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**PROJECT**

**DEVELOPMENT OF AN INJECTION  
THERAPY MODULE**

A project submitted to Middlesex University in partial fulfilment of the requirements for the degree of Doctor of Professional Studies (Orthopaedic Medicine Education)

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National Centre for Work Based Learning Partnerships

Middlesex University

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My collaborative partners, Monica Kesson and Dr Ian Davies, deserve special mention as co-authors of the textbook component of the project.

My colleagues within my practice have been unstinting in their professional and personal support, and my Society of Orthopaedic Medicine colleagues have also willingly stepped forwards to help.

Friends have borne with my social absenteeism and the suppers will be returned anon. My mother and siblings have gamely allowed me to be but a distant relative, but the true heroes are husband Clive and daughters Kate and Tess who have become used to seeing my profile in front of the computer, and have patiently waited their turn..

## **ABBREVIATIONS**

SOM – Society of Orthopaedic Medicine

MU – Middlesex University

CSP – Chartered Society of Physiotherapy

WCPT – World Confederation for Physical Therapy

ACPOM – Association of Chartered Physiotherapists in Orthopaedic Medicine

PACE – Physiotherapy Access to Continuing Education

School of HeBES – School of Health Biological and Environmental Sciences

**SECTION 1**

## **REFLECTIVE COMMENTARY**

The overarching title of my doctoral programme is that of 'Doctorate in Professional Studies (Orthopaedic Medicine Education)'. My project to conclude my programme has been undertaken as Module DPS 5140. This commentary sets out to provide a justification for the project, and will place the project in context both with respect to my whole doctoral programme and the wider professional context. An outline plan and background to the project will be provided and reference will be made to the strands of collaboration, the choice of methodology and the resources and facilities used. I shall put forward my aims and objectives for my project and contextualise my selected research and development area. The coherence of the project will be demonstrated through drawing its components together and reflecting on the project process. The commentary will be explicit in its reference to the Level 5 descriptors (Section 2, Appendix 1) and how these have been satisfied through the development and completion of the project.

### **INTRODUCTION**

The title of my project is 'the Development of an Injection therapy Module'. I undertook this project because I had been charged to develop an injection therapy module for the Society of Orthopaedic Medicine (SOM) (see below), as part of a postgraduate pathway towards an MSc in Orthopaedic Medicine at Middlesex University (MU). The project has three clear parts that link to form the coherent project as shown in the table below. This 'wrap around' reflective commentary forms the final component to demonstrate the cohesion both within the project itself and its place in my doctoral programme. Within this commentary the term 'project' is reserved for the whole project only.



## THE PROJECT – Development of an Injection therapy Module

1. The development of the injection therapy Module Handbook in satisfaction of the Middlesex University requirements, as evidenced by the production of the Handbook itself.
2. The completion of the manuscript for a textbook in theory and techniques (working title: 'Musculoskeletal Injection Skills'<sup>1</sup>), as evidenced by its submission to its publisher, Butterworth Heinemann, Oxford.
3. The investigation of the facilitating factors and barriers to practice of physiotherapists implementing their injection skills, as evidenced by the preparation and submission of a paper for publication by a high quality peer reviewed journal.
4. A commentary critically reflecting on the impact of the project on orthopaedic medicine education, and the physiotherapy profession, and an explanation of how the three previous components link together.

## BACKGROUND TO THE PROJECT

A background to the project is necessary to be able to place the project within its various contexts. Its place within the MSc Orthopaedic Medicine programme, arising from the collaborative partnership between the SOM and MU, will be highlighted, as well as its contribution to the SOM's educational aims and the orthopaedic medicine approach in the management of musculoskeletal lesions. The project's place within physiotherapy post-graduate training will be discussed, allied to its impact within the interdisciplinary framework in the provision of health care. At the same time, the project sits within my doctoral programme that itself has impact in the contextual areas above.

I shall begin by providing a background to orthopaedic medicine itself and the SOM, and shall clarify the importance of my own role in orthopaedic medicine education, specifically in context of the past, present and proposed developments within the Society's educational course.

Orthopaedic medicine is a specialism in medicine that is dedicated to the examination, diagnosis and non-surgical treatment of disorders of the musculoskeletal system (i.e.

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<sup>1</sup> Kesson M., Atkins E., Davies I. (In press) **Musculoskeletal Injection Skills** Oxford: Butterworth Heinemann

disorders of joints, ligaments, muscles and tendons; the means by which we move). It developed from the foundations of the specialism as originated in 1929 by Dr James Cyriax MD MRCP at St Thomas' Hospital, London. The SOM is a bi-disciplinary organisation of medical practitioners and chartered physiotherapists (or those holding an equivalent overseas qualification) that was established in 1979 to continue the work of Dr Cyriax in light of continuing research, and to promote the theory and practice of orthopaedic medicine through educational courses. The Society is a limited company and a registered charity that is governed by an elected Council whose members act as directors of the company and trustees of the charity. A background to the Society and its Membership course is given in Appendix 2 (Section 2).

Courses in orthopaedic medicine contribute to post-graduate programmes in medicine and physiotherapy and the Society's three-modular courses take place throughout the year at a variety of different venues both nationally and internationally. The 2001 course programme comprises thirty-five modules that will be attended by approximately 900 students, with numbers of students on each module ranging between 24-36. Full membership of the SOM is gained through successful completion of the Society's summative examinations that include a true/false written paper and a practical examination.

Courses dedicated to teaching orthopaedic medicine are also promoted by other organisations, for example Orthopaedic Medicine International and Orthopaedic Medicine Seminars, but it may be substantiated without difficulty that the Society is the largest and arguably fastest growing organisation in terms of its membership, its teaching activities and its developments in education. The Irish Society of Orthopaedic Medicine is an established Society that is accredited by the SOM and runs educational courses as according to the SOM's guidelines.

The Chartered Society of Physiotherapy (CSP), as a professional body, is responsible for the validation of education and skills training of its members. It has an important role in the consideration of the professional practice issues surrounding the application of techniques, including the soft tissue injections used in the management of musculoskeletal lesions. Intra-articular (into the joint) and intralesional (directed at the specific site of the soft tissue structure) injections, normally of steroid and local anaesthetic, are applicable as a treatment option in the management of musculoskeletal lesions, but their inclusion within the scope of physiotherapy practice

was initially resisted since they were not based on the core skills of massage, exercise and electrotherapy.

Williams (1986), quotes the Charter of the CSP that says 'The objects for which the CSP was established and incorporated are: to improve the training, education and professional status of persons engaged in the practice of massage, medical gymnastics, electrotherapeutic or kindred methods of treatment and to foster and develop these'. Her paper focuses on the importance of fostering and developing the use of these treatments with continuing research, and she poses the question '... are we rather sliding off into other academic worlds that really belong to other professions, and ignoring our own?' Her message was that 'physiotherapy is handling' and that opinion was representative of the CSP's view that injections were not based on the core skills of the Charter, and that their invasive nature debarred them from inclusion within the interpretation of 'kindred methods of treatment'.

Due to the bi-disciplinary nature of the SOM, the theory and practice of steroid and local anaesthetic injections has always formed part of the syllabus of courses in orthopaedic medicine, being taught to medical practitioners and physiotherapists alike. From the earliest stages, physiotherapists have been required to know the theory underpinning injection therapy and the key points of applying injection techniques, but have been restricted from applying them in the clinical setting through the stance of the CSP and through ethical convention and professional tradition, each to the detriment of professional autonomy. These and other barriers to practice are explored within my research paper included in Section 5. Dr Cyriax himself strongly supported the motion that physiotherapists should be able to inject, with particular acknowledgement of their knowledge of anatomy that was crucial to ensure accuracy in diagnosis and needle placement, and so to enhance effectiveness in the application of musculoskeletal injections.

The World Confederation for Physical Therapy (WCPT) is an international confederation of 83 national physical therapy (physiotherapy) organisations that was formed in 1951 to share information worldwide with the aim of improving the quality of global health care. The WCPT is dedicated to encouraging high standards of physical therapy through research, education and practice, and to developing guidelines for practice to which member organisations and individuals can aspire. The CSP is a member organisation of WCPT. WCPT organises an international congress every four years and at its 10<sup>th</sup> congress in 1982 a keynote address was given that put forward the following dictum:

*'A profession should not be regarded as an institution which protects acquired modes of functioning in its own niche. It should not be regarded as a body of knowledge and skills the possessors of which are conservative and fearful of change. Instead it should be regarded as developing and changing functions – as something both open and dynamic. It defines its own goals – anticipates changes, participates in the development of society and readily re-examines its boundaries and the content of its activities'*

Paatro (1982)

The implication was that for a profession to progress a proactive challenge should be applied to the boundaries of practice in response to developments within society and the demands of services to the public. In that respect, Paatro's statement was prophetic in predicting the move within physiotherapy nationally and globally and it is interesting to note the progression of the profession over the intervening fifteen-year period following William's view (1986), especially in relation to extension of scope of practice, as discussed below.

It was always the intention that injections would enter into practice via specialism at a post-graduate stage. The WCPT Declarations of Principle concerning Education are reproduced in Appendix 3 (Section 2). The CSP's views were important in its role in monitoring and accrediting post-graduate training programmes towards specialisation. The WCPT published a 'position statement' (1995) affirming 'the right of Member Organisations to make national policies which permit practice specialisation where such activity is considered by them to benefit the public and the profession by promoting higher standards of physical therapy'. Important 'definitions and guidelines' were adopted to 'harmonise and co-ordinate the development of practice specialisation' that are also reproduced in Appendix 3 (Section 2).

It is important to note that the WCPT issues 'guidelines' as such, to encourage high professional standards and ethical principles. The issue of regulation of practice towards the achievement of the same aims is an interesting point for discussion. In the event of adverse outcome following physiotherapy intervention the recipient would generally have three routes for investigation and redress. Firstly, the CSP as a professional body would have the authority to investigate any complaint from the perspective of professional misconduct and breach of code of professional practice. Secondly, the circumstances could be investigated through the processes of civil law in

respect of 'assault'. If found guilty then the outcome could be considered by the professional body and also the regulating authority, the third avenue, as follows. A complaints procedure is in place within the Council for Professions Supplementary to Medicine (CPSM), that is the body for 'state registration' of physiotherapy and allied professions. State Registration is a requirement for working within the National Health Service, but is not a requirement for working within the private sector. The CPSM has a defined regulatory role to ensure that ethical principles are satisfied, and the removal of state registration would limit freedom of professional practice.

Ellis (1999) points out that regulation can protect the public from unqualified people and that a regulated professional group tends to have a position of standing or trust within a community. She examines different systems of regulation in physical therapy and sets out how regulation can also help to ensure that high professional standards are maintained nationally and globally. Ellis asserts that once a proper system of registration is in place, the maintenance of standards becomes easier, because professionals can be held accountable. She notes that within some countries mandatory continuing professional development schemes are in place to maintain standards and the trend, as in the United Kingdom, is towards annual renewal of registration to be linked to the demonstration of that development. The maintenance of high professional standards would be at the heart of a professional's practice and the stance of the CSP was, and is, respected in this regard.

Thus whilst 'regulation' can imply more than the 'policing' of a profession, nonetheless it appeared that the CSP, in defining scope of practice, was effectively restricting practice. For those physiotherapists involved in the teaching and practice of orthopaedic medicine this represented a professional injustice, since in spite of identifying injection therapy as the treatment of choice, following assessment and clinical diagnosis, physiotherapists were being denied the option of affecting a cure.

The WCPT 'Declarations of Principle' (1995) relating to autonomy states:

*'The central element of professional autonomy is the assurance that individual physical therapists have the freedom to exercise professional judgement in health promotion, prevention and the care and treatment of clients within the limits of the therapist's prevailing knowledge and competence.'*

With the continued development of autonomy within physiotherapy came the extended role of the profession in orthopaedics and rheumatology, where orthopaedic and

rheumatology 'assistants' or 'practitioners' were being created, whose role included the administration of local steroid injection. Hockin and Bannister (1994) examined the extended role of a physiotherapist in an outpatient orthopaedic clinic and identified that 22% of patients had received physiotherapist administered steroid injection. With the existence of such a *fait accompli* and the moves of continuing professional development in encouraging the process of developing practice towards skill specialism (Bergman, 1990), the CSP was pressed to extend the scope of practice of physiotherapy to include intra-articular and intralesional injections in December 1995, provided that the physiotherapist was 'appropriately trained'.

The definition of 'appropriate training' allowed for interpretation in that physiotherapists could be directly supervised, mainly in orthopaedic or rheumatology departments, or could attend dedicated injection therapy courses (at that stage still to be introduced), where the principles of intra-articular and intralesional injections could be taught as part of the syllabus. Courses in orthopaedic medicine were an obvious starting point for the introduction of 'appropriate training' for physiotherapists.

The Association of Chartered Physiotherapists in Orthopaedic Medicine (ACPOM) is a clinical interest group within the CSP. ACPOM is open to membership for individual physiotherapists who have an interest in orthopaedic medicine and a proportion of physiotherapy members of the SOM will be members of both. After the introduction of musculoskeletal injections within the scope of physiotherapy practice, an injection therapy module was developed through ACPOM that led to the award of a 'Diploma in Injection Therapy'. Several SOM members attended the initial courses, particularly from its teaching body. A number of cohorts of students have been trained in injection therapy via this route and the courses continue to be well organised and popular. However, the nature of injection therapy training requires a high tutor to student ratio, with the outcome that the ACPOM courses became heavily oversubscribed.

To increase the availability of injection training courses, the governing SOM Council agreed that the SOM should design an add-on course for physiotherapists, i.e. a Module D, which would dedicate itself to the training of physiotherapists in injection skills. Dr Ian Davies, at the time a teaching Fellow of the SOM and member of Council, was appointed as 'course principal' to take the lead in designing the content, programme and teaching materials of the course, with support from the SOM education committee and medical practitioners belonging to the British Institute of Musculoskeletal Medicine (BIMM), an organisation that has a close professional

association with the SOM. I was part of the development team and pilot group of this injection therapy module.

The Society's Membership course had been presented for accreditation in 1994 through the so-called 'PACE' (Physiotherapy Access to Continuing Education) Scheme, where it was assessed by the Joint Panel of the CSP and the University of Greenwich and awarded 40 points at Level 3<sup>2</sup>, within the University of Greenwich system for accreditation. If required, the reader is referred to my 'Review of Previous Learning' (January, 2000) that provides full details of my role in achieving accreditation for the Membership course. The relevant extract is included within this presentation as Appendix 4 (Section 2).

With respect to the injection therapy module, Module D, I was charged with the responsibility for preparing the supporting module documentation that was to be presented to the University of Greenwich towards the achievement of accreditation for the injection module in its own right. My education committee colleague, Anne-Marie Ainscough-Potts, was my chief collaborative partner in this endeavour and we both attended the accreditation meeting in 1998 to present the module to the panel that was drawn from representatives of the University of Greenwich and the CSP, where it was awarded 10 points at Level 3.

The education committee of the SOM is a sub-committee of its main governing Council and comprises the current eight course principals, each of whom has been considered by the education committee to have the knowledge and organisational capabilities to run each course module in the manner in which it is accredited. The education committee is concerned with all the affairs of education in the Society but is answerable to Council to which it must report at each Council meeting. I was appointed as a course principal in 1994.

In my submission 'Review of Previous Learning' (January, 2000), I identified those areas pertaining to education within the SOM for which I had key responsibility at the time. These were highlighted as being the development and maintenance of university partnerships, the preparation of supporting course documentation and the representation of the SOM at accreditation events. Up to that time, most of my efforts had been directed towards the moves towards the achievement and maintenance of accreditation with the University of Greenwich, that was itself in partnership with the

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<sup>2</sup> Level 3: approximately equivalent to the level of learning assessed within the third year of an undergraduate course.

CSP. In order to clarify my role with respect to my project, it is necessary for me to reflect on my development as an orthopaedic medicine educator, particularly within the context of the SOM, throughout the period that has followed since the original accreditation by the University of Greenwich.

Ever since the course had been accredited through the original 'PACE' scheme described above, it had been the aim of the SOM to move its course towards a master's level option. The Society's Membership course is deemed to be successful as a useful, comprehensive clinical skills course that enables students to enhance their skills of clinical reasoning in the assessment, diagnosis and treatment of musculoskeletal conditions. From that perspective it sits neatly within the Level 3 framework and there was a reticence to 'throw out the baby with the bathwater' with further developments towards master's level that might be introduced. The Society certainly did not want to alienate those students who had no wish to study at master's level but nonetheless wanted to absorb and integrate the tenets of orthopaedic medicine into their clinical practice.

The expertise had not been within the Society's education committee to provide an option that would satisfy the requirements of Level 4 (master's level) learning, whilst allowing the students to 'step off' at the stage of achieving Membership of the SOM, or even before. Furthermore, at that time there had been several internal changes within the University of Greenwich post-graduate courses team and attempts to move things onwards within that partnership, with respect to developing the course to master's level, were unfortunately unsatisfactory.

Through a chance introduction in 1999, the SOM had forged an embryonic collaborative partnership with Middlesex University (MU), School of Health, Biological and Environmental Sciences (HeBES) to discuss the possibility of developing a master's programme in Orthopaedic Medicine, i.e. an 'MSc Orthopaedic Medicine', that, if it came to fruition, would be the first master's programme dedicated to the specialism.

The Society of Orthopaedic Medicine and its Membership course had to 'pass muster' in terms of quality and educational credibility before progress could continue and rigorous checks were made in order for the Society to gain 'Institutional Approval'. The 'Programme Planning' Stage followed in preparation for validation of the MSc Orthopaedic Medicine programme.



My experience in completing a master's programme in post-compulsory education and training, developing the Society's course in satisfaction of the requirements for accreditation by the University of Greenwich and my attendance at accreditation events, had prepared me well for the next stage of developing the course, with the support that was being offered by MU. It was inevitable that the responsibility for taking the course onwards should be given to me within the Society's education committee, and I was delighted to take on the challenge.

In accordance with the programme planning processes within the School of HeBES, I was appointed as Link Tutor to liaise between the SOM and MU. My counterpart was Dr Kay Caldwell, who also has responsibility as a postgraduate programme co-ordinator. The relationship and support provided by the personnel within the MU School of HeBES, was stimulating and refreshing in its facilitation towards the development of the master's programme. It was emphasised that the ethos of the university was to give credit for each stage of learning achieved and that viewpoint was most compatible with the existing framework of the Society's course and its aims for development.

The MSc Orthopaedic Medicine programme was designed to commence at the Post-graduate Diploma level, with successful completion of the Society's Membership Course as a pre-requisite for entry to the programme as a Post-graduate Certificate in Orthopaedic Medicine. In order to satisfy the requirements for the Post-graduate Certificate as part of the validation process, it was vital that the Society's Membership course itself should be developed to become accredited at 60 credits at Level 4, or master's level, by Middlesex University. As a guide, the Levels Descriptors central to work based learning and independent study, as mapped onto the Levels 1-4 framework of the Middlesex Academic Scheme, are included as Appendix 5 (Section 2). I was responsible for developing and submitting the necessary documentation and the Membership course was accredited by MU School of HeBES in autumn, 2000. The option for students to exit at the stage of achieving Membership of the SOM remained, and indeed it was also possible for students to opt out prior to the Society's Membership examinations, where certificates of attendance would be issued for each module attended. In this way the course would build on its Level 4 underpinning but allowing several options for study within its flexible framework. The structure and pathway of the master's programme is given as Appendix 6 (Section 2).

My role as link tutor involved the attendance of a series of programme planning meetings that were held at the Enfield campus of MU (Enfield, Middlesex). By good

fortune and coincidence this campus was near to my home and therefore a convenient venue for me.

The times of the meetings were always negotiated to have the minimum impact on my own professional commitments. In taking on the responsibility for the development of the master's programme, it was accepted that I would originate any documentation that was required from the SOM's perspective that would then be circulated to the other education committee members for comment, and that would then be incorporated into the final drafts. That method of communication had worked well for similar projects in the past and it was a satisfactory process to allow for input from all members, as well as providing an assurance to me that I had the informed support of my colleagues.

I believe that it is appropriate at this point to highlight that members of the SOM's Council and education committee take on the commitment as a voluntary, 'spare time' role. Members of the education committee may also be elected members of Council, and this is my own situation, as well as that of four of my education committee colleagues. Council meets four times each year at meetings that commence in the early evening and the education committee holds two full-day meetings twice a year, with a considerable amount of work relating to Society business carrying on throughout the year. Without exception, members of both Council and the education committee have existing full time clinical or undergraduate teaching commitments as medical practitioners and physiotherapists, and the course principals have an additional commitment to teaching and running the Society's courses that involves each of them in being away for up to eight, four- or five-day modules each year.

To ensure that the ownership of the masters programme rested with the education committee as a whole, it would have been desirable and ideal for several members of the education committee to have attended each planning meeting, just as there were always two or more representatives from MU. However, although one of my education committee colleagues from Kent was able to join me for two of the six meetings, it was not practicable for the other members to attend from further corners of the country, and an arguably unreasonable demand on their time. This was understood wholeheartedly by the MU link tutor but I did need to give myself, and her, the assurance that although the key respon responsimine I would be liaising closely with each of my colleagues at all stages of the development of the programme.

I did take best care to ensure that it was the Society's remit that I was working to, rather than my own, and I determined to remain professionally focused in that

endeavour with my personal development as a by-product of the process. It was most important to maintain the Society's corporate ownership of the programme and to allow all members of the Society to feel part of the development of the course, with equal access to a programme that would represent the final focus of all the work of all the medical and physiotherapy contributors to the development of the specialism and the Society's progress in education over the years. Nonetheless, I would suggest that the circumstances of my being the key person able to attend and contribute to the programme planning meetings further enhanced the importance of my role in developing the master's programme.

I was able to work autonomously in taking the Membership course forwards towards the development of the master's programme but remained mindful of my responsibility to the SOM Council through the education committee and ultimately the Society as an organisation.

I prepared all the documentation in preparation for the validation event in collaboration with my MU Link Tutor colleague and attended the validation event itself to introduce and speak to the master's programme from the clinical perspective. A tutor representative and student of orthopaedic medicine also attended the meeting and contributed to the discussions. MU validated the MSc Orthopaedic Medicine programme on 25 January 2001. It was an exciting achievement for the SOM and marked an important stage in attaining academic credibility for the Society's Membership course. Following the achievement of validation the roles of Kay Caldwell and myself were redefined as 'programme co-ordinators'. Details of my role within the SOM have been provided above, particularly in developing the educational aspects of its course. In context of my over-arching doctoral programme, I believe that my role has been pivotal in taking orthopaedic medicine forwards and facilitating the achievement of the SOM's educational aims.

