the service needs careful definition, whilst keeping in mind the somewhat complex nature of the subspecialty and the needs of a population of patients who have often sustained catastrophic injury.

Factors that need be taken into account include:

- Educational needs of the Advanced Trainees
- Educational needs of the Clinical Fellows
- Patient requirement for urgent management
  - Availability of junior staff
- Consultant oversight of care

With this in mind, the following guidelines are proposed:

- Notification of Referral from Outside PAH

In the event of a referral from a centre outside PAH, within working hours from Monday to Friday, the orthopaedic spine registrar should field the enquiry and take as many details of the case as practical and then notify the on-call spinal Fellow and the on-call consultant of the patient's impending arrival including a sketch of the patient's clinical condition and the circumstances of the events. Other issues such as the need for transfer and the method of transportation as well as emergency care measures can be discussed at the same time. It should be noted that due to the subspecialist nature of patient care, there is a very low threshold for accepting any patient referred to PAH, even if transfer involves no more than accurate assessment including examination and/or imaging.

Outside normal working hours (as above), the on-call orthopaedic registrar should field the call and notify the on-call consultant of the patient's impending arrival in the event of uncertainty in transportation requirements or any other issue of pre-arrival management, so that the same principles apply.

- Notification of Referral from PAH ED

In the first instance, notification of spinally injured patients from staff of PAH ED should be made to the spinal orthopaedic registrar (or after hours on-call registrar) who should notify the on-call consultant having seen and assessed the patient and having obtained relevant emergency imaging studies. The case will then be discussed and a plan of management established. The on-call spinal Fellow may then be notified at the discretion of the consultant. Where the on-call orthopaedic registrar is unavailable due to commitments in general orthopaedic surgery, the spinal Fellow (or consultant as necessary) need be contacted initially to expedite care of the patient. In the latter instance, the on-call orthopaedic registrar need be made aware of the patient's existence through messaging and, when available, the registrar should become involved in assessment and definitive care of the patient. When able to participate in care of the spinal patient and having examined the patient and familiarized himself/herself with the nature of the case, the registrar should telephone the on-call consultant to discuss the process of decision-making and to maximize the educational experience.

- Out of Hours Spinal Operative Cases

Emergency procedures involving spinal patients provide educational value for both spinal Fellows and advanced trainees. Out-of-hours spinal surgery (evenings and weekends) needs to be attended by advanced orthopaedic trainees, particularly in the event of the patient having been admitted and assessed by the registrar concerned. Unless involved in general orthopaedic trauma surgery concomitantly, there should be NO REASON for the registrar's absence from emergency spinal surgery procedures, regardless of the operating surgeon.

### **Advanced Training Requirements in Spinal Surgery**

In practical clinical terms, the trainee who is assigned the PAH term in Spinal Surgery need be able to:

- Take a comprehensive history of spinal conditions occurring in the adult
- Examine the patient presenting with a spinal disorder for evidence of neurological deficit
- Examine radiological imaging of the spine leading to informed assessment and differential diagnosis.

- Communicate findings of 1-3 above to colleagues in a clear and concise summary using terminology relevant to the field
- Apply methods of spinal immobilization including skeletal traction tongs, halo-thoracic vest and various cervical collars
- Manage inpatients with spinal conditions including a knowledge of mobility requirements and limitations (eg log rolling, skeletal traction, spine specific bed useage)
- Use ancillary interventional radiology appropriately as a diagnostic aid and as an alternative treatment to operative intervention
- Define in general terms the indications for operation across a spectrum of spinal disorders
- Appreciate basic techniques of spinal surgery including operative positioning, illumination, magnification, level and correct site recognition.
- Satisfactorily complete 2 DOPS assessments for the 6 month attachment
- Maintain an accurate elog of surgical case participation
- Contribute to a clinical research project to the point of presentation at a local or national meeting.