In sharing the MSc between the SOM and MU, it was important that optional modules should be provided by the Society as well as those already existing within the MU catalogue, that were relevant to the programme. In developing the master's programme, it was proposed that the Society's existing injection therapy and Fellowship training modules should be developed to master's level to be available as the option modules 'Theory and Practice of Injection therapy, (IPS 4020)' and 'Preparation for Teaching Orthopaedic Medicine, (IPS 4010)'.

As mentioned above, injection therapy is a treatment option in orthopaedic and musculoskeletal medicine and provides a focus for a therapeutic intervention resulting from the differential diagnosis of musculoskeletal lesions. From the outset, the SOM believed it to be essential that the quality of training courses for physiotherapists to learn how to inject should be in accordance with stringent levels of scrutiny. This belief was in accordance with point 5 of the WCPT position statement on specialisation that states 'The qualification of a physical therapy specialist will include a formal process for testing and acknowledging the appropriate advanced clinical knowledge and skills of the speciality' (Section 2, Appendix 3). Within the development of the master's programme was the opportunity to focus on the development of the Society's injection therapy module in support of the Society's role in the effective training of physiotherapists in injection therapy skills.

As listed in Appendix 2, (Section 2), the Society's educational course consists of three modules, Modules A, B and C with inter-modular course work. The injection therapy module, Module D, was already in existence but accredited as a Level 3 module. From our discussions within the education committee on the nature of the learning involved, we believed that it was appropriate for the injection therapy module to be developed towards master's level, with reference to the Level 4 descriptors (Section 2, Appendix 5). As part of my mandate from the SOM to develop the MSc Orthopaedic Medicine, I decided to focus on the development of the injection therapy module to master's level within that programme, as the medium project required in completion of my doctoral programme. I set out to address important issues and perspectives in the development of a high quality training module by drawing from the blend of my existing experience in orthopaedic medicine and education, and specifically from my experience in developing the Society's Membership course towards master's level.

## THE PROJECT

In spite of the injection therapy module's place as a core skills module within the master's programme, I did not want to confine the project by entitling it 'the Development of an Injection Therapy Module to Master's Level'. The module's development can be considered to be infinite. It has moved from its conception as Module D to being 'relaunched' at master's level and will continue to be developed in light of its own intrinsic evaluation and also as a proactive response to professionally related extrinsic drivers linked to the development of skill specialism.

The module's impact on the physiotherapy profession lies in its value as a post-graduate training course for specialist practice. The project will address the demands of its stakeholders within its associated contexts and will demonstrate the strands of collaboration established towards its development.

The project sits at the heart of several contexts that are best represented as a series of concentric circles that illustrate the contextual relationships and their increasingly widening professional scope. The diagram is reproduced as Figure 1 on the following page.

The injection therapy module is placed at the centre of the circles. Moving outwards its first relationship is to the surrounding MSc Orthopaedic Medicine programme where it sits as a clinical skills option module. The collaborative partnership between the SOM and MU is the next context represented with the MSc programme, and the injection therapy module within, representing the outcome of that partnership.

Moving further outwards, the collaborative partnership allowed for the fulfilment of the aims of the SOM. The SOM was committed to moving its educational course towards the development of a master's option and the SOM then has its place as a teaching body in context of the specialism of orthopaedic medicine itself. Since the injection therapy module is a post-graduate course targeted at those physiotherapists who are practising in the field of orthopaedic medicine, and who have successfully completed the Society's Membership course, I have selected the profession of physiotherapy as the next contextual surround. That itself is embraced by the girdle of an interdisciplinary collaborative framework, particularly with respect to the partnership between physiotherapists and medical practitioners.

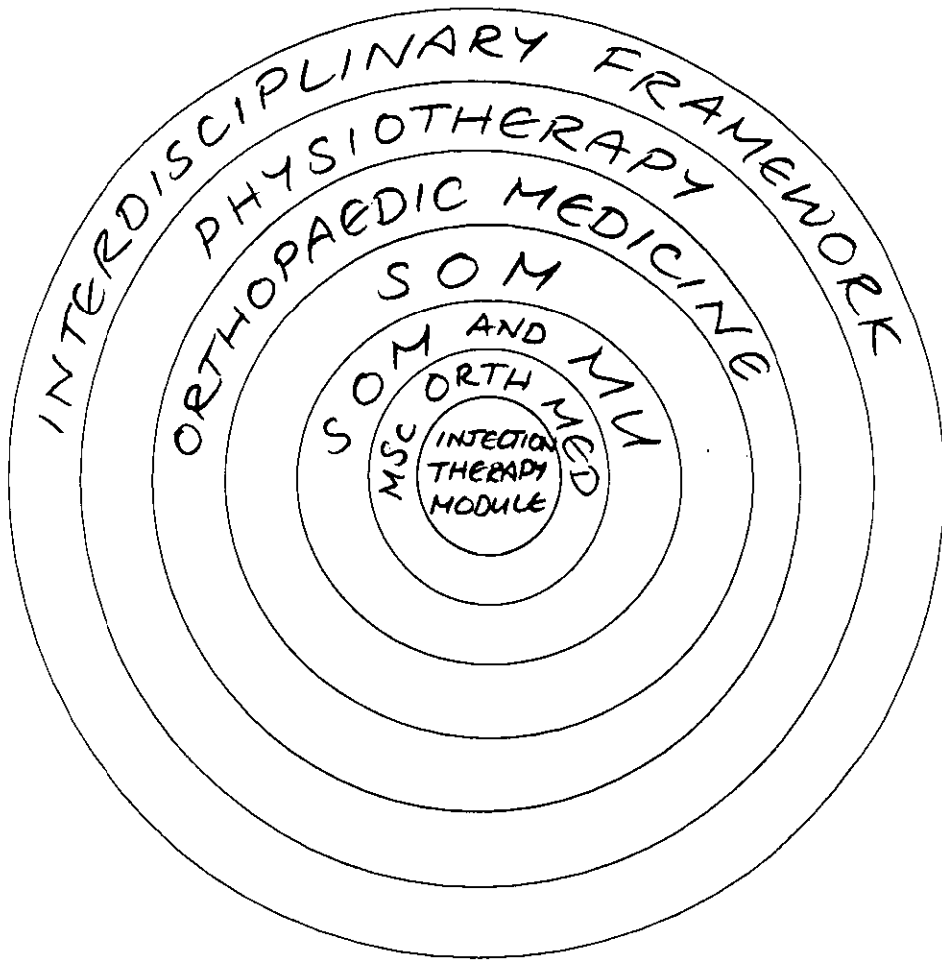


Figure 1

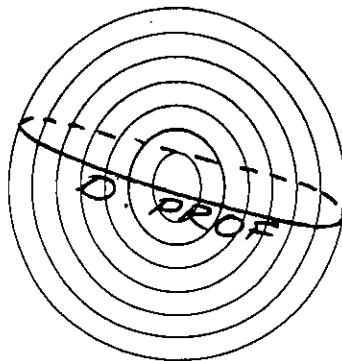


Figure 2

Each stage of the contextual relationship can also be applied to my doctoral programme that is aligned across the concentric arrangement as illustrated in Figure 2.

Stakeholders can be identified within each circular relationship that have an interest in the development of the injection therapy module. Returning to the heart of the illustration, the injection therapy module leader is experienced in the administration of injections in musculoskeletal conditions, but is looking to my role in developing the supporting framework of the module through the fulfilment of my project's aims. Similarly the collaborative partnership with MU depends on my input towards the development of a core skills option module that can be offered as part of the MSc Orthopaedic Medicine programme. The SOM is committed to offering an injection therapy module to provide comprehensive postgraduate training in this skill specialism that forms an essential part of the orthopaedic medicine approach to management of musculoskeletal lesions. The Society also has a stake in my completion of the project, therefore, towards the development of a high quality injection therapy training module that can be offered as a sequel to its Membership course.

With respect to the physiotherapy profession and the juxtaposed interdisciplinary framework for working, the project is vital in facilitating the development of specialism towards a total professional approach in the management of musculoskeletal lesions. Furthermore, the importance of continuing professional development is well recognised as a fundamental need for all individuals engaged in the provision of health care services, and a professional requirement for those engaged in clinical practice. The module sits well within that framework for the continued development of skill specialism in medicine and physiotherapy.

For clarity the table detailing the key elements of the project is repeated below.

#### THE PROJECT – Development of an Injection therapy Module

1. The development of the injection therapy Module Handbook in satisfaction of the Middlesex University requirements, as evidenced by the production of the Handbook itself.
2. The completion of the manuscript for a textbook in injection theory and techniques (working title: 'Musculoskeletal Injection Skills'), as evidenced by its submission to its publisher, Butterworth Heinemann, Oxford.

3. The investigation of the facilitating factors and barriers to practice of physiotherapists implementing their injection skills, as evidenced by the preparation and submission of a paper for publication by a high quality peer reviewed journal.
4. A commentary critically reflecting on the impact of the project on orthopaedic medicine education, and the physiotherapy profession, and an explanation of how the three previous components link together.

An explanation follows to justify the inclusion of each of the components within the project. Each component will then be discussed in turn to allow me to develop my role in completing the project and to address the project itself in terms of internal coherence and impact in the wider context. The project's place as the ultimate contribution to my whole doctoral programme will be made apparent and explicit reference to the Level 5 descriptors will be made.

As a member of the Society's education committee, and latterly as its Chair, I have been an integral part of the team developing the academic content of the whole course and the original injection therapy module within that. From the outset we believed that it was crucial that the module leader and those teaching on the module should be drawn from those who are highly experienced in the use of the technique, and medical input was paramount. The course content and learning resources, including the course manual, would need to reflect that expertise. At present, I have not taken the development of my own injection therapy skills forwards in my clinical practice and I shall expand on that point within my critique of both the 'textbook' and the 'investigation'. I was, and am, clear on the extent of my own role in developing and supporting the module on the basis of my own qualifications.

From the educational standpoint I took a pragmatic view on what was 'wanting' in the module, linked to the contribution that I could make to the development and support of the injection therapy module. In line with current educational theory, a student centred approach to teaching and learning underpins the Society's Membership course and I was careful to consider the module from the student's perspective, as well as that of the teacher.

Having been a student within several programmes myself, I found the administrative handbooks invaluable for the information they provided concerning the framework of thef2Uand referred to them frequently throughout the duration of the respective



courses. No such handbook was in place for the injection therapy module, Module D, and I viewed the handbook as an essential starting point. With my personal experience as a student and having developed the documentation for the master's programme, including the programme handbook and validation document, I was best placed to produce a Module Handbook that would give general information and detail on the administrative aspects of the module in context of the MSc Orthopaedic Medicine programme. Thus, as a token of my authority in that role, I elected to include the production of the Module Handbook to be a component of my project. I was prepared to seek the advice of Dr Kay Caldwell, my collaborative MU MSc Orthopaedic Medicine programme co-ordinator, to ensure consistency with the existing MU, School of HeBES module documentation.

As part of my doctoral programme I have presented the textbook 'Orthopaedic Medicine: a Practical Approach'<sup>3</sup>, a collaborative project with my colleague Monica Kesson, to claim recognition and accreditation of learning (RAL) within Part 2 of the programme. The book had been written to be the 'book of the Membership course' and had established itself as a core reader in that role in support of students and teachers alike. Its success in that regard had led to the creation of a textbook to support the existing injection therapy module and that was already underway at the start of my project, in collaboration with my colleagues Monica Kesson and Dr Ian Davies. However, against the background of the development of the injection therapy module to master's level, and the module's place in the MSc Orthopaedic Medicine programme, it needed to be looked at afresh before its ultimate submission for publication, to ensure that it was appropriate as a dedicated specialist textbook and a key core reader to support the module. Its role was essential in this respect and I therefore included the book as a component of the overall project.

I mentioned above that at present I am not developing my injection therapy skills further within my clinical practice, but to clarify, I *have* injected as part of the clinical supervision stage of the pilot injection therapy module. In fulfilling the requirements of clinical supervision and in implementing the skill, I had encountered barriers to training and practice. From my own experience, I believed that it would be *would be* explore the experiences of physiotherapists in implementing their injection therapy skills to be able to identify those barriers to practice that might be met, but also to be able to counter these by identifying factors that might facilitate the implementation of the skills. I intended that the findings of the study would inform the module to allow a proactive

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<sup>3</sup> Kesson M., Atkins E. (1998) *Orthopaedic Medicine – a Practical Approach* Oxford: Butterworth Heinemann

approach in the advice given to students, to enable them to apply their skills following training. As well as directly affecting the Society's training modules, and more indirectly other injection therapy training modules, this will also have important impact on the profession of physiotherapy as a whole as it moves to fully integrate this technique into its scope of practice. The investigation was therefore selected as the third component of my project.

It is my intention to extend the study referred to above following the completion of my project, to be able to reflect on the experience of students and the findings of my original investigation from a different perspective. My aim will be to generate theory to inform the continued development of injection therapy training and to forge a closer link between education and implementation.

Since I would not consider myself to be experienced in the application of injection therapy in clinical practice, it will be for the module leader and those appointed to the development team to have chief responsibility for the content and design of the course and the preparation of teaching materials. However, although my input into these will be secondary, my previous experience in course design and preparation of teaching materials, and my input as programme co-ordinator will be important nonetheless, both to support the development team and to ensure coherence of the programme as a whole.

Each part of the project was worked on simultaneously and the findings and experience of each informed the other. Within the following sections I shall reflect on each of the components listed above in turn, before drawing the project together within my commentary and conclusion.

My 'Programme Planning and Rationale' assignment, had stated deadlines for each component of the project:

*The first 'deadline' as such will relate to the textbook manuscript that has to be submitted by 31 October 00. At present, the pathway towards the MSc in Health Studies (Orthopaedic Medicine) is a commence in the second semester of the academic year 00-01, and the Module Handbook will need to have been produced and the programme validated by then. I intend to start conducting interviews for the third part of the project as soon as ethical issues have been satisfied, and would aim to have the paper ready for submission for*

*consideration by a professional journal by no later than January 01, i.e. Semester 1, 00-01.*

The first lesson learned in pursuing the project was that in spite of being determined to adopt a proactive approach throughout, nonetheless I fell victim to external stressors that led me to develop my skills of reacting to and managing the challenges they presented. Details of those challenges and how they were met will be included within my evaluation of the processes included below.

## **MODULE HANDBOOK**

The Module Handbook is included as Section 3 of this project presentation.

In a sense the pressure to meet the original deadline of having the handbook ready in time for the second semester of the academic year 2000-01 was removed, since it was agreed that the MSc Orthopaedic Medicine should begin in the first semester of the academic year 2001-02. However, this also took the pressure off the appointed module leader and his collaborative medical practitioner partner that were detailed to prepare the course material, particularly the Course Manual and the Pre-Course Handbooks. That affected me in that I had wanted the various written materials to form a set, such that the boundaries of content of each would be clear, and there were elements appertaining to the course design and content that needed to be included within the handbook that had not been finalised within the context of the module's preparation.

I should point out that the injection therapy module will be available as a stand-alone module irrespective of whether or not students are enrolled on the MSc Orthopaedic Medicine programme. On reflection, I needed to consider those students who might enrol on the injection therapy module but who might not be registered for the MSc Orthopaedic Medicine, and decided that some overlap of information would be both desirable and acceptable. The module leader also gave full support for my requirements by focussing specifically on the areas that needed to be finalised for the purposes of the handbook.

I prepared the Module Handbook, but since it was important that it was consistent with the format for handbooks available for other MU modules provided by the School of

HeBES, I collaborated with my co-programme co-ordinator, Dr Kay Caldwell, in acknowledgement of her considerable experience in preparing such material. I particularly needed advice on access to general University information, student support services, information and learning resources and module evaluation.

Although the preparation of the handbook was fairly straightforward and in that, the 'easiest' component of the project to compile, nonetheless I believe that that in itself was a reflection of my accumulated experience in preparing documentation for the master's programme. That experience had facilitated the process and had enhanced my confidence in performing the task.

A draft copy of the handbook is included in Section 3, preceded by a testimonial from my collaborative programme co-ordinator relating to its final production.

#### *LEVEL 5 DESCRIPTORS*

##### *Cognitive*

The Module Handbook is intended as a token of my development in orthopaedic medicine education and as a single component of the project it is least aligned to the satisfaction of the Level 5 descriptors. I had identified that it was a requirement, or tool, to support the student of injection therapy and it was a product of the synthesis of my existing experience in producing course materials and documentation, with fresh ideas for its development in collaboration with the module leader and the MU programme co-ordinator, to ensure consistency with other MU School of HeBES handbooks.

##### *Transferable skills*

The key transferable skills evidenced through its production relate to problem solving, planning and management, with autonomy in its production whilst engaging in collaborative working and communication.

##### *Operational context*

I was responsible for the Module Handbook's production and was aware of my responsibility to the stakeholders that include:

- the future students on the injection therapy module
- the module leader
- the collaborative partnership between MU and the SOM in co-ordinating the MSc Orthopaedic Medicine programme
- the SOM in its aim to provide a high quality training module
- orthopaedic medicine as a specialism
- the profession of physiotherapy to support the development of specialism within practice
- the interdisciplinary collaboration towards improved patient care in the management of musculoskeletal lesions.

## TEXTBOOK

The draft of the Textbook as submitted is included for reference as Section 4 of this project presentation.

As referred to above, the preparation of the textbook, 'Musculoskeletal Injection Skills', was already underway when I began the project of developing the injection therapy module. It had initially been commissioned as the textbook to accompany the original injection therapy module, Module D, and I collaborated with my colleagues Monica Kesson and Dr Ian Davies in its preparation as my respective physiotherapy and medical practitioner co-authors.

I mentioned above that, at present, I am not developing my injection therapy skills within my clinical practice. The appropriateness of my being commissioned to write a text on 'Musculoskeletal Injection Skills' in the absence of those personal skills is therefore a matter for debate and would certainly require some explanation and justification. In response to the challenge of my qualifications to write a textbook on injection therapy my starting point would be to steal a phrase from the Gestalt school: 'the whole is greater than the sum of its parts'.

Following the invitation to prepare the textbook from the publisher, Butterworth Heinemann, I needed to address the question within myself on what part I could play in its preparation, with consideration for the absence of the development of my personal skills in the application of injection techniques. My collaborative physiotherapy author and I had written the original textbook 'Orthopaedic Medicine – a Practical Approach'

as the sole authors. However we had sought the input of our teaching medical practitioner colleagues to read and evaluate the sections on injections both to ensure accuracy and to allow for inclusion of those small points that enhance the teaching value of any practical educational text. Those who had contributed to the text in this way were acknowledged, by agreement, within the appropriate section whilst not being listed as co-authors as such.

Both my collaborative physiotherapy author and I have confidence in our teaching abilities and have a mandate to put our ideas in writing through past and present feedback following courses and lecture/demonstrations. Our partnership worked well in our collaborative publication mentioned above. The notion of confidence was an important point when we were commissioned to provide a companion to our original textbook that would dedicate itself to musculoskeletal injection skills. We were totally secure in the theory of injection therapy, but at the same time fully aware that the input of someone with the practical experience in the skill was crucial. We also believed that it was vital that a medical practitioner with experience of musculoskeletal injections should be included as a co-author of the text, even rather than an experienced injecting physiotherapist. I believe that, justifiably, we would have been exposed to criticism from both the medical and physiotherapy professions without that input and we agreed that we would not consider taking on the task without medical support.

Dr Ian Davies had been the teaching medical practitioner (as a Fellow of the SOM) who had originally taken the injection therapy module, Module D, forwards. He had had the main responsibility for designing the module and its teaching materials from the outset. In that role he had also been able to observe physiotherapists as learners and had been able to take note of the queries they had had, and any special needs in terms of facilitating their learning. With his knowledge of the theory and practice of orthopaedic medicine and his background in anaesthetics he was the ideal collaborative author.

My collaborative physiotherapy author and I had been part of the pilot student cohort on the original injection therapy module and I consider that that put us in a very strong position in being able to identify the module's strengths and shortcomings and the particular difficulties we as learners. From that perspective, I do not believe that it would have been appropriate for a medical practitioner (or medical practitioners) only to write a text to support the injection therapy module since they would have emerged from a different professional background and different issues might exist within their realm of experience in relation to the sociology of the professions. With consideration for the specific contributions of each of my co-authors and myself, I do

not believe that it would have been possible or desirable for the text to have been written by any one, or even two of us, but the inputs of all three of us combined to produce the 'whole' in the form of a credible text.

Macdonald (1995) provides a useful introduction to the sociology of the professions that acted as a 'springboard' in increasing my awareness of factors that could impact on the ability for physiotherapists to put their injection therapy skills into practice. Reference to his text is also made within the paper that was produced from my research investigation (Section 5). Macdonald considers the attainment of autonomy within the medical profession itself and the way in which this has extended into 'dominance' over 'kindred occupations'. He cites midwives who he describes as needing the sanction of the medical profession as one of the bases for their legitimacy, but not wanting to be dominated by it, acting as 'low status assistants'. The culture of physiotherapy has developed in that it originally achieved legitimacy in mainstream medical practice, particularly with respect to its core skill of massage, by forging a partnership with the medical profession. In the initial stages this demanded the surrender of autonomy and subservience to the medical profession, with parallels being drawn with the midwives mentioned above. With the continued development of the interdisciplinary partnership, each profession has come to acknowledge the skills and boundaries of ethical practice of the other, and independent practice has emerged.

For the most part, the textbook 'Musculoskeletal Injection Skills' was prepared in a similar way to 'Orthopaedic Medicine – a Practical Approach' with our roles combining towards the preparation of the final draft. Both my physiotherapy co-author and I had a clear plan in mind for the structure of the book, and our medical practitioner co-author was supportive of our ideas. It was not intended merely to draw out the relevant sections from our original textbook, and we set out to expand the introductory chapters to cover the theory of injection therapy with a particular emphasis on pharmacology. The remaining chapters of the book would take a regional approach to peripheral joint and soft tissue lesion injections but would be updated with relevant recent references.

I believe that the 'lived experience' is valuable in allowing reflection on that experience and from which to derive a theoretical framework. It was understood from the outset that those students who were attending the pilot injection module should provide feedback on the course content and teaching and assessment methods, to feed into the continued refinement and improvement of the module. The feedback was offered in group 'brainstorms', on a 'one-to-one basis' and retrospectively at education committee level. This spirit of evaluation was extremely useful from the SOM's

standpoint as well as from my personal point of view, in being able to identify the main points wanting of expansion to enhance the understanding of important concepts. The analysis directly informed the textbook and we aimed to be proactive in identifying the areas to highlight the questions to anticipate to be able to facilitate students' learning. This was true of the sectional approach to injections in discussing indications, contraindications and the specific techniques. It was particularly important in developing the theory chapters of the book. Pharmacology is not part of the undergraduate syllabus for physiotherapists and it was essential that these chapters should provide a comprehensive foundation for injection therapy to enable safe and effective practice. As teachers, it was an interesting exercise to set out to identify what we, as physiotherapists, *need* to know derived from what we do not know.

Returning to the 'team' approach to writing the textbook, I believe that each co-author was vital for their contribution and that the end result, evidenced by the manuscript included in Section 4 (planned for publication in Autumn, 2001), is the richer for receiving the different inputs, and more credible as a core text for physiotherapists attending the modules to learn the skills of injection therapy.

My collaborative physiotherapy author tended to perform most of the original literature searches and would then create a first thoughts draft as according to our decided scheme. It was accepted that my role was to scrutinise and expand on the original draft with respect to credibility, readability characteristics and general clarity. I also had responsibility for the 'cut and paste' role of swapping chapters and sections within the drafts to create a logical flow through the material as it was presented. My collaborative medical practitioner author had a key role in checking the content for accuracy and in introducing his medical input, particularly with respect to medico-legal aspects, to enhance the credibility of the whole publication. My collaborative physiotherapy author and I have been teaching orthopaedic medicine for many years but since neither of us is currently developing our injection skills in clinical practice, our medical practitioner partner's role was essential in this regard.

Through the illness of one of my co-authors, the book's preparation had been delayed, but this enabled us to consider the developments within the injection therapy module to be able to reflect them within the textbook. The changes were not dramatic within themselves in terms of content, but the master's level of the module influenced the 'essence' of the style of writing to a degree.



In my project plan, I had committed to hand the manuscript to the publisher, Butterworth Heinemann, by the end of October 2000, but, from our previous experience of preparing a manuscript, neither my colleagues nor myself were surprised or disappointed that the eventual handover date was moved to the end of November 2000. I would say that we were relieved that it was delayed by such a comparatively short time.

We worked well as a team in the preparation of the book. I mentioned that my colleague's illness for several months near the beginning of its development led to the book being placed 'on hold' throughout that period. The close collaborative nature of our partnership made it hard and undesirable to move on, and the publisher was most understanding. It was hard to eventually pick up on the original embryonic drafts, with the effect that much of the theory appeared to be seen 'as for the first time', and the renewal of enthusiasm was extremely difficult. However, throughout our previous combined projects, the challenge has always been to move things 'off one desk and onto the other's' and the impetus to achieve that soon led to a return to our previous pace of working. Certainly with our introduction to electronic communication since we had prepared our first textbook, the process of moving drafts between us was much easier and more straightforward than the cumbersome swapping of floppy discs and hard copy via 'snail mail' that had been employed previously. Nonetheless, with recognition of our considerable clinical, teaching, and family commitments, it was a great relief to hand over the manuscript at last.

The attached manuscript (Section 4) may appear to be disappointingly bland. Clear guidelines are given to authors on the page layout and text style to be adopted. For ease of processing, highlighting and emphasis must be kept to a minimum and all laying out of the text is left to the publisher's design department. As the book develops, the authors' suggestions are taken into account and the production of the book is very much seen as a collaborative venture between the authors and the publisher.

In early conversations with the publisher we had arranged to use the photographs that had been used in our previous textbook, 'Orthopaedic Medicine: a Practical Approach', to illustrate the techniques in the new text. Techniques had been included in the new book and an evaluation of the original textbook had demonstrated the need for supplementary photographs.

We had worked with the pharmaceutical company 'Pfizer' in the past, to produce a small handbook on commonly used techniques for distribution to general practitioners.

A selection of the existing photographs had been used but using the considerable expertise within the design department appointed by the drug company, that had produced computer enhanced interpretive photographs and diagrams that were to a high specification in terms of quality and clarity in presenting the key points of the injections. We were aware that the original booklet was no longer in print but decided to ask the company if they would be prepared to sponsor our new publication through their educational grants, to enable us to tap into that expertise once more. Having submitted the manuscript, the preparation of the photographs and illustrations was the next important task towards publishing the book, and the draft page layouts would be delayed until that task was completed.

Using the contacts established previously we arranged a meeting between the marketing department of the pharmaceutical company, the publisher and ourselves as the authors, and met at Pfizer's headquarters in Kent, where the initial meeting was very positive in the support and resources that would be offered. We were aware of the existing projects underway at Pfizer's in promoting new products and were prepared to wait for a final decision. However, a month or two passed when we were reluctant to apply inappropriate pressure for fear of forcing a refusal. Having tentatively arranged a follow up meeting, we were delighted to have the original offer confirmed, with the additional offer of sponsorship for colour in the book plus a sophisticated 'wiro' binding that will allow the book to open flat on a desk top, so enhancing its usefulness as a training guide in clinical practice.

A date has been arranged for a completely new set of photographs to be taken that will be incorporated in the new textbook alongside interpretive drawings. My regret is that, with the production of the book being delayed in this way, I shall be unable to include some of the initial page proofs within this project presentation, that would have provided a further glimpse of the layout planning stage of the book towards its publication. An original draft of a proposed cover of the book is attached as a cover to the manuscript in Section 2, although this will be modified in terms of colours and layout in line with further discussions.

#### *LEVEL 5 DESCRIPTORS*

##### *Cognitive*

The textbook itself is of my depth of knowledge of an inter-disciplinary nature and it is underpinned by recent research that required understanding of

research in its analysis, evaluation and synthesis into the text. Although the textbook is not exclusively intended for physiotherapists, its opening chapters required evaluation of gaps in undergraduate training of physiotherapists in related subject areas, particularly pharmacology, and the identification of knowledge that is needed to be able to develop safe and effective practice of injection therapy. The reporting of others' work is explicit in supporting the text with relevant references.

### *Transferable skills*

The textbook was created to develop and improve practice skills in injection therapy. Reflection on my own practice and my collaborative authors' practice contributed to the text especially in the questions addressed towards increased understanding of the theory underpinning injection therapy and the facilitation of the application of the specific techniques. Autonomous study and working was essential towards the completion of the text whilst contributing to the author 'team' in the identification of problems and queries and the generation of solutions. Such problems arose within the creation of the content of the text but also in the process of developing a text for publication and the attendant problems accompanying that process. Throughout the development of the text ideas were presented and reviewed by SOM colleagues and student groups on the Society's Membership course modules, that supported the refinement of content and the style of presentation. Full use of critical communities was made in this way. The textbook will also be submitted for peer review following its publication.

### *Operational context*

The production of this text was highly specialised in its subject area of musculoskeletal injections, and as innovative practice within physiotherapy it was a complex process to melt the demands of the medical and physiotherapy professions towards the creation of a comprehensive and useful text to both professions.

I was aware of the contexts of this specific component of the project and also aware of its stakeholders, namely:

- my co-authors as part of the collaborative team
- students and readers of the text, from both the medical and physiotherapy professions, with an interest in developing their injection therapy skills

- injection therapy module leaders (not only the module leader of the SOM's module), as a core reader for the module
- the SOM in support of its injection therapy module
- orthopaedic medicine as a specialism
- the medical and physiotherapy professions in support of this skill specialism.

I was aware of my responsibilities to each of the stakeholders mentioned and shared autonomy in the textbook's production as part of the author team. The publisher also supported that autonomy wholeheartedly. Understanding of ethical principles underpinned the production of the text and the ethical boundaries of medicine and physiotherapy were respected, particularly with reference to prescribing issues and interprofessional communication.

## INVESTIGATION

A copy of the paper drawn from the investigation and submitted for publication is included as Section 5 of this project presentation.

I deliberately took on the challenge to develop the injection therapy module because of my own personal experiences that had, on the whole, been negative with respect to my being able to successfully implement and develop my injection therapy skills. Since I had been teaching the theory and demonstrating the practice of injection therapy for over twelve years, it should have been a 'short hop' for me to be able to integrate and develop those skills within my own clinical practice. That was not the case, and it was my personal reflections that led me to identify the barriers, as I perceived them and that led me to investigate whether my experiences had common threads with the experiences of other physiotherapists.

As I mention in the introduction to my paper, in common with other treatment techniques, competence does not necessarily imply confidence. The physiotherapist may not feel confident to administer injections, especially with the potential threat of the emergency situation of anaphylactic shock (a severe allergic reaction that could be fatal in outcome), or introduction of sepsis via this invasive technique. Potential problems could also exist with medical colleagues who might not support the physiotherapist in injecting their patients, their reasons including lack of confidence in the physiotherapist's abilities, particularly in coping with emergency procedures when

they have not had the experience in professional practice, and threat to financial and professional monopoly. Without the prescription of drugs and supportive relationships with medical colleagues, physiotherapists would be barred from implementing their skills. My investigation started from a stance of curiosity, but then became most relevant in context of the potential for informing the development of an injection therapy module.

I set out to investigate the facilitating factors and barriers to practice of physiotherapists in implementing their injection therapy skills. The paper is self explanatory in presenting the background, methodology and results of the investigation (Section 5). Political issues referred to earlier within this commentary, relating to physiotherapists injecting, are also expanded within the paper.

My reflections on the performance of the investigation follow, and the reader is encouraged to consider them alongside the paper itself.

In terms of those who volunteered to participate in the study there was a noticeable bias towards those who had successfully implemented their skills. On reflection, those physiotherapists who had been thwarted in this regard may have been less likely to respond, although this was not borne out totally by the sample. One participant had chosen not to develop her injection therapy skills in her clinical practice following qualification, and the other had been inhibited by local protocols that had debarred him from practising. The 'pilot' interviewee was selected on a 'first come' basis in being the first subject to be interviewed having arranged interview dates at the convenience of the participants.

I chose to visit the participants at their chosen venue, mainly to minimise any inconvenience on their part. Interviews were conducted in the interviewees' own homes, hospital departments or practices and I was fortunate in that, with consideration for the variety of settings, all of the interviews were conducted without interruption. I had set out to limit the interviews to one hour, to be mindful of taking the participants away from other commitments, but although this was adhered to, I was not aware of any time pressure and none of the interviewees put any pressure on me to finish through time constraints.

I enjoyed the process of conducting the interviews. With the cooperation of the interviewees, I was able to group the interviews broadly according to which area of the country they were based and I experienced a feeling of liberation in pursuing my

interviewees through Kent, Leicestershire, Yorkshire, East Midlands and Worcestershire over three separate days. I have mentioned the variety of settings above and I was also delighted at the variety of clinical backgrounds of the interviewees, encompassing private, corporate and national health service practice, that gave a broad spectrum of experience within the data collected.

The interviews were unstructured but recurrent themes emerged in the direction that the conversations took, and I gradually became aware of this consistency as being derived from and pertinent to their experience. I had mentioned to interviewees at the outset that I might be making notes, either to prompt me to explore avenues that were suggested within their conversation or to remind me of specific points that I would need for the purposes of triangulation, to be able to demonstrate the trustworthiness of my observations and conclusions.

I believe I conducted the interviews fairly in only following those leads that were suggested within the conversation and also in picking up those cues to explore further avenues. In reading the literature I became a little confused with identifying the key points of linking the phenomenological approach with respect to the tenets of Husserl and Heidegger. Within my original proposal for my investigation I had noted the importance of bracketing my assumptions to avoid introducing bias into the interview on the basis of any preconceived judgments I may have made from my existing experience. I quoted Ashworth (1997) in that regard. However, an example of a debate underpinning my confusion appears in a response by Koch to Walters (1995) who pinpoints the distinctions between Husserlian and Heideggerian phenomenology. She describes that the 'notion of bracketing is central to Husserlian phenomenology' which is at odds with the phenomenology of Heidegger that would propound that 'the observer cannot separate themselves from the world' and that 'the interpreter inevitably brings certain background expectations and frames of meaning to bear in the act of understanding. These cannot be ignored, forgotten or bracketed'. I was certainly aware of my own assumptions prior to the start of the investigation, largely on the basis of my own experiences.

The Module D of the Society's course was arranged over two weekends in the form of Modules D1 and D2. Within the intervening period of approximately four months there was a requirement for physiotherapists to undergo a period of clinical supervision, where ten specified injections would need to be performed under clinical supervision. One of these would form the basis for the final case study assignment to be able to complete the assessment requirements of the module. In setting up the initial pilot

injection therapy module, the Society itself had set out to provide a network for support for students by compiling a directory of medical practitioners who would be willing to provide supervision in the inter-modular periods.

I was fortunate in that Ian Davies, the Module D course principal, offered to support me through this phase and we arranged that I could visit him in his surgery where he would arrange for suitable patients to be 'clumped' together to allow me to perform the injections. This arrangement would consolidate and facilitate my clinical supervision in that his surgery was based in Worksop, Nottinghamshire and I would be driving from my home in Woodford Green, Essex. It was very generous of him to provide the facility and to apportion time to the exercise that fell on his usual day off.

We both noted a limitation of the arrangement in that the decision to inject had arisen through his own clinical reasoning and in that sense, my role was rather that of technician in performing the injection. Also, he alone would be in the position to assess the outcome at follow up, since I would be far removed and the patients would return for their follow-up appointments on a less regulated basis. I performed seven injections on that day and was very grateful for the experience. I had not expected to feel so nervous before performing the injection. I fumbled ridiculously in gathering together the necessary items prior to performing the injection and felt 'cack handed' in assembling the syringe and needle. I had rehearsed the stages of the so-called 'no touch' or 'aseptic' technique, to avoid introducing infection, several times before driving to Worksop – and had indeed taught it many times in the past – but nonetheless I faltered through the sequence when it came to putting it into practice.

I was aware of the possible side effects of injection, particularly noting the small chance of anaphylactic shock, but felt totally secure in the environment in which I was performing the injections. In the event of such a happening, I would have been able to step back from the main responsibility, although being prepared to play a supportive role in the emergency procedures. This was another area that did not allow a role-play for, say, single-handed practice.

Having completed my seven injections, I arranged to sit in with a local respected rheumatologist, who expressed delight at having an observer and was very keen to help with my progress through the module. He included me in the assessment process and we discussed the cases in terms of management. However, he apologised that he had no control over the conditions presenting themselves via GP referral to his clinic and in spite of several visits and being able to perform two or three

injections, they were not those required to complete my supervised 'set' and I was unable to complete the module. On reflection, I do believe that if I had been going through a relatively quiet period in terms of my activities both within my own practice and with the SOM, I would have travelled the length of the country to complete the set, and thus the module.

I think that an added block to this was provided by the knowledge that within my local area there are medical practitioners who closely guard their right to inject and, although I have not so far put it to the test, I sense that there would be a resistance to my being able to develop my skills. The fact that physiotherapists are unable to prescribe is a bar to autonomy, and a major barrier to practice in that there is a reliance on the medical practitioner to prescribe the drugs required for injection.

I would own to confidence issues within myself too. I enjoy the respect of my medical colleagues at a local level for the 'hands-on' work that I do, and I believe that I was resistant to not feeling totally 'at one' with a new skill, particularly with the knowledge of potential life-threatening consequences. I felt that I would find it hard to justify performing injections without medical support and back up, should 'the worst' happen. This was in spite of knowing the specific emergency routines to follow and being quite confident in the management of emergency procedures that I update on an annual basis.

As part of my own continuing professional development plan, it is my intention to resurrect my interest in developing my skills of injection therapy after the completion of my doctorate, and I should anticipate that the experience I have gained through completing my project will inform the process as I incorporate the skills into my professional practice.

As mentioned in the preceding paragraphs, I had encountered barriers to both training and practice. However, in relation to the interviews that I was proposing to conduct, I was also considering that facilitating factors might have been in place in allowing physiotherapists to apply their skills and I was not expecting other physiotherapists to duplicate my experience as such.

My recording equipment for the interviews was basic but effective and I heeded the advice of Easton et al (2000) to be aware of and to avoid common pitfalls in qualitative data collection. I used a recorder that could be both battery and mains operated and carried spare batteries, as well as having a small hand held Dictaphone as a 'belt and



braces' back-up. I had originally considered the latter method as a first choice, since transcription would have been made easier with the use of a foot switch. However, when I had conducted a recording pilot using the Dictaphone, the recording was indistinct and several changes of tape would have been needed during each interview. No doubt more sophisticated Dictaphone equipment exists, but I did not have access to it.

When it came to the point of transcribing the interviews I encountered several problems. Initially I sought the help of my secretary to help with the task of transcribing. However, having checked the initial drafts it was clear that not only was a knowledge of the field necessary but I needed to be 'in touch' with the interviewee to be able to remind myself of the interview as a total experience, and to check all those characteristics that are not identifiable in the written word: the laughter, pauses and inflections, that were particularly revealing of the physiotherapists' feelings and attitudes in their experience and the general atmosphere of the interview. When I then took the task over, I noted the 'ums' and 'ahs' and rambling repetition that occurs in conversation, but I chose not to include that, since it appeared to be unnecessarily labour intensive and unwieldy, and not particularly helpful in enabling me to establish the trends necessary for the purposes of my study. Each transcript took between eight to ten hours to complete and although I had been forewarned of this by Bell (1993), it was nonetheless an unpleasant truism.

The transcribing itself was interpretative, in that there was the decision at the outset of what to include and what to leave out. In performing the transcription myself it was helpful, and vital, to hear the tones and inflections and to annotate the typed transcript as a check that the actual meaning matched up with the interpretation of the written word. My own mutterings in steering the interview through were also very much part of the process and although they weren't included in the transcript, they should be acknowledged as an integral part of the conversations. I had made scant notes at the time of the interviews and these, with my personal reflections both at the time of the interview and afterwards also provided clues to support my impressions and subsequent interinterpret the interview as a whole, in a form of triangulation to enhance the trustworthiness of the investigation.

I found the interviews and preparation of the paper to be the most difficult component of the project. I conducted the interviews in November and December 2000, but, my attention was drawn to the preparation for the validation event for the MSc Orthopaedic Medicine at MU, to be held on 25 January 2001, as well as to the revision of the

handbooks for the Society's Membership course that were needed for printing and distribution in the new year. I had already missed my intended January deadline for submission of the paper when I began the earliest stages of interpreting the data in early February 2001.

The professional peer reviewed journal I selected for submitting my paper is 'Physiotherapy', the professional journal of the CSP that has a monthly circulation of 35,000 worldwide. In accordance with the 'guidelines for authors' given within each issue, I had submitted a draft proposal and outline of my paper for consideration by the journal's editorial board. The response from the Scientific and Clinical Editor of 'Physiotherapy' was most encouraging saying:

*'I think overall that it will make a most interesting contribution and as far as I am aware no-one has really looked at aspects of the introduction of a new technique in this way.'*

However, at the same time I had felt a blow to my confidence in the methodological approach I had selected when she then went on to say:

*'From the perspective of whether your article will be publishable, rather than considering the value of your study per se I would suggest that you need to consider the number of informants involved. If your aim is to develop theory, i.e. to use a grounded theory approach, then you will need enough sources for your data to become saturated, and therefore enhance the dependability of any theoretical generalisations which you may be able to make as a result of your study.'*

My study was based on phenomenology to explore the actual experience of physiotherapists, but the implication was that I might be better to use a grounded theory approach in analysing the data, from which to produce theory and to develop insights to inform both injection therapy training programmes and the physiotherapy profession as a whole. At that stage, most of my background reading and groundwork towards my initial proposal had been concerned with phenomenology. I felt bleakly that I might have pursued a blind alley and was locked into the opinion of Wimpenny and Gass (2000) who explored the differences between the use of interviewing in phenomenology and grounded theory and noted that 'it is imperative that the means of collecting data should be consistent with the underlying prescriptions of the specific

research approach selected' to avoid the 'muddling, slurring and blurring' of methods by combining elements of each.

I was reassured by the view of my adviser however, that the data I had collected could be a basis for different interpretation using an alternative approach, as long as this was clarified at the outset. This could allow the preparation of a further paper that would develop the investigation still further in the manner suggested by the Scientific and Clinical Editor of 'Physiotherapy'. I decided to stay with my initial aims and viewed my investigation as the bottom step towards the generation of theory that could ultimately inform the profession on the facilitation of the integration of this relatively new skill within its scope of practice.

I studied several textbooks as sources for ideas and approaches in data analysis with a particular focus on phenomenological data analysis. Miles and Huberman (1994) and Moustakas (1994) were particularly helpful, and Strauss and Corbin (1990), in presenting grounded theory procedures and techniques, enabled me to clarify my understanding of the important differences between the approaches.

The actual writing of the paper presented a problem for me particularly in deciding what was essential to include by way of background information to contextualise the study. Finlay (1999) is adamant that 'phenomenology is committed to describing, not explaining, how and why meanings arise'. In describing categories identified from the transcriptions and my recollections, I found it difficult to decide on the boundary between enough evidence in the form of quotation, and too much. Tarling and Crofts (1998) advise against looking for 'quotability' in the text and choosing the best quotes to illustrate the theme, suggesting that this might lead to an approach of making the data fit the quote. They suggest that it is better to choose the quote after categorisation to avoid this, but I still encountered the problem in spite of heeding the advice.

Finlay (1999) provides a further useful insight into the approach:

*'Phenomenological analysis remains both a logical procedure and an exercise in creativity where the researcher is simultaneously involved and analytically distant. The analysis is both intuitive and systematic; simultaneously subjective and objective.'*

The balance between being 'involved and distant' was also difficult to achieve, especially with reference to the debate between the Husserlian and Heideggerian interpretations of phenomenology as discussed above.

I was excited by my findings and wanted to be able to present the data in a style that was both interesting and relevant to practice. My initial drafts were at least 2,000 words over the suggested limit of 4,000 for a research article and I reached an 'author's block' where I was unable to see where the paper could be edited without detriment to the central themes of the investigation and the overall structure. I was aware that input from my consultant would provide a jolt out of my inertia and so put the work aside to await his return from extended trans-global travel, whilst concentrating on the preparation of the required 'wrap around' reflective commentary.

Interestingly, I had been working to the guidelines 'Writing for 'Physiotherapy'' published in the journal dated June 2000, that had stated the word limit for a research article as 4,000. In reading a later journal, December 2000, I skimmed the guidelines included in that issue and, with some relief, noticed that the word limit had been raised to 6,000 for a research article. I did review the article several times more to be more succinct in my literary style, but the 'goal posts' had nonetheless been moved in my favour.

My consultant's comments on his return were as expected in being insightful and direct. I was as appreciative of his 'pedantic' (his word) literary and grammatical offerings as I was of his comments that addressed the broader issues of my paper. I was inspired to complete the paper (Section 5) and it was submitted to 'Physiotherapy' on 3 April 2001 for peer review and consideration for publication. An acknowledgement of its receipt was received on 7 April 2001, that is included for completeness at the end of Section 5.

## *LEVEL 5 DESCRIPTORS*

### *Cognitive*

This component of the project relied on great depth of knowledge of the development of injection therapy as innovative practice and its relationship to physiotherapy and medicine. The investigation of the experience of physiotherapists in implementing their injection therapy skills was a novel area for research and the methodological approaches adopted required review and refinement towards understanding and

implementation for the purposes of the research. The research area was complex and I believe that the investigation demonstrated that complexity and my ability to analyse and synthesise information in establishing the current status, as an initial step towards the generation of theory to inform injection training programmes. The investigation report provides evidence of my ability to evaluate the information obtained, with reference to the work of others.

### *Transferable skills*

The investigation evolved through reflection on my own practice and relied on participants' reflection on their own experience as a step towards establishing theory as a basis for training programmes in injection therapy. The interviews conducted demanded simultaneous analysis of other's self-appraisal and reflexive inquiry to lead towards improvement and refinement of training.

The literature searches and conversations with colleagues to establish the background for the study were conducted with full autonomy. I was fully aware of the political implications of the study in relation to the medical and physiotherapy professions and the ethical principles and boundaries of each. My reflection on the process of performing the investigation within this section has identified challenges I faced and my ability to isolate, assess and resolve problems has been demonstrated.

The nature of the investigation relied on my ability to communicate effectively with participants and I believe that that communication was effective for the purposes of the study. Through the investigation I was able to demonstrate effective selection, combination and use of research methods with full appreciation of the limitations and possibilities of the methods adopted for my investigation towards the trustworthiness of the study.

### *Operational context*

The experience of physiotherapists in implementing their injection therapy skills was a new area of study and injection therapy is an extension of scope of practice into the domain of traditional medical practice. An awareness of the interdisciplinary relationship was necessary with understanding of the issues relating to the different approaches to treatment and communication between the disciplines.

The research was conducted with awareness of ethical dilemmas particularly relating to ethical physiotherapy practice and prescribing issues in the implementation of injection therapy skills. Within the study I believe that I demonstrated a high level of responsibility for the participants who contributed to the study and for myself in conducting the investigation with autonomy but with full use and acknowledgement of the support of others, including my professional body.

## COMMENTARY

As stated, my overall aim for the project was to develop and support the injection therapy module, and my objectives will be achieved through its successful launch and ongoing development.

The project has internal coherence but also forms a component of my whole doctoral programme. I have been involved at each step of the process towards the attainment of accredited and validated status for the Society's Membership course. My project, and the doctoral programme within which it sits, aims to be a coherent demonstration of my abilities to operate in satisfaction of the Level 5 descriptors in overseeing that process, and ultimately my authority as an orthopaedic medicine educator.

To be able to consider myself as an authority in orthopaedic medicine I believe that it has been necessary for me to reflect on my past learning, as a step towards the achievement of learning to support me within that role. The project has allowed me to demonstrate that authority in that I have demonstrated knowledge of the tenets of orthopaedic medicine as embedded in my career in education, itself aligned within the SOM and the developments of its educational aims from hereon.

Other modules are, or have been, in existence, but I have striven to take an holistic viewpoint of the module linking quality of presentation tightly to content and investigating potential barriers and facilitating factors to physiotherapists implementing their injection therapy skills, as a step towards informing training courses of strategies to minimize the former and to exploit the latter. In this I have demonstrated my ability to analyse the complexities of the module that are covertly affecting its administration, to eventually be able to construct new approaches to module delivery.

In taking into account the opinions and criticism of the module I have demonstrated my ability to synthesise information and ideas towards the development of the injection therapy module that will be measured by future evaluations of the module as it continues within the MSc Orthopaedic Medicine framework.

I am keen to absorb the feedback of my peers towards the development of the module and, importantly, towards my own personal and professional development. I have expounded on the political implications of the project through the evidence I have provided, and have embedded the project firmly in a variety of contexts.

Throughout the planning stage of both the master's programme and the injection therapy module within that, there has been a chain of problems to solve in terms of the module's design and its supporting documentation. Deadlines have been the driver in forcing responses to the challenges set and solutions have been drawn from the depths of creativity both within myself and those colleagues that I have recruited to assist in this endeavour.

The 'roundness' of my achievement I do believe has been through my ability to communicate with my peers and those that I have needed to call on for support to be able to move the development of the project on. I have been mindful of the research questions to pursue in support of the projects aims and have been careful to conduct that research ethically and with a focus on the trustworthiness of the data accumulated. I have been excited by the challenges presented by the research process and the new questions that have emerged.

As a 'field worker' within orthopaedic medicine with over 25 years' experience I have had the opportunity to live through the change from prescriptive physiotherapy to that of autonomous practice and that has informed me of the political and professional contexts of injection therapy. The relationship between the medical and paramedical professions can be constructive and supportive but simultaneously fragile and vulnerable. The boundaries between professions have tended to become blurred and to explore those boundaries through extended practice can be a threat to the adjacent professions. An awareness and understanding of interdisciplinary approaches is paramount in the promotion and development of interdisciplinary professional practice towards enhanced patient care.

I have been aware of my responsibility to all stakeholders in the development of the Society's injection therapy module. The Society itself, MU, the injection module

leader, the MSc Orthopaedic Medicine student (and the student of the module as a stand-alone module), medical and paramedical colleagues, colleagues in the orthopaedic medicine approach, the profession of physiotherapy and the patient, have all needed to be considered within my realm of responsibility. I have been mindful of their presence whilst supporting the autonomy of my profession linked to the development of an injection therapy module.

I am aware of the ethical dilemmas that were likely to arise in my research and within my professional practice in relation to injection therapy, and was aware of the support of my professional body and peers should any unethical practice become apparent.

My plans for my future role in orthopaedic medicine education would be to continue to collaborate as part of the SOM's education committee to be able to continue to develop and support the Society's courses and educational aims. The MSc Orthopaedic Medicine will form a significant component of that commitment over the next few years and, in terms of the project, the injection therapy model will also be a prime focus for evaluation and continued development.

Several higher education establishments have expressed an interest in incorporating the Society's Membership course and injection therapy module into their existing post-graduate programmes and I hope to have a significant role in forging additional partnerships for the Society.

I believe that the tenets of orthopaedic medicine should be more strongly integrated into undergraduate education in the management of musculoskeletal lesions, and that is another area that I intend to explore in the future for the continued development and dissemination of the specialism of orthopaedic medicine.

## **CONCLUSION**

The aim of my project was to develop and support an injection therapy module, specifically as an option module as part of the MSc Orthopaedic Medicine programme in the School of HeBES at Middlesex University. Within that context, this commentary has set out to reflect on the process of completing the three component parts of the project. Whilst this reflection has addressed each component separately, it has been



made explicit that the components were worked on simultaneously and each informed the other in the development of a coherent project towards the satisfaction of my aim.

I have been mindful of the Level 5 descriptors throughout my entire doctoral programme and have endeavoured to demonstrate the capabilities that I possess in respect of the learning outcomes as specified. I have demonstrated my knowledge within my research area, my ability to conduct research within a selected area of interest with justification for my chosen methodology, and then to analyse and discuss the data obtained. Within the pursuit of my project aim, I have encountered a variety of problems and hurdles that have required the development of my skills in evaluation towards the generation of solutions to overcome obstacles, against a background of perseverance. The implementation of the strategies so constructed has required the use of effective communication skills to be able to move the project forwards and thus achieve my aim.

Injection therapy is innovative practice within the realm of physiotherapy and I have needed to be mindful of my own responsibilities and those of the Society in developing the injection therapy module. I have paid particular attention to professional ethics in moving the whole profession forwards to be able to integrate this new skill into its scope of practice, and also to the interdisciplinary issues as part of that process.

I believe that the pursuit and completion of my project has enabled me to feel entrenched in the development of the injection therapy module, and to derive fresh insights for taking that development on in relation to the module itself and its position within the MSc Orthopaedic Medicine programme. The project has allowed me to exercise autonomy in developing the module but with due recognition for the responsibility I hold in context of the students, the module's development team and the SOM itself, and in the wider scheme of the profession of physiotherapy and interdisciplinary relationships. The completion of my project has satisfied both my professional and personal interests, particularly in relation to my emergence as an authority in orthopaedic medicine education and to my commitment to the dissemination and continuing development of the specialism of orthopaedic medicine.

**Elaine Atkins MA MCSP**

**20 April 2001**

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## SECTION 2

## Appendix 1

### LEVEL 5 DESCRIPTORS

<b>Cognitive</b>	
Knowledge:	Evidence that the candidate has great depth of knowledge of an inter-disciplinary nature in a complex area and is working at current limits of theoretical and/or research understanding.
Analysis:	Can deal with complexity, lacunae and/or contradictions in the knowledge base and make confident selection of tools for the job.
Synthesis:	Can autonomously synthesise information/ideas and create responses to problems that expand or redefine existing knowledge; can develop new approaches in new situations, through adding a new dimension to existing understanding or predicting an outcome that can be verified.
Evaluation:	Can independently evaluate/argue a position concerning alternative approaches; can accurately assess/report on own and others' work; can justify evaluations as constituting bases for improvement in practice.
<b>Transferable skills</b>	
Self appraisal/reflection on practice:	Evidence that the candidate has worked with 'critical communities' through whom a new or modified paradigm is being established. Habitually reflects on own and others' practice so that self appraisal and reflexive inquiry become intertwined, thereby improving the candidate's own and others' action.
Planning/management of learning:	Is autonomous in study and use of resources; makes professional use of others in support of self directed learning and is fully aware of the implications of the study.
Problem solving:	Can isolate, assess, and resolve problems of all degrees of predictability in an autonomous manner in work situations; can tackle unpredictable problems in novel ways
Communication/presentation:	Can engage in full professional and academic communication with others in their field and place of work: can give papers/presentations to 'critical communities' for developmental purposes.
Research capability:	Can demonstrate effective selection, combination and use of research methods; can show full appreciation of their limitations and possibilities in achieving objectivity, reliability and validity appropriate to the area and subject of study in the work situation; can contribute to the development of applied research methodology.
<b>Operational context</b>	
Context:	Complex, unpredictable, specialised work contexts requiring innovative study, which will involve exploring current limits of knowledge and, in particular, interdisciplinary approaches and understanding.
Responsibility:	Autonomy within bounds of professional practice with high level of responsibility for self and others.
Ethical understanding:	Awareness of ethical dilemmas likely to arise in research, professional practice and work situations, ability to formulate solutions in dialogue with superiors, peers, clients, mentors and others.

## Appendix 2

### BACKGROUND TO THE SOCIETY OF ORTHOPAEDIC MEDICINE

Orthopaedic medicine is the examination, diagnosis and non-surgical treatment of disorders of the musculoskeletal system. The Society of Orthopaedic Medicine (SOM) is an organisation of medical practitioners and physiotherapists, established to promote the theory and practice of orthopaedic medicine. Courses in orthopaedic medicine contribute to the post-graduate education programme in both medicine and physiotherapy, and are run throughout the year at different venues both nationally and internationally.

Orthopaedic medicine itself began in 1929 through the work of Dr James Cyriax at St Thomas' Hospital, London, and the Society was formed in 1979 to develop his philosophy. Charitable status has since been achieved by the Society.

The Society continues to run courses, both nationally and internationally with a team of experienced teachers. Medical practitioners and physiotherapists come together to learn this approach and the Society continues to grow with a constantly increasing demand for courses. In 2000, 33 course modules were arranged, attended by 900 students, and the Society had over 2,000 members.

Since Dr Cyriax formulated the approach, it has undergone continual development and reappraisal in the light of current research.

An academic journal is produced three times a year in conjunction with the British Institute of Musculoskeletal Medicine, the American Association of Orthopaedic Medicine and the Irish Society of Orthopaedic Medicine, and a Symposium and Conference are organised annually. These enable past students to maintain contact with the Society, so facilitating on-going education and communication.

The course leading to full membership of the SOM achieved accreditation by the Joint Accreditation Panel of the Chartered Society of Physiotherapy and the University of Greenwich for 40 points at Level 3 in its PACE (Physiotherapy Access to Continuing Education) Scheme, which was based on the national Credit Accumulation and Transfer Scheme (CATS). In the light of changes within the 'PACE' scheme, courses were encouraged to explore partnerships with higher education institutions. The University of Greenwich reviewed the SOM Membership course in summer 1998, with an additional Injection Module for physiotherapists, and each was accredited at Level 3 being awarded 40 points and 10 points respectively. Also at this time, Leeds Metropolitan University took the Membership course as part of its MSc programme 'The Healthy Athlete', awarding it 15 points at masters level as part of that programme.

In 2000 the course was developed and accredited by Middlesex University for 60 credits at Level 4/master's level. In January 2001, an MSc Orthopaedic Medicine programme was validated by Middlesex University with the SOM Membership course in its accredited form as the pre-requisite for entry to the programme.

#### COURSE STRUCTURE

The course is arranged in three modules: -

- |          |   |   |
|----------|---|---|
| Module A | - | Cervical spine and upper limb   |
| Module B | - | Lumbar spine and lower limb   |
| Module C | - | Thoracic spine and Sacro-Iliac joint. Revision of Modules A and B. Advanced techniques for the lumbar and cervical spine and less common neuromusculoskeletal conditions. |

Modules A and B can be attended in either order but must be completed before attending Module C.

Modules A and B consist of 26 hours and Module C of 28 hours tuition each taking place over four days. The whole course will normally be completed between 12 and 24 months.

## **COURSE PROGRAMME ORGANISATION**

The Education Committee of the SOM is a sub-committee of the main SOM Council and consists of the active Course Principals (see below). SOM teachers, or Fellows, may be medical practitioners or physiotherapists and each has completed the SOM's Fellowship Training Course proving competence in teaching orthopaedic medicine.

The Education Committee forms the development and management team for the SOM course and is concerned with all the affairs of education in the Society. It reports to the SOM Council at each Council Meeting.

An official Administrator has been appointed by the Society, who liaises with the Chair of the Education Committee who, through the Education Committee and the SOM Council bears responsibility for the annual course schedule, course module programmes, liaison with local organisers, appointing the teaching team for each course module and assimilating resources.

The SOM runs a three-module course and the courses are run as satellite courses at a variety of venues and with a variety of course personnel.

The Society is a limited company and a registered charity (Ch no 802164), and produces annual audited accounts. The Society Account finances the provision of resources and reimburses all expenses incurred. Research grants are available for suitable projects on application to the Society's appointed Research Officer. Funds are accrued through the provision of courses, membership fees and the Annual Symposium (shared with the British Institute of Musculoskeletal Medicine (BIMM), an organisation of medical practitioners with a special interest in musculoskeletal medicine). A copy of the most recent Accounts is obtainable from the Honorary Treasurer of the Society.

The Education Committee supervises the continuous assessment procedure for the course. It meets twice a year as well as holding an annual review meeting in November, dedicated to educational policy.

## **STAFFING**

There are 30 active teachers, or Fellows, in the Society and each has passed the Fellowship Examination to demonstrate competence in teaching the tenets of orthopaedic medicine. Several teachers have completed master's level courses, and have also attended educational courses independently to achieve an awareness of current educational theory, particularly with regard to a student centred approach to teaching and learning.

One Course Principal has achieved a Certificate of Education and another has completed a Masters Degree in Post-Compulsory Education and Training. Her dissertation investigated the introduction of a student centred approach into the SOM course.

The Education Committee actively encourages development in teaching and assessment methods and teachers are strongly recommended to achieve the City and Guilds Teaching Certificate in Adult and Further Education, (Course 7307) Stage 1, as a basic teaching qualification.

## **STUDENTS**

The course is open to qualified medical practitioners and chartered physiotherapists, or those holding a qualification recognised by the Chartered Society of Physiotherapy, regardless of gender, age, disability or ethnic background. Previous experience in orthopaedic medicine is not essential and, for physiotherapists, there is no requirement for previous attendance at courses in manual therapy. It is recommended that students should preferably be working with musculoskeletal lesions during the intermodular learning period. No other criteria have been set

in terms of current work placement since for some jobs in manual therapy, it is a pre-requisite that the physiotherapist has attended a SOM course.

The most important requirement is an enthusiasm and commitment to orthopaedic medicine within the learning group. The course is designed to encourage and foster this interest.

The SOM supports its students in on-going education and communication by providing the following:

- A Membership List that is regionalised to offer students the support of other members of the SOM in their area
- Access to a centralised collection of relevant papers, held by the SOM Course Organiser, and information relevant to orthopaedic medicine
- A Journal of Orthopaedic Medicine (produced jointly with the British Institute of Musculoskeletal Medicine and the American Association of Orthopaedic Medicine)
- Grants for research, available at the discretion of the SOM Council following the consideration of a written request detailing the focus of the study. Students awarded grants are expected to publish the results of their research in the Society's Journal, and to make the results available to other students and teachers of orthopaedic medicine.
- An Annual conference with selected speakers, but with a focus on problem solving in an atmosphere of shared experience
- An Annual Symposium, together with the British Institute of Musculoskeletal Medicine
- Local group meetings with a specific interest in orthopaedic medicine through the specific interest group ACPOM (Association of Chartered Physiotherapists in Orthopaedic Medicine)



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An official Administrator has been appointed by the Society, who liaises with the Chair of the Education Committee who, through the Education Committee and the SOM Council bears responsibility for the annual course schedule, course module programmes, liaison with local organisers, appointing the teaching team for each course module and assimilating resources.

The SOM runs a three-module course and the courses are run as satellite courses at a variety of venues and with a variety of course personnel.

The Society is a limited company and a registered charity (Ch no 802164), and produces annual audited accounts. The Society Account finances the provision of resources and reimburses all expenses incurred. Research grants are available for suitable projects on application to the Society's appointed Research Officer. Funds are accrued through the provision of courses, membership fees and the Annual Symposium (shared with the British Institute of Musculoskeletal Medicine (BIMM), an organisation of medical practitioners with a special interest in musculoskeletal medicine). A copy of the most recent Accounts is obtainable from the Honorary Treasurer of the Society.

The Education Committee supervises the continuous assessment procedure for the course. It meets twice a year as well as holding an annual review meeting in November, dedicated to educational policy.

## **STAFFING**

There are 30 active teachers, or Fellows, in the Society and each has passed the Fellowship Examination to demonstrate competence in teaching the tenets of orthopaedic medicine. Several teachers have completed master's level courses, and have also attended educational courses independently to achieve an awareness of current educational theory, particularly with regard to a student centred approach to teaching and learning.

One Course Principal has achieved a Certificate of Education and another has completed a Masters Degree in Post-Compulsory Education and Training. Her dissertation investigated the introduction of a student centred approach into the SOM course.

The Education Committee actively encourages development in teaching and assessment methods and teachers are strongly recommended to achieve the City and Guilds Teaching Certificate in Adult and Further Education, (Course 7307) Stage 1, as a basic teaching qualification.

## **STUDENTS**

The course is open to qualified medical practitioners and chartered physiotherapists, or those holding a qualification recognised by the Chartered Society of Physiotherapy, regardless of gender, age, disability or ethnic background. Previous experience in orthopaedic medicine is not essential and, for physiotherapists, there is no requirement for previous attendance at courses in manual therapy. It is recommended that students should preferably be working with musculoskeletal lesions during the intermodular learning period. No other criteria have been set

in terms of current work placement since for some jobs in manual therapy, it is a pre-requisite that the physiotherapist has attended a SOM course.

The most important requirement is an enthusiasm and commitment to orthopaedic medicine within the learning group. The course is designed to encourage and foster this interest.

The SOM supports its students in on-going education and communication by providing the following:

- A Membership List that is regionalised to offer students the support of other members of the SOM in their area
- Access to a centralised collection of relevant papers, held by the SOM Course Organiser, and information relevant to orthopaedic medicine
- A Journal of Orthopaedic Medicine (produced jointly with the British Institute of Musculoskeletal Medicine and the American Association of Orthopaedic Medicine)
- Grants for research, available at the discretion of the SOM Council following the consideration of a written request detailing the focus of the study. Students awarded grants are expected to publish the results of their research in the Society's Journal, and to make the results available to other students and teachers of orthopaedic medicine.
- An Annual conference with selected speakers, but with a focus on problem solving in an atmosphere of shared experience
- An Annual Symposium, together with the British Institute of Musculoskeletal Medicine
- Local group meetings with a specific interest in orthopaedic medicine through the specific interest group ACPOM (Association of Chartered Physiotherapists in Orthopaedic Medicine)

## Appendix 3

### Source:

**WCPT (1995) Declarations of Principle and Position Statements. WCPT London**

### **Declarations of Principle**

#### **EDUCATION**

Physiotherapy education is a continuum of learning beginning with admission to an accredited physical therapy school and ending with retirement from active practice.

1. The goal of physical therapy education is the continuing development of physical therapists who are entitled, consistent with their education, to practice the profession without limitation.
2. The curricula for physical therapy education should be relevant to the health and social needs of the relevant nation.
3. The term 'accredited' is used in relation to physical therapy education to describe a programme which is regularly evaluated according to established educational standards.
4. The first professional qualification should represent completion of a curriculum that qualifies the physical therapist for practice as an independent professional.
5. An integral component of the curriculum for the first professional qualification is direct clinical experience under the supervision of appropriately qualified physical therapists. Clinical education will involve gradual access to responsibility as skill and experience grow.
6. Life-long learning and professional development is the hallmark of a competent physical therapist, participation in continuing education contributing to the development and maintenance of quality practice.
7. Physical therapists should be encouraged to undertake post-graduate education in physical therapy or related fields for advanced professional development.
8. Physical therapists should be encouraged to undertake post-basic education in scientific methodology in order to contribute to a critical and researched-based professional approach that may extend into daily practice.
9. Basic physical therapy education should be conducted by physiotherapist (*sic*) teachers able to transfer knowledge and skills for the critical analysis of theories and methods of physical therapy.
10. Where national physical therapy associations have adopted specialisation, the process of becoming recognised as a specialist should meet the academic and practice rigours of such a qualification.

11. The goals, content, format and evaluation of the education programmes provided for physical therapists are the responsibility of the faculty but should involve the active participation of the national physical therapy association.

*(Approved at the 13<sup>th</sup> General Meeting of WCPT, June 1995)*

## **SPECIALISATION – Definitions and Guidelines**

- 1 Physical therapy specialisation is the application of advanced clinical competence by a physical therapist qualified in a defined area of practice within the field of activity recognised as physical therapy.
- 2 Advanced clinical competence is the demonstration of knowledge and skills beyond those required for entry to basic professional practice.
- 3 A physical speciality is a prescribed area of physical therapy practice formally recognised by a Member Organisation within which it is possible for a physical therapist to develop and demonstrate higher levels of knowledge and skills. Specialisation is not to be considered or implied to mean a limitation or restriction of practice. The field of activity recognised as physical therapy will remain open to all appropriately qualified physical therapists both specialist and non-specialist practitioners working within their respective levels of competence.
- 4 A physical therapy specialist is a physical therapist who can demonstrate advanced clinical competence in a physical therapy speciality by satisfying the requirements of suitable procedures for the formal recognition of his/her knowledge and skills by a member organisation or its accredited agent.
- 5 The qualification of a physical therapy specialist will include a formal process for testing and acknowledging the appropriate advanced clinical knowledge and skills of the speciality. It is expected that the formal process will be fully documented.

*(Approved at the 13<sup>th</sup> General Meeting of WCPT, June 1995)*

## **Appendix 4**

### **EXTRACT: 'Review of Previous Learning' Jan 2000**

#### **THE SOCIETY OF ORTHOPAEDIC MEDICINE EDUCATION COMMITTEE**

The Education Committee of the SOM is a sub-committee of its main Council and, at the time of my appointment, it consisted of seven members, each of whom was an active teacher on the Society's educational course. The Education Committee is concerned with all the affairs of education in the Society but is answerable to Council, to which it must report at each Council Meeting.

In the early nineties, the notion of continuing professional development was beginning to be formalised across the professions. The Chartered Society of Physiotherapy, the professional body of physiotherapy, was proactive in this process and, in partnership with the University of Greenwich, introduced a scheme entitled Physiotherapy Access to Continuing Education (PACE), which conformed to the existing national Credit Accumulation and Transfer Scheme (CATS). Physiotherapy is now an all graduate profession, but originally the qualification was that of Diploma of the Chartered Society of Physiotherapy, with the transition of training courses to degree status being driven through in the latter eighties. Apart from providing a system for accreditation of post-graduate courses as a form of 'quality control', 'PACE' was also conceived to enable those physiotherapists who had qualified by diploma to upgrade their qualification to a degree. Post-graduate course teams were invited to present their courses for accreditation by the Joint Panel of the Chartered Society of Physiotherapy and the University of Greenwich.

The course leading to full membership of the SOM was originally presented to the Joint Panel for consideration in 1991. I was part of the sub-group of three of the Education Committee that had been given responsibility for preparing the course documentation and being part of the team representing the SOM's educational course at the Chartered Society of Physiotherapy. The course was initially criticised for its mainly didactic style of teaching. It was true at the time that the course was mainly organised on the basis of transmission of knowledge from the teacher as 'expert' to the student as 'novice', with the lectures being typically the main method of teaching and with comparatively little recognition of the learning needs of the individual.

There were several specific points within the documentation that were faulty in not giving sufficient information. The assessment procedures, being summative with tutor assessment only, did not conform to current educational theory and provided little formative information on student progress. Certainly there was no self or peer component to the assessment procedures as well as being no demonstration of progression through the three modular course.

With experience and hindsight, I am able to reflect on the deficiencies and shortcomings of the course as they were given to us at the time. However, with the reminder that we were mainly clinically based physiotherapists with scant knowledge of educational theory, our reaction to the criticism was dejection and frustration at our ignorance. In spite of patient efforts made by the Chartered Society of Physiotherapy team to explain measures towards a more student centred approach in the course, we simply did not have the background or experience to get past the 'jargon', as we perceived it at the time.

Having contacted the teams of other post-graduate courses that had been similarly rejected, there appeared to be a move to pay educationalists to 'tweak' the documentation and to advise on the implementation of changes suggested towards making courses more student-centred in their approach. The mood of the SOM however, was that we should take steps within our own body to drive the project through on a sound educational basis which we could all understand. My colleague, the Society's Course Organiser, and I, with the support of Council, chose to be the prime movers in the latter task. Having sought advice on how we could make a start in gaining knowledge and experience in teaching theory and practice, we were guided by the Chartered Society of Physiotherapy's Education Officer to attend the City and Guilds 7307 course towards gaining a Teaching Certificate in Adult and Further Education.

## **CITY AND GUILDS 7307 – TEACHING CERTIFICATE IN ADULT AND FURTHER EDUCATION**

I completed the City and Guilds 7307 Course, Stages 1 and 2, through attendance at my local college of further education, to gain the teaching certificate mentioned above. I found the experience very rewarding in that the assignments were based on the Society of Orthopaedic Medicine course, and so were most pertinent, and the content and approach of the course gave valuable insights into educational theory. As a direct result of attending the course I was able to work with my colleague, who had also gained the certificate, to begin to implement a student centred approach in the Society's course. In contrast to the didactic approach, I now understood that a student centred approach recognises the thoughts and feelings of the individual and includes them in the educational process. Carl Rogers (1902-87), a psychologist of the so-called humanistic school, originated the terms 'active' or 'participatory' learning and I became interested in his ideas on education, which largely underpin the student centred approach. I appreciated that a key change was needed in the ethos of the Society's course to transfer responsibility for learning much more towards the student, with the teacher becoming more of a 'facilitator' in the learning process. As mentioned in my introduction to the review, I particularly identified with the notion that the student learns how to learn, with the implication that the process is ongoing (Rogers, 1983).

I experienced a huge gain in confidence in using teaching methods and activities and devising assessment strategies after attending the '7307' course. My colleague and I were able to collaborate on both the course design and documentation to implement the necessary changes towards gaining accreditation, and reported to the Education Committee to work closely as a team in this endeavour.

In introducing a student centred approach in the SOM course it was necessary to explain the need for change and the essence of the changes to the 29 active teaching Fellows in the SOM's teaching body. A Teachers' Study Day was arranged which was attended by 25 teachers. I had had considerable experience in managing change in my previous role as Physiotherapy Manager and in the running of my own practice and was prepared for some resistance since it was important to implement the changes fairly quickly, to be able to present the course for accreditation by the looming target date. The structure of the day had been deliberately designed to be largely student centred in itself with respect to activities, assessment, feedback and evaluation. There was indeed massive resistance, with many of the more established teachers exhibiting dissension and opposition, and some owing to a feeling of threat.

In the meantime, I was appointed to act as a Course Principal on the SOM courses, i.e. to be responsible for the organisation of the component modules, overseeing the management of the course programme, teaching team, the tutor groups, audio visual aids, course evaluation etc. At this stage the major implementation of a student centred approach was taking place with the introduction of a professional diary, inter-

modular case studies and a continuous assessment scheme that included elements of self and peer assessment.

The new thrust of the course was that '*the synthesis of these ( i.e. the course objectives) will promote a reflective approach to problem solving in orthopaedic medicine, in line with current educational theory*' (Kolb 1984, Schon, 1983).

The course was officially submitted for accreditation in 1994 and was awarded 40 points at Level 3. I was one of two Education Committee members appointed to attend the Accreditation Meeting and admit to a feeling of triumph at playing such a major role in the development of the course and the preparation of its documentation.

## **References**

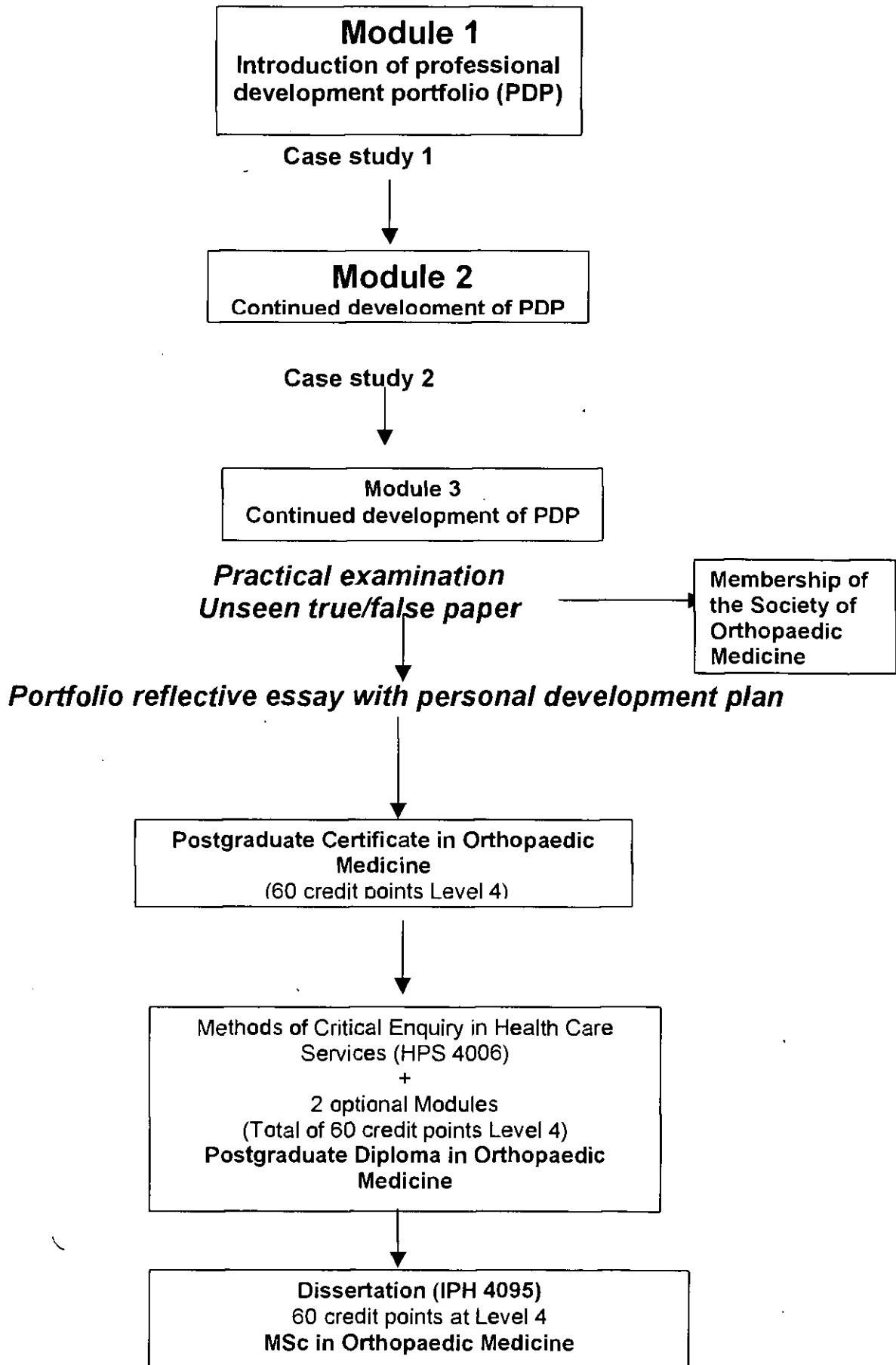
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## MSc Pathway



## Appendix 6

### LEVEL DESCRIPTORS

Learning at higher educational level develops certain abilities which make the individual a more effective work based learner and hence a more capable and insightful individual. Assessment criteria and the forms of assessment are directly related to the following abilities that are central to work based learning studies and independent learning:

1. identification and appropriate use of sources of knowledge and evidence
2. analysis, synthesis and evaluation of information and ideas
3. application of learning
4. selection and justification of approaches to task
5. action planning leading to effective and appropriate action
6. effective use of resources
7. effective communication
8. working and learning with others
9. self appraisal/reflection on practice
10. ethical understanding

These abilities are developed over the course of the module. They are mapped onto the Levels 1 to 4 framework of the Middlesex Academic Credit scheme.

**Level 1: Knowledge and straightforward comprehension predominate at this level.**

1. Identification and appropriate use of sources of knowledge and evidence will be within a very familiar context
2. Analysis will often be partial, synthesis and evaluation of information of ideas is likely to be limited
3. Application of learning is likely to be highly context specific
4. Selection and justification of approaches to task will often show little or no consideration of alternative approaches
5. Action planning leading to effective and appropriate action will tend to be in a prescribed context and probably not impact greatly upon others
6. Effective use of resources will be limited to familiar context
7. Effective communication but may be limited in context
8. Working and learning with others will often be in a familiar context and not challenge or develop beliefs/practices of others
9. Self appraisal/reflection on practice will be evident but may not be fully developed
10. Ethical understanding is likely to be context specific and may sometimes be limited to knowledge and application of a prescribed code

**Level 2: Application of knowledge and comprehension predominate at this level**

1. Identification and appropriate use of sources and knowledge and evidence may be within a familiar context but will be largely self directed
2. Analysis, synthesis and evaluation of information and ideas is likely to be partial but will be sufficient to indicate further areas for development
3. Application of learning beyond a specific context
4. Selection and justification of approaches to task/problem will often be self-directed and involve recognition of a range of options from which a justified selection is made
5. Action planning leading to effective and appropriate action will tend to be in a prescribed context but may be wide ranging and may involve the work of others
6. Effective use of resources will normally be limited to familiar context but will be largely self directed

7. Effective communication both in writing and orally
8. Working and learning with others will often be in a familiar context and may challenge or develop practices of others
9. Self appraisal/reflection on practice will lead to significant insights although these may not be fully developed
10. Ethical understanding is likely to be context specific, where applicable prescribed codes will be understood and routinely applied

**Level 3: High level analysis and synthesis are the predominant features of this level**

1. Identification and appropriate use of sources of knowledge and evidence will be wide ranging and critical
2. Analysis, synthesis and evaluation of information and ideas will be sufficient to make judgements and derive principles to guide further action
3. Application of learning in a number of contexts
4. Selection and justification of approaches to task/problem will be self directed and involve recognition, articulation and critical evaluation of a wide range of options from which a justified selection is made
5. Action planning leading to effective and appropriate action is likely to be complex and impact upon the work of others
6. Effective use of resources will be wide ranging
7. Effective communication both in writing and orally will be clear, concise and persuasive
8. Working and learning with others may span a range of contexts and is likely to challenge or develop the practices of others
9. Self appraisal/reflection on practice will lead to significant insights impacting upon personal and professional development
10. Ethical understanding will span a range of contexts, where applicable prescribed codes and their rationale will be fully understood and sensitively applied

**Level 4: Self directed research and development, depth of understanding and the creation and articulation of knowledge of significance to others are the hallmarks of this level.**

1. Identification and appropriate use of sources of knowledge and evidence will be wide ranging, critical and often innovative
2. Analysis, synthesis and evaluation of information and ideas will result in the creation of knowledge of significance to others
3. Application of learning will transcend specific contexts
4. Selection and justification of approaches to task/problem will be self-directed and involve recognition, articulation and critical evaluation of a range of options from which a justified selection based upon a reasoned methodology is made
5. Action planning leading to effective and appropriate action will be complex and is likely to impact upon the work of others
6. Effective use of resources will be wide ranging and is likely to impact upon the work of others
7. Effective communication both in writing and orally will be in an appropriate format to appeal to a particular target audience and will be clear, concise and persuasive
8. Working and learning with others will span a range of contexts, often in a leadership role, and is likely to challenge or develop the practices and beliefs of others
9. Self appraisal/reflection on practice will lead to significant insights which are likely to make a lasting impact upon personal and professional understanding
10. Ethical understanding will span a range of contexts, where applicable prescribed codes and their rationale will be critically understood and sensitively applied

**SECTION 3**

## STATEMENT OF COLLABORATIVE WORK

During the past year Elaine Atkins and I have taken the lead in developing the MSc Orthopaedic Medicine, as a collaborative venture between Middlesex University and the Society of Orthopaedic Medicine. Elaine took the lead in developing a module in Theory and Practice of Injection Therapy - IPH 4020, which was successfully validated as one of the clinical skills option modules within the programme. The development of this module involved a number of key tasks:

- Restructuring the current course in line with University and School Policy
- Developing appropriate level 4 aims and learning outcomes
- Reviewing and revising the content of the current Society of Orthopaedic Medicine Injection Therapy Course with Society colleagues
- Developing the teaching and learning strategy with the module leader
- Developing the assessment strategy and constructing the assessment guidelines and marking criteria
- Producing the Module Handbooks

To date Elaine has successfully completed the first five tasks, and in relation to the production of the module handbook, has reviewed the current course manual and developed the additional sections to meet the School requirements for Module Handbooks. The production of the Handbook is now in the hands of the print designers, and Elaine will continue to oversee this until production is complete.

*Kay Caldwell*

Dr Kay Caldwell  
Postgraduate Programme Coordinator



**SOCIETY OF ORTHOPAEDIC MEDICINE**

**MIDDLESEX UNIVERSITY**

**SCHOOL OF HEALTH, BIOLOGICAL AND ENVIRONMENTAL  
SCIENCE**

**IPH 4020**

**THEORY AND PRACTICE OF INJECTION THERAPY**

**2001/2002**

**Module Handbook**

Module Leader  
Telephone  
E-mail

Paul Hattam  
0114 267 8181  
paulhattam@taptonville.fsnet.co.uk

## **PLEASE NOTE**

1. This Module Handbook should be read in conjunction with the University Catalogue, University Diary and Programme Handbook. All of these documents should be given to you at enrolment. A separate Course Manual will be issued to you on the first day of the Module. All specific administrative information relating to the module will be sent to you directly by the Society of Orthopaedic Medicine Administrator, whose details are given below.
2. The material in this handbook is as accurate as possible at the date of publication.
3. Your comments on any improvements are welcome – please put such comments in writing (with the name of the handbook) and hand them to the student office or Module Leader.

Amanda Sherwood  
Administrator, Society of Orthopaedic Medicine

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Bristol BS32 4DW

Telephone/Fax 01454 610255  
E-mail [AmandaSherwood@compuserve.com](mailto:AmandaSherwood@compuserve.com)

## Welcome

Welcome to the Theory and Practice of Injection Therapy module, IPH 4020. We hope that you will find this module both relevant to your clinical practice and a stimulating component of your postgraduate programme.

The value of this module lies in the commitment of all students to participate fully, and to be prepared to share their experiences with the whole group. Students are actively encouraged to engage in dialogue and discussion with their fellow students in an atmosphere of mutually supportive learning and development.

Any comments or suggestions for improvement to the structure and delivery of this module are warmly welcomed.

Paul Hattam  
Module Leader IPH 4020



## **CONTENTS**

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Introduction to the module	I
Module programme	4
Assessment guidelines and criteria	6
Core reading	13

### **Appendices:**

1. The student voice
2. Module evaluation form
3. Key university publications
4. Information on student support
5. Equal opportunities and the environment
6. Abbreviations
7. Campus student offices

**SOCIETY OF ORTHOPAEDIC MEDICINE**  
**MIDDLESEX UNIVERSITY**  
**SCHOOL OF HEALTH, BIOLOGICAL AND ENVIRONMENTAL SCIENCE**

**THEORY AND PRACTICE OF INJECTION THERAPY**

**IPH 4020**

**INTRODUCTION TO THE MODULE**

**Module Structure**

Code:	<b>IPH 4020</b>
Title:	<b>Theory and Practice of Injection Therapy</b>
Level:	<b>4</b>
Credit points:	<b>20</b>
Pre-requisite:	<b>Must be a Member of the Society of Orthopaedic Medicine</b>
Teaching hours	<b>24</b>
Teaching/Learning Strategies	<b>Lecture, Demonstration, Group work, Case Study, Tutorials</b>
Total study hours:	<b>180</b>
Module Leader	<b>Paul Hattam</b>

**Rationale and aims**

This module in injection skills is designed to develop cognitive and psychomotor skills-essential to the advancement of the chartered physiotherapist specialising in injection treatments for musculoskeletal lesions. The module aims to develop the knowledge of the chartered physiotherapist in the theory, application and practice of injection treatments in musculoskeletal disorders. It further aims to enhance constant critical reasoning and evaluation in the application of injection skills. It should be noted that this module is only open to Members of the Society of Orthopaedic Medicine who are currently practising.

## **Learning outcomes**

On completion of this module students will be able to: -

- Demonstrate a high level of knowledge and understanding of the pharmacology of local anaesthetic and corticosteroid drugs in relation to orthopaedic medicine injections as well as the indications for and contraindications to injection techniques
- Carry out an expert assessment of clients to determine drug selection and dosage
- Demonstrate mastery of the handling skills required to administer injections appropriately and accurately
- Critically evaluate the effects of treatment
- Extrapolate and integrate the advanced knowledge and skills required to undertake independent practice in relation to orthopaedic medicine injection therapy

## **Outline of content**

- Medico-legal aspects of injection therapy
- Principles of diagnosis and treatment
- Absorption and elimination of drugs
- Drug nomenclature and doses
- Local anaesthetics
- Corticosteroids
- Basic equipment and safety
- Aseptic technique
- General injection techniques
- Emergencies and complications
- Record keeping and treatment protocols
- Regional injection techniques
- Supervised clinical practice

## **Teaching and learning strategies**

This module will use a range of teaching/learning strategies including lectures, demonstrations, group work, case studies and tutorials.

## **MODULE PROGRAMME**

The Society of Orthopaedic Medicine's module 'Theory and Practice of Injection Therapy', IPH 4020, will be run at various locations across the UK. Each module will require a total of three days' attendance, split over two weekends, with guided study in between.

Two modules are scheduled for the academic year 2001/2002, each of which is conducted over two units as shown below.

**October 1st and 2nd 2001, and March 18th 2002**

**October 22nd and 23rd 2001, and April 22nd 2002.**

### **Unit 1**

Drawing up etc  
Clinical Pharmacology

Practical demonstration, order of drawing up etc  
LA/CS/Adrenaline  
absorption/elimination  
pharmacokinetics

Aseptic technique  
Needle proprioception  
Side effects/Complications

Appreciating feel of different structures with a needle

Injection Techniques: emphasis on the injections that demonstrate 'basic' techniques and that need to be practised in the inter-unit period as they are likely to be the ones used most frequently:

Shoulder joint – Subacromial bursa – acromioclavicular joint – 'tennis elbow' – 'golfer's elbow' – elbow joint – carpal tunnel – trochanteric bursa – knee joint – tendon in a sheath (Dequervain's/Peronei)

### **Unit 2**

Resuscitation techniques

Other drugs injected      Voltarol, sclerosant, etc

Other techniques

Medicolegal aspects

Prescriptions/Crown Report  
Historical perspective  
Information to patient  
Record Keeping

## **ASSESSMENT GUIDELINES AND CRITERIA**

### ***Formative***

Clinical supervision of injection therapy techniques.

Clinical supervision is a vital component of the module and essential to your development of confidence and competence in performing the application of injection therapy. It will be your responsibility to arrange for your own clinical supervision, although we shall be pleased to advise you in support of this. The following guidelines should help you to locate a suitable supervisor, or supervisors.

### **Guidelines for organising clinical supervision**

Your supervisor should be medically qualified and have an interest and experience in the use of injections in the management of musculoskeletal conditions.

It is important that your supervisor is aware of what will be required of them before agreeing to act in that role.

The clinical situation in which you are being supervised should allow for you to assess patients to be able to reach a diagnosis and recommend that injection therapy is the treatment of choice, prior to discussion with the supervisor. It is accepted that injection therapy may not always be appropriate following those discussions in light of the collaborative clinical reasoning process.

Throughout the module recommendations for drugs and dosages of injectable steroid and local anaesthetic will be given, to form the basis of the suggested approach to apply in clinical practice. These may vary from those usually applied by supervisors in their own clinical practice and their cooperation is sought in this. The criteria for the assessment of your supervised injections are given below. The injections that you will be required to perform will be specified at the commencement of the module. An evaluation of each injection you administer should be included within your professional portfolio.

---

**Criteria for assessing supervised injections**

INJECTION:	Pass	Fail
Carries out an expert assessment of clients to determine drug selection and dosage		
Demonstrates mastery of the handling skills required to administer injections appropriately and accurately		
Critically evaluates the effects of treatment		

**SIGNATURE**

---

**Summative**

**Students will demonstrate achievement of the learning outcomes by producing an assignment of 4,000 words in the form of a case study presentation of an injection treatment conducted.**

**Guidelines for preparation of the case study**

Please read through the following guidelines **before beginning** your case study, including the 'criteria for marking the case study' on page 10.

The case study should be presented using the headed sections set out below. A4 paper should be used and the case study should be typed or hand written on **one** side of the paper and using **double spacing**.

1. Introduction

This should give an **outline** of the content and the intentions of the case study.

2. History (Subjective Examination)

Mention **relevant** points of history relating to:

- Age, occupation, lifestyle (male/female)
- Site and spread of the pain and other symptoms
- Onset and duration of the pain and other symptoms
- Behaviour of the pain and other symptoms
- Other joint involvement
- Past medical history
- Medications

Reference should be made to the **significance** of your subjective examination findings.

3. Examination (Objective Examination)

- Observation
- Inspection
- State at rest
- Logical examination by selective tension

Reference should be made to the **significance** of your objective examination findings.

4. Clinical diagnosis

The results of the examination should be carefully evaluated and a clinical diagnosis made.

5. Treatment plan

This should encompass your rationale for your selected treatment approach:

- Aims of treatment
- Modality of treatment
- Estimated duration of the treatment



Any discussions or exchange of ideas that you may have with colleagues.

**Guidelines for referencing are included at the end of this section on page 12**

6. Re-assessment

Show which objective markers you used to re-assess the patient before each treatment session.

Indicate how the treatment was progressed and explain the reasons for any changes or modifications to the treatment programme.

7. Discussion and evaluation

**The discussion and evaluation portion of the case study is most important**

Reflect on the effectiveness of your treatment plan and discuss any changes you could have made to enhance treatment. How do you feel you managed the case? In **conclusion**, how has the theory and practice gained on the injection therapy module influenced your own abilities to apply injection therapy in clinical practice?

**It is important that your work shows clear analysis and reasoning throughout and that you justify your clinical decisions.**

**The suggested word count for the essay is 4,000 words. The criteria for marking your case study are given on page 10.**

For the case study, you will be expected to provide evidence through referencing that you have read enough relevant literature to give you some awareness of the current knowledge on the subject area of your study, and to support your discussions. You will not be expected to conduct a full-scale literature search as such. You should back up your decisions with evidence (e.g. clinical papers and other references) wherever possible.

**The case study is designed to allow you to realise and provide evidence for your achievement of the learning outcomes of the module (page 2). Check that your study meets the following criteria before it is submitted:**

## CRITERIA FOR MARKING THE CASE STUDY

**Student's name**

		1-4	5-8	9-12	13-16	17-20	
1	All relevant information of the history and examination is included, referring to applied functional anatomy.						Relevant information of the history and examination, referring to applied functional anatomy, is not included.
2	An analysis is included of how the clinical diagnosis was reached.						An analysis is not included of how the clinical diagnosis was reached.
3	The aims of treatment are documented identifying any relevant theoretical information.						The aims of treatment identifying any relevant theoretical information are not documented.
4	Objective markers have been established to show how progress will be monitored.						Objective markers to show how progress will be monitored have not been established.
5	The relevant anatomy is included to demonstrate an accurate approach to treatment.						The relevant anatomy is to demonstrate an accurate approach to treatment is not included.
6	Safe and effective treatment with evaluation of treatment application is clearly documented.						Safe and effective treatment with evaluation of treatment application is not documented.
7	A critical evaluation of the outcome of the application of injection therapy is provided together with the development and progression of the treatment programme.						A critical evaluation of the outcome of the application of injection therapy together with the development and progression of the treatment programme is not provided.

8	A self-evaluation is included of your clinical reasoning in performing orthopaedic medicine assessments and selection of conditions suitable for treatment with injection therapy, relating to your experiences in preparing this case study.						A self-evaluation of your clinical reasoning in performing orthopaedic medicine assessments and selection of conditions suitable for treatment with injection therapy, relating to your experiences in preparing this case study is not included.
9	An evaluation is made of your professional development relating to the integration of injection therapy into your clinical practice. Reflect on any change in your confidence and overall competence.						An evaluation of your professional development relating to the integration of injection therapy into your clinical practice, with reflection on any change in your confidence and overall competence is not made.

## REFERENCING

There are several different methods of referencing that are all perfectly acceptable. The Society's preferred system is the name and date system (Harvard), rather than the numerical system, and a brief outline of the former is given below.

Please check that only references that appear in the text are listed in the References list. Other written work that you may have read without referring to may be included in a further reading list or bibliography if you wish.

Within the text the references are usually contained within brackets giving just the authors surname followed by a comma, and the year of publication e.g. (Twomey, 1992). Two authors may be included within the brackets but if there are more than two authors the first is usually listed followed by *et al* e.g. (Twomey and Taylor, 1994) or (Kuslich et al, 1991).

The reference list should give the names and initials of all authors unless there are more than four, when the first three are usually given followed by *et al*.

### For books:

- Put the author's surname followed by the forename or initials
- Put the year of publication in brackets
- Give the title of the book either underlined, in bold or in italics
- Give the volume and/or edition
- Mention the place of publication followed by the name of the publisher

E.g.: Cyriax, J. (1982) **Textbook of Orthopaedic Medicine**. Vol 1, (8<sup>th</sup> Ed)  
Oxford: Baillière Tindall.

### For journal articles or chapters in books:

- Put the author's surname and forename or initials
- Put the year of publication in brackets
- Give the title of the article or chapter, usually in plain script or inverted commas
- Give the title of the journal or book, usually in italics or underlined
- Give the volume number, issue and page numbers in journals

E.g.: Coonrad, R.W., Hooper, W.R. (1973) Tennis elbow: its course, natural history, conservative and surgical management. *Journal of Bone and Joint Surgery* **55-A** 1177-1182.

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# **APPENDICES**

## **MIDDLESEX UNIVERSITY**

**2000/2001**

### **SECTION ON GENERAL UNIVERSITY INFORMATION**

### THE STUDENT VOICE

The University attaches great importance to the opinions of its students on the teaching and facilities provided for them. There are a number of formal and informal ways of collecting this information.

#### Questionnaires

Every two years, each student is asked to complete the **Student Service Survey**, on a range of services provided by the University: libraries, counselling, catering, childcare; transport etc. Response to this is analysed in May/June and dealt with by the relevant Heads of Services, Deans of School, and other staff. Feedback is also published in the *North Circular*.

#### Feedback on Subjects and Programmes

Each Curriculum Leader is expected to gather systematic feedback from students on their opinion of the way in which their programme is delivered. This can be collected by one or more methods: module questionnaires, group discussion, individual comment. This feedback is provided for annual monitoring surveys and periodic reviews of the Subject or Programmes. The action taken by the teaching team on the feedback is also monitored.

#### Boards of Studies

Each Subject or Programme is required to have a Board of Studies. This is a group of academic staff, and usually two student representatives from each year of the Programme. They meet once a semester to discuss strengths or weaknesses of the programme, and to make recommendations for action to relevant staff. The student members represent their year, and are responsible for notifying the Board of issues, which have been brought to them by their fellow students. Boards of Studies reports are carefully monitored for issues arising and action taken on them. MUSU run short training courses intending to become representatives (see Student Information - last bullet point - above).

#### Suggestions and Concerns

Students can, individually or by group, make suggestions or raise concerns relating to general University facilities or aspects of a study programme. If there is no relevant staff member to contact, these can be left (in writing) with the Campus Student Office staff.



**SCHOOL OF HEALTH, BIOLOGICAL AND ENVIRONMENTAL SCIENCES  
MODULE EVALUATION FORM**

To be completed by Student at end of Module

Module Code and Title:

Start Date:

Please take the time to complete this form by ticking the boxes. Your opinions will help us to continually monitor and improve the quality of the teaching and learning you and others experience whilst with Middlesex University. The results of your evaluation, and feedback as necessary, will be made available through the Boards of Studies at which you are represented. Further information about the School's Quality policies and procedures can be obtained from your module leader or the School's Quality Co-ordinator. Please hand this form to your module leader.

	Strongly Agree	Agree	Disagree	Strongly Disagree	Does Not Apply
Pre-module information was timely and useful					
Admissions/Student Office Staff were courteous and helpful					
Module handbook was informative and easy to use					
Teaching facilities were appropriate and of a satisfactory standard					
Learning resources (library, computers etc.) were accessible, available and appropriate					
The teaching programme took place according to previously provided information.					
Teaching and learning methods used/promoted were appropriate and effective					
Academic staff were accessible, approachable, and assisted me in achieving learning outcomes.					
Learning outcomes were relevant to stated aims of module and were clear and explicit within teaching.					
Assessment was related to the learning outcomes and used acceptable/appropriate methods					
Assessment information was clear, helpful and provided in good time					
The workload the module demanded of me was demanding whilst not being excessive					
The module was academically/professionally challenging.					
I am aware of how the module fits into a longer-term programme of study					
I have had access to student facilities (refreshments, student lounge etc.) during this module					
Overall, the module has met my expectations and needs.					

**General Comments:**

**Thank you for taking the time to complete this form. Student evaluation summaries are presented to the Board of Studies for the Course or Subject area of your module. Your student representative is invited to attend this meeting.**

## KEY UNIVERSITY PUBLICATIONS

- \* **The University Catalogue / Guide and Regulations Booklet 2000/2001**  
These include the University regulations on awards and assessment, and the full list of Subjects, Programmes and all current modules. All students should refer to these publications and be familiar with the regulations relating to their programmes.
- \* **The University Handbook/Diary 2000/2001**  
In addition to the diary section, this provides (in alphabetical order) a brief description of the main University structures, student services and names of key staff etc.

The two publications above are re-issued at the beginning of each academic year, and each student should have a current copy.

- \* **The North Circular**  
Don't forget this useful weekly University paper, published every Wednesday/Thursday during semesters, and in shortened form during the holidays.
- \* **The Internal Telephone Directory**  
This also gives staff grouped by School, Campus or Service area, and provides other useful information.

## STUDENT PUBLICATIONS AND OTHER INFORMATION

All produced by the Middlesex University Students Union (MUSU)

- \* **The Rough Guide for Students 2000/2001**  
(produced by the Advisory Services of MUSU and the University)  
A useful guide on student life including: Out and about; Equal Opportunities; Money; Overseas Students; Legal Aid; Health
- \* **Freshers' Handbook 2000/2001** \* **The Clubs and Societies Handbook 2000/2001**  
Information on student Sabbatical Officers for the Year, Campus Union Offices and staff, student societies and how to start a new society etc
- \* **The Planet**  
Issued monthly: student news and articles of interest.
- \* **The Website**  
MUSU updated information can be accessed on:  
[WWW.mdx.ac.uk/www/musu/](http://WWW.mdx.ac.uk/www/musu/)
- \* **Planet FM** (under development)  
MUSU runs short, accredited, training courses for student reps. For information on these, ask your Curriculum Leader or contact Selena Bolingbroke (6481) or Vicky Hallett (6754)

**INFORMATION ON STUDENT SUPPORT**

Read the front section of the **UNIVERSITY CATALOGUE** for information on the following:

**Information and Learning Resource Service (ILRS)**

There is a section on Campus Computing Services, Language Centres and Libraries. Each Campus library has a number of factsheets designed to help with particular skills. (These will also be available shortly on the University Website.)

Currently these are:

1. Bibliography Humanities
2. Bibliography Social Sciences
3. Presentation of Theses
4. Essay Writing

University library books can be checked, and reservations made, via the University computer network (Programme Manager - Corporate - Desktop) - under the icon *Horizon OPAC*.

**Counselling, Health and Advice**

The Dean of Student on each major campus is responsible for the student support arrangements for the Campus. Health Campuses are co-ordinated from Highgate Hill Campus; Quicksilver place is covered from Cat Hill Campus; Ivy House and Bedford Campuses are covered from Trent Park Campus.

**Careers Advisory Service**

This service helps students to plan their academic programme and personal development in relation to career goals, to become more aware of employment and study opportunities and to assist them to use their own study programme to take advantage of career opportunities.

The Careers Service offers:

- \* access to up-to-date information in the Careers Libraries at Enfield and Hendon on careers, employers, vacancies and postgraduate study
- \* guidance from qualified Careers Advisers
- \* help with job search procedures, interview technique and compiling a CV
- \* opportunities to attend presentations from employers
- \* student support from the time of enrolment to up to a year after the finish of study

Students should:

- \* make full use from an early stage of the careers information, careers presentation, planning and guidance resources available
- \* recognise the importance of career planning and decision making from the beginning, and throughout their time at University.
- \* Identify which careers services are available on their Campus by consulting the Campus Careers Advisory Service noticeboard.

**Policies on Equal Opportunities and the Environment**

The University has agreed and published a policy on each issue (Policy HRPS 8 and APS 5 respectively). The University's Equal Opportunities Officer, Susanna Hancock, is based at Trent Park Campus (Ext 6873).

The University's Environment Advisory Group is chaired by Professor Margaret House (ext 5398). Each major Campus has an Equal Opportunities and an Environmental representative.

## ABBREVIATIONS

## APPENDIX 6

These are the main abbreviations used across the University.

AAM	Academic Administration Manager
ADPA	Art, Design and Performing Arts (based at Cat Hill)
APC	Academic Planning Committee
AP(E)L	Accreditation of Prior (Experiential) Learning
ASQC	Academic Standards and Quality Committee
CCSS	Computing and Communication System Services
CDOS	Campus Dean of Students
CFM	Campus Facilities Manager
CL	Curriculum Leader
CLD	Centre for Learning and Development
CLRM	Campus Learning Resources Manager
CS	(School of) Computing Science
CSM	Computer Support Manager
CSO	Campus Student Office
CSS	Corporate Student System (computerised database)
DA	(Campus) Data Administrator
DCLQ	Director of Curriculum Learning & Quality
DORA	Director of Resources & Administration
DOS	Dean of Students
DRPS	Director of Research and Postgraduate Studies
Edexcel	Formerly operated as BTEC
ENB	English National Board (Nursing Studies)
ES	(School of) Engineering Systems
FTE	Full time equivalent (method of counting part time students)
HEBES	School of Health Biological and Environmental Sciences
HETP	(North London) Higher Education and Training Partnership
HCS	(School of) Humanities and Cultural Studies
HNC/HND	Higher National Certificate/Diploma Run by Edexcel (formerly BTEC)
ILRS	Information and Learning Resource Services (includes Library and Computing)
LLE	(School of) Life long Learning and Education
MASN	Maximum Allowable Student Numbers (HEFCE enrolment quota for each University)
MDP	Multidisciplinary Programme
MSG	Management Services Group (IT Systems Development and Training)
MUBS	Middlesex University Business School (based at Hendon)
MUSU	Middlesex University Student Union
NCWBLP	National Centre for Work Based Learning Partnerships
PDS	Planning and Development Service (based at Trent Park)
PVC	Pro Vice-Chancellor
QA	Quality Assurance
QAA	Quality Assurance Agency for Higher Education
QAAS	Quality Assurance and Audit Service
QTS	Qualified Teacher Status (relating to a school teaching degree)
RAP	Review of Academic Provision
RBL	Resource-based learning
RSP	Review of Service Provision
SAPC	School Academic Planning Committee
SASQC	School Academic Standards and Quality Committee
SS	(School of) Social Science

VC  
WBL

Vice-Chancellor  
Work Based Learning

**MIDDLESEX UNIVERSITY CAMPUS STUDENT OFFICES  
2000/2001**

CAMPUS	OFFICE LOCATION	OPENING HOURS
<b>NORTH MIDDLESEX</b>	Corridor B, North Middlesex Centre	Mon – Fri 10.00 - 3.00
<b>ROYAL FREE</b>	2nd Floor	Mon – Fri 10.00 - 3.00
<b>WHITTINGTON</b>	St Mary's Wing	Mon – Fri 8.45 - 11.30 12.45 - 3.30
<b>CHASE FARM</b>	Reception, Block 4	Mon – Fri 8.30 - 12.00
<b>ENFIELD</b>	<p><b>Student Office</b> Ground Floor Broadbent Building</p> <p><b>Postgraduate Office</b></p>	<p><b>Mon-Fri</b> 9.30 - 12.30 1.30 - 3.30 (Term Time)</p> <p><b>Mon – Thurs</b> 9.30 - 5.00 <b>Tues &amp; Wed</b> 9.30 - 6.00 <b>Fri</b> 9.30 - 3.00</p>



## SECTION 4

Musculoskeletal

# Injection Skills

Monica Kessor • Elaine Atkins • Ian Davies



BMJ

## Dedication

This book is dedicated to Rod, Clive and Barbara

# MUSCULOSKELETAL INJECTION SKILLS

Monica Kesson, Elaine Atkins and Ian Davies

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2. Essential equipment, safety precautions, emergency situations, record keeping
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4. General injection principles

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6. The elbow
7. The wrist and hand
8. The hip
9. The knee
10. The ankle and foot

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## About the authors

Monica Kesson Grad Dip Phys MCSP Cert Ed Cert FE  
Elaine Atkins MA Grad Dip Phys MCSP Cert FE  
Ian Davies MB ChB

Monica Kesson and Elaine Atkins are both physiotherapists in private practice who share a commitment to the development of the educational course of the Society of Orthopaedic Medicine. As educators they both have a gift for making the complicated clear and this was reflected in their previous collaborative best selling publication 'Orthopaedic Medicine – a Practical Approach' (1998). Ian Davies is a general practitioner and teacher of orthopaedic medicine, who also achieved an anaesthetic fellowship earlier in his medical career. He was the prime mover in developing the Society's Injection Module to provide comprehensive training for physiotherapists keen to develop their skills in this relatively new specialism within physiotherapy. All three authors support a multi-disciplinary approach to primary care and extended scope of practice within professions. This has underpinned their determination to produce a text that is relevant to both doctors and physiotherapists alike.

## Foreword

Dr Richard Ellis

What's the difference between a bible and an encyclopaedia? To my mind a bible is a friendly companion that I constantly refer to, whereas an encyclopaedia is a mine of information that I never quite get round to looking up. So, a bible is something by my side, which keeps me on the straight and narrow, allowing me as far as possible to live a purposeful and rewarding life.

"Musculoskeletal injection skills" is certainly a bible. It contains not only the primary information about how to position your patient and yourself for all the common musculoskeletal injections, but also answers those doubts and little ignorances which nag most of us who want to do the best for our patients. If you're starting from scratch, this book will keep you as free as possible from these nags. And in addition, when you dip into it in an (unusual) idle moment, or it opens at a page you hadn't intended, there are yet more pearls of information revealed.

What a refreshing concept this book is, also. In the 'corporate structure' which medicine often seems to have, each division, such as 'pharmacology' and 'musculoskeletal medicine' is liable to remain quite separate with its own textbook and jargon; as exactly may the disciplines, such as 'doctoring' and 'physiotherapy'. Here we are dealing with a clinical task, with its basic evidence of efficacy, which the book takes apart into its essential aspects from basic sciences through to the clinical scenario and complications. The patient who is needing an injection wants it to be done by someone who has all the knowledge in this book: and the label on the operator's collar is not important.

Of course extra background knowledge, as the book states, is of the greatest assistance on the diagnostic side, and familiarity with the applied anatomy and the function and dysfunction of the neuromusculoskeletal system is essential. You must have an understanding both of these areas and with the contents of this book if you are able to be an efficient and safe injector in orthopaedic medicine, whether you are physiotherapist, nurse or doctor.

## Acknowledgements

Dr James Cyriax will always deserve acknowledgement for his life's work that provided the approach that underpins this text.

We are grateful to Butterworth Heinemann for providing the impetus to produce 'Musculoskeletal Injection Skills'. Heidi Allen and Caroline Makepeace have been supportive throughout and we have appreciated their understanding when schedules have gone awry. Pfizer Pharmaceuticals have generously supported our illustrations with an Educational Grant and Myriam Brearley and Margaret Gascoyne from Butterworth Heinemann were enormously helpful in developing that association.

The Council of the Society of Orthopaedic Medicine has continued to stand behind us and thanks are due particularly to those Society fellows who suggested changes: Dr Gordon Cameron, Paul Hattam, Alison Smeatham, Gordon Smith and Dr Bruce Thompson.

Our colleagues within our respective practices have been unstinting with their support, gamely keeping things going through times of literary turbulence. We are also indebted to our friends for providing a much needed social oasis.

As ever, those at home deserve the most special of thanks for providing inspiration, admiration and encouragement. Thank you Rod, Andrew, Denise; Clive, Kate, Tess; and Barbara.

## Preface

Musculoskeletal medicine and therapy have traditionally sat side by side, with both doctors and physiotherapists combining experience in the assessment and clinical diagnosis of musculoskeletal lesions and applying their different approaches and skills.

The role of Dr James Cyriax FRCP was pivotal in the development of orthopaedic medicine, arguably the bedrock of musculoskeletal medicine. The specialism developed from his background in orthopaedic surgery at St Thomas' Hospital, London, in 1929, where he was intrigued by conditions presenting in orthopaedic clinics with normal radiographic findings, where the lesion was clearly within the so-called 'soft tissues'. Putting surgery aside, he devoted his life's work to developing a system for examining the soft tissues towards establishing a clinical diagnosis, and from there to devising treatment techniques for the lesions diagnosed. Throughout his long professional life, he dedicated himself to the continued development of the specialism and, as well as techniques of mobilisation, manipulation and traction, injections were very much part of his treatment approach to the soft tissue lesions encountered within clinical practice. His approach was bi-disciplinary from the outset, drawing on the experience of doctors and physiotherapists and acknowledging the importance of co-operation and collaboration in the management of patients. Doctors and physiotherapists were taught alongside each other on his educational courses to acquire the theory and skills of assessment, manual techniques and injection therapy, even though the boundaries of scope of practice prevented physiotherapists from being able to put injection skills into practice. Musculoskeletal injections, therefore, traditionally remained firmly within the province of the physician.

Physiotherapy is derived from a base of massage, remedial gymnastics and electrotherapy (Williams, 1986) and these have traditionally been considered to be the core skills of the profession, in determining scope of practice.

The Chartered Society of Physiotherapy (CSP), the professional body of physiotherapy, is responsible for both the training and support of Chartered Physiotherapists whilst having a key role in deciding professional issues. A discussion document published in 'Physiotherapy' in 1988 ('Physiotherapy', August 1988, pp 356-358) emphasised the process of developing practice. It was clear in its guidelines for exploring developments in practice that the 'new modality, technique or philosophy' should be 'clearly based upon the core of physiotherapy'. This dictum had presented the stumbling block for the introduction of the use of injections which had been first considered in 1987 ('Physiotherapy', April 1990, pp 218-219), when the Professional Practice Committee of the CSP recommended that the giving of injections by physiotherapists, as an invasive technique, was not within the scope of physiotherapy practice.



It was also highlighted that the administration of drugs by physiotherapists was not consistent with Section 58(2)(b) of the Medicines Act 1968, where only registered medical practitioners, dentists and veterinary surgeons have the right to prescribe drugs, and that 'such a practice could cause conflict between physiotherapists and medical practitioners' ('Physiotherapy', April 1990, pp 218-219).

With the continued development of autonomy within physiotherapy came the extended role of the profession in orthopaedics and rheumatology, where orthopaedic and rheumatology 'assistants' or 'practitioners' were being created, whose role included the administration of local steroid injection, with consultant support but without direct intervention. This move towards greater autonomy was welcomed by both the medical and physiotherapy professions as a safe and cost-effective use of resources (Hourigan and Weatherley, 1994).

Hockin and Bannister (1994) examined the extended role of a physiotherapist in an outpatient orthopaedic clinic and in analysing the treatments selected in patient management identified that 22% of patients had received local steroid injection. With the existence of such a *fait accompli* and the moves of continuing professional development in encouraging the process of developing practice towards skill specialism (Bergman, 1990), the CSP Professional Practice Committee was pressed to extend the scope of practice of physiotherapy to include injections in December 1995. The CSP produced guidelines for practice, which clearly enforced the need for proper post-graduate training. With respect to the Medicines Act it was pronounced that the doctor would be responsible for prescribing the drug but the physiotherapist would be responsible for administering the injection.

In interpreting the term 'proper post-graduate training' a vehicle was required that would extend the physiotherapists' existing knowledge in injection therapy and allow the development of skills in the use of this modality. Even for physiotherapists who had been taught, and were experienced in, the application of the principles and practice of orthopaedic medicine and musculoskeletal therapy, it was apparent that further training was required to be able to achieve both the competence and confidence to inject.

'Bolt on' courses in injection therapy have been developed that rely on a sound existing knowledge of functional anatomy and clinical diagnosis of soft tissue lesions, with an awareness of the basic tenets of injection therapy. There are particular implications for the process of clinical reasoning, now that the modality has come to form part of the armoury of the manual therapist and care in the selection of this invasive technique and issues of clinical safety have been emphasised within the training programmes.

Evidence based medicine has been a driver in consolidating the basis for selection of treatments applied in medicine and physiotherapy. In 1999, the Chartered Society of Physiotherapy endorsed 'A Clinical Guideline for the use of Injection Therapy by Physiotherapists' that was prepared by ACPOM, the Association of Chartered Physiotherapists in Orthopaedic Medicine, a clinical interest group of the Chartered Society of Physiotherapy. The guideline was rigorous in its approach to identifying evidence to support its recommendations for best practice in the application of injection therapy, and as well as being pertinent to physiotherapists intending to use the modality, it is also relevant to doctors who work in the field of musculoskeletal medicine and for general practitioners in primary care. At the time of writing, the guideline is undergoing a process of clinical audit to be able to monitor the extent to which it is being followed and to enhance reflection on the modality's effectiveness in clinical practice.

The Crown Review of Prescribing, Supply and Administration of Medicines (1999) recommended that prescribing rights should be extended to physiotherapists, with appropriate legislation affecting physiotherapists, pharmacists and other health professionals awaiting Parliamentary discussion time ('Frontline', April 2000, p 7). The extended role of physiotherapy practitioners working in musculoskeletal clinics has already been demonstrated to be effective in the primary care setting, (Hattam and Smeatham, 1999) and the role will undoubtedly be enhanced still further by the introduction of prescribing rights, albeit limited at the outset.

Injection therapy courses sit comfortably within masters programmes since they conform to the achievement of Level 4 (masters level) learning outcomes in allowing the demonstration of mastery in the application of a clinical skill within post-graduate education programmes. Clinical reasoning is paramount in the selection of intra-articular and intralesional injections as appropriate and efficacious treatment techniques. Subsequent evaluation and reflection on treatment outcomes promotes safe and effective practice.

This text aims to support courses in injection therapy by addressing the theory underpinning the approach and the specific techniques presented on a regional basis. It will also be pertinent to those doctors who find themselves new to the specialism of musculoskeletal medicine, or will act as a refresher or corroborative reference to those who have existing experience. Physiotherapy 'grandfathers' who have been using the modality for many years, and who have now been able to own up to the skill, may also be included within the latter group.

The adopted title 'Musculoskeletal Injection Skills' is intended to encompass those injections that may be appropriate for peripheral lesions encountered in sports and orthopaedic medicine, and is in line with the increasingly popular use of the terms musculoskeletal medicine and therapy within the respective professions. We have aimed for clarity and accuracy in presentation, whilst

acknowledging the need for continued research to monitor this developing therapy, and its place with respect to other available treatment modalities in both medicine and physiotherapy.

Monica Kesson, Elaine Atkins and Ian Davies

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## Section 1 Principles of Musculoskeletal Injections

## Introduction to Section 1

This section presents the theory underpinning the administration of intra-articular and intralesional injections for peripheral musculoskeletal lesions. The first two chapters provide an overview of basic pharmacology and the essential equipment required for administering injections. Safety precautions are highlighted with guidance on recognising and dealing with emergency situations. The third chapter describes injectable drugs for use in musculoskeletal injections with important note of their mechanism of action, effects and side effects. The section concludes with a chapter on general principles of injection therapy and lists the indications and contra-indications for injections, whilst explaining the application of general techniques, and providing notes on record keeping. A flow chart provides a background for the clinical decision making process.

## 1 Basic pharmacology – what do drugs do?

### Chapter summary

This chapter presents the key points of pharmacology that are relevant to applied injection therapy. Pharmacology is introduced with an outline of how drugs are administered, absorbed, distributed, metabolised and eliminated. Drug nomenclature is then defined.

The pharmacology presented in this chapter is basic, for which we make no apology. In preparing a text to enable both doctors and physiotherapists to enhance their injection skills, the authors were mindful of the lack of pharmacology within undergraduate physiotherapy training, at least until relatively recently when injections came within the scope of physiotherapy practice in 1995.

All will agree that an understanding of pharmacology or, simplistically, how drugs work, is essential for the application of injection therapy. Doctors may choose to skip to Chapter 2, where the theory presented in Chapter 1 will be assumed, and all should be equal from there on.

A **drug** is a substance which modifies body function (Grundy, 1990; Kalant, 1998). **Pharmacology** is the study of drugs and their action in the body. It can be subdivided into **pharmacokinetics**, the process whereby drugs are absorbed, distributed, metabolised and eliminated from the body or, simply, what the body does with the drug, and **pharmacodynamics**, the action of drugs on the cells, tissues and organs or, simply, what the drug does to the body (Grundy, 1990; Rang et al, 1995; Laurence et al, 1997). For a drug to be therapeutically useful it must act selectively on particular cells and tissues i.e. the target for the drug action. Individual classes of drugs bind to certain targets and individual targets recognise certain classes of drugs. However, a drug is not usually completely specific in its action and its effects on cells and tissues other than the target inevitably produce side effects (Rang et al, 1995).

#### **A:** The pharmacokinetic process

In order to produce its effects, a drug must be present in appropriate concentrations at the target tissue (Benet, 1996). As mentioned above, the pharmacokinetic process (what the body does with the drug) is the process whereby a drug is absorbed, distributed, metabolised and eliminated from the body. In order to go through these processes the drug must first cross the cell membrane. The cell membrane preserves and regulates the internal environment and consists of bilayers of lipid molecules with 'islands' of proteins (Laurence et al, 1997).

A variety of different mechanisms enable the drug to cross cell membranes within the tissues to facilitate its absorption. The drug's molecular size, its relative solubility in lipid and water, its ionisation and other properties, can all influence absorption (Kalant, 1998). There is a close correlation between the permeability of the cell membrane and the drug's solubility in lipid and water and for this reason, lipid solubility is an important determinant of the pharmacokinetic characteristics of a drug. The relative solubility determines whether the drug molecule will stay in the water phase or permeate the fatty cell membrane. Generally, a more lipid-soluble drug molecule is less water-soluble and a less lipid-soluble drug molecule is more water-soluble. Properties such as the rate of absorption, penetration into the tissues and duration of action can be predicted from knowledge of the drug's lipid-solubility (Rang et al 1995).

### **B: Drug absorption**

In whatever form a drug is given, it will first pass into free solution at the site of administration. If administered by mouth, the dissolved drug is absorbed into the portal circulation (the visceral system which circulates via the liver). If administered by injection, inhalation or via the skin or mucous membranes, it is directly absorbed into the systemic circulation. Musculoskeletal injections are intended to directly affect the target tissue, but some systemic absorption is inevitable and is responsible for unwanted side effects (see Chapter 3).

Absorption is the passage of the drug from its administration site into the plasma, which then transports it to its site of action or elimination (Rang et al, 1995). The more rapidly the drug is absorbed the more rapidly it is eliminated, and factors which affect its absorption therefore also affect its duration of action. Relatively insoluble drugs e.g. triamcinolone acetonide, have a longer period of action than relatively soluble drugs such as hydrocortisone.

The drug may pass through some tissues and organs which are not affected by it, but act as reservoirs, affecting the drug's overall volume distribution and concentration in the plasma. Some drugs act as agonists (activators) binding to specific receptors on or in the target cells. A small number of drugs act as antagonists (causing no activation or acting as blockers), binding to a receptor without initiating change, but preventing other substances from gaining access to the receptor.

### **B: Drug administration routes**

The main administration routes are:

- Oral
- Sublingual
- Buccal

- Rectal
- Topical – by application to the epithelial surfaces e.g. skin, cornea
- Inhalation
- Injection

For the purposes of this text, administration by injection is the only route that concerns us.

Injections are delivered:

- Intravenously
- Subcutaneously
- Intramuscularly
- Intralesionally and intra-articularly

**Intravenous injection** gives direct access to the circulation and is the fastest route of delivery, producing high concentrations of the drug. It is initially delivered principally to organs of high blood flow such as the brain, liver, heart, lung, and kidney. It is an appropriate route for the administration of lidocaine to treat cardiac arrhythmias, but not for musculoskeletal injections where the high blood level produced can be dangerous. Musculoskeletal injections require local, not systemic effects. The rate at which the injection is given determines the levels of drug in the circulation, with a rapid intravenous injection producing the highest blood levels. The disadvantage of the intravenous route is that if the drug is delivered too quickly, the plasma concentration rises so rapidly that the normal mechanisms of distribution are outpaced and toxic side effects can occur (Laurence et al, 1997, BNF, 2000).

**Subcutaneous, intramuscular, intralesional or intra-articular injections** produce a slower effect than the intravenous route, but generally a quicker effect than the oral route. The subcutaneous route tends to have relatively poor absorption and repeated injections into one site can cause fat atrophy (lipotrophy) (Laurence et al, 1997). Absorption may be more rapid by the intramuscular route, which is suitable particularly for irritant drugs and depot preparations (slow release drugs that may remain in the tissues for days, weeks or months).

**Clinical tip:** Anatomical knowledge of the structures to be injected is paramount. A poorly placed injection into the subcutaneous tissues may cause fat atrophy (lipotrophy) e.g. as may be seen with injection at the tennis elbow site.

Musculoskeletal injections are delivered to the exact site of the lesion, in order to produce their effects locally, but some of the drug may be absorbed into the general circulation. As mentioned above, complete specificity cannot be guaranteed, and knowledge of the side effects of the injected drugs is therefore



most important. The recognised side effects will be covered under the topics of local anaesthetics and corticosteroids (see Chapter 3).

**Clinical tip: Take care**, a rapid, accidental intravenous injection of local anaesthetic can produce life threatening side effects. Therefore, when delivering an intralesional injection containing local anaesthetic, aspirate before delivery of the solution to ensure that placement of the needle is not within a blood vessel.

The rate of absorption of the drug from the intralesional site will depend on:

- The nature of the tissue injected
- Local blood flow
- The rate of diffusion through the tissues
- The solubility of the preparation

A high local blood flow produces more rapid absorption, but this will vary according to the tissue injected, as some are more vascular than others. The rate of diffusion is generally more rapid in inflamed tissues due to the increased blood flow in the area. The more soluble the preparation injected, the more rapidly it is absorbed.

#### **B: Drug distribution**

Distribution of the drug to its target occurs by passage across cell membranes and via the body fluids by:

- Diffusion
- Filtration
- Carrier molecules

**Diffusion** is the natural tendency of any substance to move from an area of high concentration to one of low concentration. Corticosteroids are transported across cell membranes by this method. Lipid-soluble substances diffuse more readily into cells and this is the most important way in which a drug enters the tissues to be distributed through them. Drugs show greater or lesser degrees of lipid-solubility according to the structural properties of the molecule and the acidity or alkalinity of the environment (Laurence et al, 1997). Local anaesthetics are weak bases (i.e. alkaline) and are less soluble in lipids in an acid environment, such as within inflamed tissues. They therefore do not cross cell membranes easily and their activity becomes impaired. However, in an alkaline environment, local anaesthetics are comparatively more soluble in lipids, and cross the cell membrane more readily by diffusion.

**Filtration** is the passage of small water-soluble molecules through aqueous channels in tight junctions between adjacent epithelial cells. Filtration plays a minor role in drug distribution and is mainly concerned with excretion of drugs by glomerular filtration (Laurence et al, 1997).

**Carrier molecules** are special protein molecules within the lipid bilayer, which act as 'ferry boats' allowing drug molecules, which are insufficiently lipid-soluble to penetrate lipid membranes on their own, to cross by active transportation against or with the concentration gradient (Rang et al, 1995; Laurence et al, 1997).

## **B: Drug metabolism**

Drugs affect the metabolic processes of the cell in a variety of ways, such as by blocking ion channels, e.g. the blocking action of local anaesthetics on the voltage-gated sodium channel, or by inhibiting the action of enzymes. Specific receptors (proteins) may exist within the cell to which a drug may become bound (Rang, et al, 1995).

Most drugs are treated by the body as foreign substances (xenobiotics) and are metabolised by enzymes (Rang et al, 1995; Laurence et al, 1997). This process occurs mainly in the liver, but other tissues such as the kidney, gut mucosa, or lung may contribute.

Metabolism occurs in two phases, involving different types of biochemical reaction (Rang et al, 1995; Laurence et al, 1997):

- An initial 'phase I reaction', which changes the drug molecule by oxidation, reduction or hydrolysis, producing a derivative which may be more active or toxic than the original drug. In some cases the original drug (known as a pro-drug) is inactive and the phase I metabolite is in fact the active drug
- The subsequent 'phase II reaction', which usually terminates the drug's activity producing an inactive compound

## **B: Excretion of drugs**

Once a drug is absorbed it must be eliminated from the body and this normally begins with a process of metabolic intervention. Most drugs are excreted as metabolites but a few are eliminated unchanged.

One method of describing the rate of elimination is by the concept of **the 'plasma half life' ( $t_{1/2}$ )** of the drug, which is the time taken for the plasma concentration to fall by 50%. In reality this is an oversimplification, e.g. with a slowly absorbed drug such as the corticosteroid triamcinolone acetonide, absorption is still taking place as elimination occurs. The uneven distribution of some drugs throughout the fluid compartments and tissues of the body makes the concept an inaccurate measure. The plasma half-life is only one factor involved in the duration of action of a drug, e.g. dexamethasone has a longer half-life compared with triamcinolone, but the available preparation is shorter acting due to its greater solubility than the available preparations of triamcinolone.

As mentioned above, there are three main routes of elimination:

- The main route is via the kidneys, where the drug and its metabolites leave the plasma by filtration through minute pores in the capillary walls of the glomerulus
- The lungs, which deal with inhalational agents such as general anaesthetics
- Some drugs and their metabolites are excreted in the bile by the liver, and ultimately eliminated in the faeces. Re-absorption is common in the gut, making this a relatively inefficient route of elimination, but 25% of corticosteroids are excreted in this way

#### **A: The pharmacodynamic process**

Pharmacodynamics is the action of drugs on the cells, tissues and organs of the body, or what the drug does to the body. Drugs act by altering the body's control systems. Most bind to a specialised constituent of the cell to alter its function, selectively changing the physiological or pathological system to which it contributes. Drugs may act on the cell membrane, or may affect the metabolic processes within and outside the cell (Laurence et al, 1997). Further information on the pharmacodynamic processes of injectable drugs used in musculoskeletal medicine will be covered in Chapter 3.

#### **A: Drug nomenclature**

Each drug has three names:

A **chemical name** that is of no clinical interest but describes the compound for the chemist e.g. N-diethylaminoacetyl-2-6xylidine hydrochloride monohydrate which is the chemical name for lidocaine hydrochloride (Wood-Smith, Stewart and Vickers, 1968).

A **generic name** or approved name chosen by the Nomenclature Committee of the British Pharmacopoeia Commission (Henry, 1991) e.g. lidocaine (now the internationally standardised name for lignocaine), or triamcinolone acetonide as a further example.

A **proprietary or trade name** chosen by the manufacturer which may apply only to a specific formulation e.g. Xylocaine® (lidocaine manufactured by Astra Pharmaceuticals), Adcortyl® (triamcinolone acetonide suspension 10 mg/ml manufactured by E.R. Squibb & Sons), Kenalog® (triamcinolone acetonide suspension 40 mg/ml manufactured by E.R. Squibb & Sons).

Since proprietary names differ internationally, generic prescribing is the preferred method for clarity, economy and convenience (Laurence et al, 1997).

## Conclusion

This chapter has been deliberate in its attempt to set out the basic pharmacology of how drugs work. From that starting point, the next step will be to consider the equipment needed and the safety precautions to be taken prior to performing an injection. These topics will form the basis of the following chapter.

## 2 Essential equipment, safety precautions, emergency situations

### Chapter summary

This chapter provides details of the range of needle and syringe sizes commonly used for musculoskeletal injections. Emphasis is placed on precautions to be taken to ensure safety and to minimise the risk of infection. The potential side effects are listed with notes on how to recognise and deal with emergency situations.

#### A: Basic equipment

#### B: Drug containers

##### Fig 2.1: Drawing or photo of drug containers

Drugs for injection are usually supplied in either vials or ampoules. Vials have a rubber cap, which is designed to be penetrated by the needle and to self-seal afterwards. The cap may be covered by a hard plastic seal (e.g. Kenalog, Depomedrone) or by a metal seal. Ampoules are normally of glass construction, with no separate stopper, and care needs to be taken when breaking off the top in order to prevent injury. The narrow neck of the ampoule may be scored during manufacture or a file may be used to weaken the neck to facilitate opening. Lidocaine and some other local anaesthetics may be contained in plastic ampoules such as Polyamps™ or Sure-amps™. Each usually comes with full instructions but generally the top of the ampoule twists off and the syringe taper then fits directly into the neck of the ampoule.

**Clinical tip:** Caution should be exercised to prevent inflicting skin wounds if a glass ampoule should shatter on opening. An opening device should be used or the hands protected with a cloth or gloves.

#### B: Syringes

##### Fig 2.2: Drawing or photo of syringes

Disposable syringes should be used. These are all manufactured with expiry dates clearly marked on the paper side of the wrapper. This wrapping is usually of 'peel apart' type, consisting of paper and clear plastic.

Sizes 1, 2, 5, 10, 20, 30, 50 and 60 ml are available and generally speaking, the size is chosen to be appropriate for the amount of solution delivered. More pressure may be required when injecting the teno-osseous sites of tendons e.g. the common extensor tendon at the elbow (tennis elbow/enthesitis). This can be achieved by using a small piston to produce a higher pressure for a given force

and a 1 ml syringe is ideal for this. The effect of syringe size on injection pressure is illustrated below (Fig 2.3).


Fig: 2.3 Chart and graph – effect of syringe on injection pressure

### B: Needles

Fig 2.4: Drawing or photo of needles

Disposable needles should be used. These are packed in 'peel apart' paper and clear plastic with the needle protected by a rigid or semi-rigid plastic tube. All should be clearly marked with the size and sterilisation and expiry dates on the paper side of the wrapper. The needles are available in a range of lengths and diameters but it is common practice to refer to the colour of the plastic hub, which denotes the diameter (or gauge) of the needle.

The following table gives an indication of the needle sizes available; those highlighted in bold type denote the needles more commonly used in musculoskeletal injections.

	Imperial size (")	Metric size (mm)	Hub colour
Fine diameter  Large diameter	25G x 5/8"	0.5 x 16 mm	Orange
	25G x 1"	0.5 x 25 mm	Orange
	23G x 1"	0.6 x 25 mm	Blue
	23G x 1¼"	0.6 x 30 mm	Blue
	21G x 1½"	0.8 x 40 mm	Green
	21G x 2"	0.8 x 50 mm	Green
	19G x 1½"	1.1 x 40 mm	White

(G - gauge)

Each needle has an acute angle on the bevel (Fig 2.5)

Fig 2.5: diagram to illustrate the bevel of the needle

For some musculoskeletal injections, a spinal needle may be an appropriate choice (e.g. hip joint or psoas bursa injections) and although available in different lengths, these are generally longer than the standard hypodermic needles (e.g. 20G x 3½ in, 0.9 x 90 mm). Spinal needles have a wire stylet which remains present in the lumen of the needle during its insertion, to prevent the skin being taken in with the needle, and is withdrawn before connecting the syringe. This feature is important for spinal injections but is also pertinent when the needle is required for musculoskeletal injections, since that fragment of skin may be a means of carrying infection to the site of the lesion.

The needles and syringes referred to above are usually available from NHS supplies for general practitioners, or may be ordered from a pharmacy or medical supplier for physiotherapists.

#### **A: Disposal of equipment**

'Sharps' containers should be used for the disposal of syringes, needles and empty drug containers. These containers will be readily available in hospital or general practitioners' surgeries where a policy will be in place for the safe disposal of 'sharps'. In private clinics, advice should be sought from the local council's environmental health department, who can usually provide suitable containers and offer a disposal service.

#### **A: General safety precautions**

All doctors and physiotherapists wishing to practise injection therapy should undergo a course of immunisation against Hepatitis B. This involves three doses, the second being given one month after the first and the third six months after the original dose. An accelerated regime is possible should it be required (contact your general practitioner or practice nurse for further details). Antibody levels should be checked two to four months after completing the course, with 80-90% of people responding overall. Those aged over 40 are less likely to respond. As a general rule poor responders should receive a booster dose and non-responders should consider repeating the course. All responders should probably have a booster dose after five years (Salisbury and Begg, 1996).

You should be aware of all safety policies within your place of work relating to protection against viruses (Hepatitis B, HIV). Doctors and physiotherapists working in private clinics may need to establish a policy for themselves.

All equipment should be disposed of safely (see above). Clinical waste should be placed in appropriately marked plastic bags (usually yellow) and removed for subsequent incineration (seek advice from appropriate local environmental health department). Spilt blood or body fluids should be dealt with correctly using latex gloves and paper towels. If gloves are to be worn, latex is safer than polythene for protection against viruses (Korniewicz et al, 1989). The area of spillage should be cleaned with sodium hypochlorite solution e.g. Domestos™, rinsing any soiled linen in cold water and an appropriate disinfectant e.g. 1/10 solution of bleach.

#### **A: Needlestick injuries**

To prevent needlestick injuries, a used needle should never be re-sheathed. However, if an injury does occur, the recommended procedure is to encourage bleeding as much as possible and to wash with soap and water. Urgent medical advice may be obtained by telephone from the following sources as appropriate:

- Nearest Public Health Laboratory
- CPHM (Consultant in Public Health Medicine) on call for the Local Health Board in Scotland
- Hospital Control of Infection Officer
- Occupational Health Services

(Salisbury and Begg, 1996)

**Clinical tip:** Remember – NEVER re-sheath a used needle

**A:** 'No touch' technique

A 'no touch', 'clean' technique is vitally important, particularly when using corticosteroid agents, since their immunosuppressive effect increases susceptibility to infection and makes infection more difficult to detect and treat (Schimmer and George, 1998). Particularly when injecting a joint, septic arthritis should be considered as a serious, but avoidable, complication.

Possible sources of infection include:

- Skin organisms carried in during the injection procedure or spread from other adjacent infections
- Introduction via contaminated equipment or solutions
- Haematogenous spread from distant infection such as septicaemia e.g. following dental procedures or the use of genito-urinary tract instrumentation such as during cystoscopy
- Direct trauma may have produced infection into the local area, particularly in superficial bursae e.g. the pre-patellar or olecranon bursae (Hughes, 1996)

A 'no touch' routine to minimise the risk of infection is suggested in Chapter 4.

The recommended maximum dose for the local anaesthetic, lidocaine, is 200 mg, (see Chapter 3). It is advised that to avoid reaching toxic levels of local anaesthetic, those new to musculoskeletal injection therapy may prefer to use no more than 5ml of 1% lidocaine, or 15 ml of 0.5% lidocaine on one occasion. Local anaesthetics are relatively more toxic in more concentrated solutions and both figures given are deliberately below the maximum dose. These recommendations provide a wide safety margin to minimise the potential risk from accidental injection via a blood vessel directly into the bloodstream.

In general, the patient receives one injection for each musculoskeletal lesion diagnosed. In one year it is advisable not to give more than two injections into any one anatomical structure except the glenohumeral joint where three may be necessary for the treatment of traumatic arthritis (frozen shoulder) (Kesson and Atkins, 1998).



Should the patient present with more than one lesion, two injections could be considered at one treatment session, but it is recommended that the total dose of corticosteroid does not exceed 60 mg as a maximum, to err on the side of caution. However, if there is any query for particular drugs, the manufacturer's recommendation on the data sheet should be checked.

#### **A: Complications and recognising and dealing with emergencies**

##### **B: Infection**

It is not uncommon for patients undergoing corticosteroid injection to experience a post-injection flare of pain, which is treated by rest, ice and non-steroidal anti-inflammatory drugs, or simple analgesia. However, this must be distinguished from the pain signifying infection, which is generally more severe and lasts beyond the approximate limit of 72 hours of a post-injection flare. As mentioned above, corticosteroids can mask signs of infection, which are heat, redness, swelling and loss of function. If a septic arthritis or infection following intralesional injection is suspected, the patient should be referred urgently to hospital where an initial aspiration to confirm diagnosis will be followed by intravenous antibiotic therapy (Hughes, 1996).

##### **B: Simple faint**

This presents as pallor, hypotension with bradycardia, occasional twitching movements and possible eye rolling. The normal management for such an event is to loosen tight clothing and to place the patient in a horizontal or lateral position with the feet raised. Most patients wake up as soon as they are horizontal but, if not, they should be moved into the recovery position to safeguard the airway and to prevent the risk of aspiration should vomiting occur.

##### **B: Allergy**

This can vary from simple urticaria to anaphylaxis (see below). Urticaria may be present as a minor irritation or 'nettle rash' in which the itching may be treated with an antihistamine e.g. Piriton®. A more severe urticaria may present as large wheals and possible facial and glossal swelling. Medical advice should be obtained for both situations but is urgent if facial or glossal swelling occurs. A rash other than that classified above may present as an allergic dermatitis for which the application of hydrocortisone cream may prove curative.

##### **B: Anaphylactic shock**

This is an extremely rare complication of injection, but it requires prompt action to treat the laryngeal oedema, bronchospasm, hypotension and associated tachycardia (BNF, 2000). An itchy sensation progressing rapidly to facial or glossal swelling, as mentioned for severe allergy above, may be an indication of impending anaphylactic shock. Should this event occur it should be treated as a

medical emergency, physiotherapists should obtain urgent medical advice, and the routine for Basic Life Support should be followed (Gabbott and Baskett, 1997; Handley, 1997; Resuscitation Guidelines for use in the United Kingdom, 1997). Following most regional anaesthetic procedures, maximum arterial plasma concentrations of anaesthetic develop within 10 to 25 minutes. For this reason careful monitoring for toxic effects is recommended during the first 30 minutes after injection (BNF, 2000).

The CSP Clinical Guideline for the Use of Injection Therapy by Physiotherapists (1999) provides specific points for the management of anaphylactic shock, suggesting the following regime:

- Stop delivery of the drug
- Summon medical help
- Administer adrenaline
- Administer cardiopulmonary resuscitation

## Conclusion

This chapter has provided details of the range of needle and syringe sizes commonly used for musculoskeletal injections. The precautions to be taken to ensure safety and to minimise the risk from infection have been highlighted. The potential side effects have been listed with important notes on how to recognise and deal with emergency situations. The following chapter will describe the drugs used in musculoskeletal injections, with note of their mechanism of action, effects and side effects.

### 3      Injectable drugs for musculoskeletal lesions

#### Chapter summary

This chapter sets out to provide an overview of the principal drugs used in musculoskeletal injections with note of their mechanism of action, effects, side effects and contra-indications. It contributes still further to the development of safe and effective practice in the administration of musculoskeletal injections.

#### A: Corticosteroids

Local corticosteroid injections are used to reduce inflammation and pain, allowing mobilisation. They are given intra-articular to treat episodic disease flares (Hunter and Blyth, 1999) as in acute episodes of degenerative osteoarthritis e.g. osteoarthritis of the knee, inflammatory arthritis e.g. rheumatoid arthritis of the wrist, and occasionally traumatic arthritis e.g. traumatic arthritis of the elbow.

Weitoff and Uddenfeldt (2000) suggested that the aspiration of synovial fluid before placement of an intra-articular injection of corticosteroid reduced the risk of relapse in patients with rheumatoid arthritis. Creamer (1999) reviewed the literature on the use of intra-articular corticosteroid injection in osteoarthritis and noted several studies which indicated significant benefit compared with placebo in the knee although the beneficial effects were short lived.

Intralesional corticosteroid injections are given for tendinitis e.g. tennis elbow, tenosynovitis e.g. de Quervain's tenosynovitis where the injection is delivered between the tendon and its sheath, compression neuropathies e.g. carpal tunnel, and for some ligamentous lesions e.g. coronary ligaments at the knee.

Corticosteroids are hormones that are produced in the body by the adrenal cortex. They are classified into two broad groups; mineralocorticoids and glucocorticoids. Although several individual corticosteroids have mixed actions, the main properties of the groups are listed below:

- **Mineralocorticoids** (the main endogenous hormone is aldosterone) which influence water and electrolyte balance
- **Glucocorticoids** (the main endogenous hormones are corticosterone and hydrocortisone (cortisol) which influence carbohydrate and protein metabolism. As well as their metabolic effects they also have anti-inflammatory, anti-allergenic and immunosuppressive actions (Rang et al, 1995; Schimmer and George, 1998)

A range of synthetic corticosteroids has been developed with the glucocorticoid and mineralocorticoid actions separated. However, it has not been possible to separate the wanted anti-inflammatory actions of the glucocorticoids from their other unwanted side effects (see side effects of corticosteroids, Chapter 3) (Rang et al, 1995).

The anti-inflammatory (glucocorticoid) effect of corticosteroid is only advantageous if the mineralocorticoid effect of the drug is low, with little effect on water and electrolyte balance. Prednisolone produces predominantly glucocorticoid effects and is the drug of choice for long term use by mouth. Cortisone and hydrocortisone are not suitable for long term use because their mineralocorticoid effects are high, resulting in fluid retention. However, hydrocortisone has less side effects and its moderate anti-inflammatory effect makes it useful for topical application for inflammatory skin conditions and for injection in musculoskeletal intralesional injections. Betamethasone and dexamethasone have insignificant mineralocorticoid effects and high glucocorticoid effects, making them suitable for administration in high doses where fluid retention is not wanted, e.g. cerebral oedema.

Methylprednisolone and triamcinolone have anti-inflammatory and immunosuppressive effects but little or no mineralocorticoid effects, making them suitable for musculoskeletal injections.

Glucocorticoids act intracellularly at the target tissue, binding to specific receptor proteins in the nucleus which become activated after interaction with the steroid. The steroid-receptor complex then binds to DNA and either initiates or prevents transcription of certain genes, although the mechanisms by which this modification of gene transcription occurs are not fully understood. The anti-inflammatory effects of glucocorticoids are thought to occur through decreased generation of prostaglandins. The enzyme cyclo-oxygenase (COX-2) is responsible for producing the prostaglandins involved in inflammation. Exogenous glucocorticoids inhibit COX-2 by inhibiting transcription of the relevant gene, reducing prostaglandin generation in inflammatory cells. There is also evidence that glucocorticoids induce the anti-inflammatory mediator lipocortin (Grillet and Dequeker, 1990; Rang et al, 1995). Time is required for the changes in gene transcription and protein synthesis which is clinically significant in that most of the effects of corticosteroids are not immediate, there is generally a delay before the beneficial effects are seen (Schimmer and Parker, 1996).

#### **B: Anti-inflammatory effects of corticosteroid injection**

All aspects of the inflammatory response are depressed by corticosteroid, regardless of cause, from the early acute phase of pain, heat, redness and swelling to the later chronic phase in which proliferation and remodelling are affected. Excessive or 'useless' inflammation can benefit greatly from corticosteroid. However, it is generally accepted that corticosteroid is not an appropriate treatment for acute inflammation because of its potent effect on the protective aspects of the inflammatory response and on the delay it causes in fibre formation (Kerlan and Glousman, 1989; Nelson et al, 1995; Laurence et al, 1997). In the chronic inflammatory phase the balance in collagen synthesis is disrupted and inflammation and proliferation continue side by side. Corticosteroid injection can be beneficial in this phase, providing its unwanted effects are

recognised, with particular note of the loss of tensile strength in the structure due to reduced production of collagen and glycosaminoglycans (Stefanich, 1986; Grillet and Dequeker, 1990; Mazanec, 1995; Rang et al, 1995). For this reason, relative rest from causative or overuse factors is most important following injection until the soft tissues are considered to have returned to their functionally normal strength, e.g. approximately two weeks following triamcinolone acetonide injection (Cameron, 1995, Drugs and Therapeutic Bulletin, 1995; CSP Guideline for the Use of Injection Therapy by Physiotherapists, 1999)(see below).

Reduced inflammation and immunosuppression is mainly achieved by the action on blood vessels, inflammatory cells and inflammatory mediators, and involves the following processes (Rang et al, 1995; Schimmer and Parker, 1996):

- Vasoconstriction of small blood vessels
- Reduced fluid exudation
- Reduced leucocyte infiltration
- Reduced production of the inflammatory mediators, prostaglandins, histamine, kinins
- Production of anti-inflammatory mediators, lipocortins
- Inhibition of the macrophage, delaying phagocytosis, fibroblast activity and ultimately repair
- Reduction in the permeability of the synovial membrane; corticosteroid is taken up selectively by the synovium
- Reduced migration of leucocytes
- Reduced activity of mononuclear cells
- Reduced proliferation of blood vessels
- Reduced fibrosis

The effect of corticosteroid injection on collagen synthesis in the proliferation and remodelling phases is disputed (Sandberg, 1964; Ehrlich and Hunt, 1968; Ehrlich et al, 1972; Kulick et al, 1984). Marks et al (1983) showed a significant delay in wound healing by the application of topical steroids. Long-term, large doses of the sustained-release form of methylprednisolone were found to suppress collagen synthesis (Cohen et al, 1977), whilst intermittent doses appeared to have no effect. Intralesional corticosteroid produces keloid regression by inhibition of fibroblast migration, decreased collagen synthesis and increased collagenase activity (Carrico et al, 1984).

In basic terms, an intra-articular or intralesional corticosteroid injection reduces inflammation, alters collagen synthesis and relieves pain. The reduced inflammation and analgesic affect allows the patient to move the affected part more normally. Normal mechanical stress induces collagen fibre orientation and leads to a strong mobile repair (Stearns, 1994a; Stearns, 1940b; Le Gros Clark, 1965; Kesson and Atkins, 1998). The altered collagen synthesis may initially weaken collagen fibres and, as a general rule, the patient should be instructed to rest from causative or overusing factors until they are symptom and sign free.

**B: Corticosteroids used in musculoskeletal injection techniques**

Preparations licensed for intra-articular and intralesional injections (compiled from information contained in manufacturer's data sheets):

Generic name	Trade name	Strength of preparation	Presentation
Hydrocortisone acetate	Hydrocortistab <sup>®</sup>	25 mg/ml	1 ml ampoules
Prednisolone acetate	Deltastab <sup>®</sup>	25 mg/ml	1 ml ampoules
Methylprednisolone acetate	Depo-medrone <sup>®*</sup>	40 mg/ml	1,2 & 3ml vials
Triamcinolone acetonide	Adcortyl <sup>®</sup>	10 mg/ml	1 ml ampoules, 5 ml vials
Triamcinolone acetonide	Kenalog <sup>®</sup>	40 mg/ml	1 ml vials **
Triamcinolone hexacetonide	Lederspan <sup>®</sup>	20 mg/ml	1 ml & 5 ml vials
Betamethasone sodium phosphate	Betnesol <sup>®</sup>	4 mg/ml	1 ml ampoules
Dexamethasone sodium phosphate	Organon <sup>®</sup>	5 mg/ml	2 ml vials & 1 ml ampoules
Dexamethasone sodium phosphate	Decadron <sup>®</sup>	4 mg/ml ***	2 ml vials

\* also available as a combined preparation with lidocaine, containing methylprednisolone 4% and lidocaine 1% in 1 or 2 ml vials

\*\* also available in 1 and 2 ml pre-filled syringes, although these are mainly intended for systemic administration by deep intra-muscular injection, rather than intralesional use

\*\*\* the quoted dose is actually expressed as the equivalent dose of dexamthasone phosphate

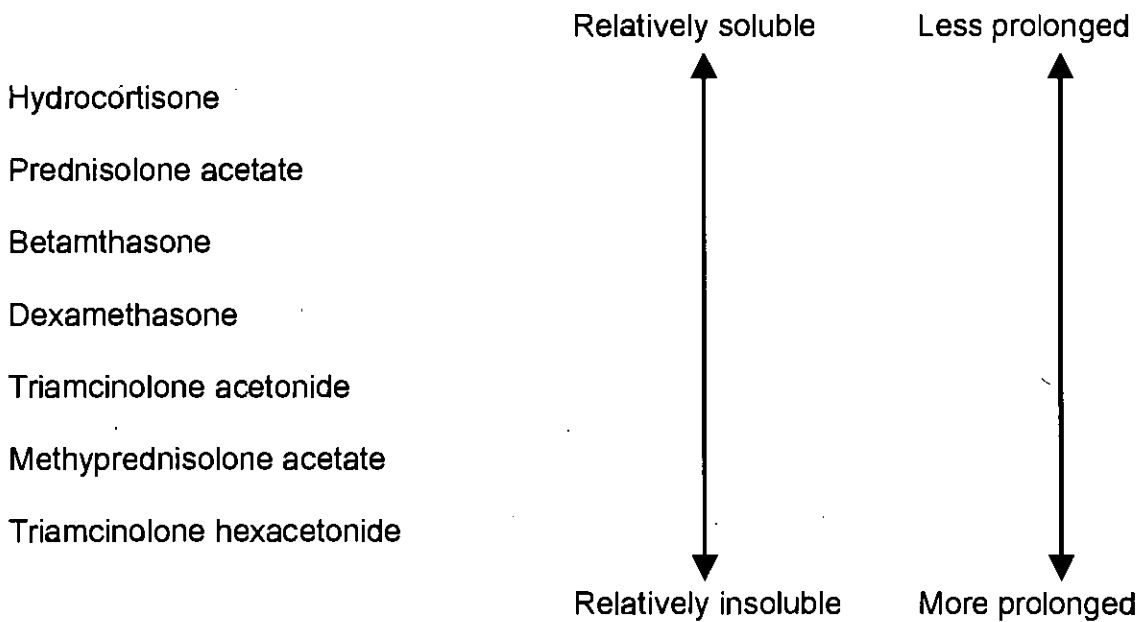
**B: Relative potency**

This is expressed in terms of hydrocortisone as the standard, administered systemically, which is said to have a relative potency of 1:

Corticosteroid	Relative potency
Hydrocortisone	1

Prednisolone	4
Methylprednisolone	5
Triamcinolone	5
Betamethasone	30
Dexamethasone	30

**B: Duration of action of the corticosteroids**



Corticosteroids are categorized according to their duration of action, which varies inversely with the solubility of the drug in water. Preparations such as Dexamethasone and Betamethasone have relatively more potent anti-inflammatory effects compared to the shorter acting preparations, such as Hydrocortisone, and equivalent doses will therefore vary. For example, 20 mg of Hydrocortisone is equivalent to 4 mg of Triamcinolone, 5 mg Prednisolone and 0.75 mg of Dexamethasone (Kerlan and Glousman, 1989; Nelson, et al, 1995, BNF, 2000). The medium acting preparations, such as triamcinolone, fall into the middle range in terms of relative anti-inflammatory potency and equivalent dose. Hydrocortisone acetate is weak, relatively soluble and is usually absorbed within 36 hours. Synthetic corticosteroids are more potent and less soluble and their anti-inflammatory effects are therefore more prolonged. Precise data on the duration of action is scant, but after peri-articular injection, methylprednisolone

acetate remains in the plasma for a mean of 16 days, triamcinolone hexacetonide takes 14-21 days to be absorbed from a joint and triamcinolone acetonide takes slightly less time (Cameron, 1995, *Drugs and Therapeutic Bulletin*, 1995). The duration of action of corticosteroids, once absorbed, is described by the 'plasma half life' of the drug ( $t_{1/2}$  i.e. the time taken for the plasma concentration to fall by 50% (see Chapter 1).

The corticosteroid used as an example throughout the regional techniques in this book is triamcinolone acetonide (for other drugs and information see page 000 and refer to current manufacturer's data sheets). The recommended dosage given in the regional section is intended as a guideline and is a conservative estimate. It is recommended that the clinician who judges that an injection of corticosteroid is the treatment of choice, makes a decision on dosage in line with the guidelines, but also takes into account the severity of the patient's condition, the relative size of the area to be injected and any response to previous injection.

Fig 3.1 Dose/volume for Adcortyl®

Fig 3.2 Dose/volume for Kenalog®

In order to provide immediate pain relief and to allow confirmation of accurate diagnosis and appropriate treatment, the chosen corticosteroid is injected together with a local anaesthetic agent (Nelson et al, 1995; Saunders and Cameron, 1997; Kesson and Atkins, 1998). Lidocaine is generally the local anaesthetic of choice (see page 000).

### **B: Side effects and complications of injected corticosteroids**

Side effects and complications of corticosteroids are generally related to large doses and/or prolonged systemic use. Systemic side effects of a 'one-off' injection of corticosteroid are rare, but can occur. The potential benefits from the prudent use of local corticosteroid injections outweigh their adverse effects (Cooper and Kirwan, 1990). Kumar and Newman (1999) conducted a prospective study to investigate the possible complications associated with intra- and peri-articular steroid injections and found the procedure to be safe with a very low complication rate, if performed while taking adequate precautions. In the section below, the more common side effects associated with local injection of corticosteroid are listed first, followed by the side effects most often associated with systemic use.

### **C: Post injection flare**

This is a self limiting side effect occurring 6 to 12 hours after injection, once the local anaesthetic effect has worn off, and resolving in less than 72 hours. It is an acute inflammatory reaction considered to be associated with the precipitation of steroid crystals due to the paraben preservatives in the local anaesthetic. The induced synovitis in a joint causes typical symptoms of acute inflammation i.e.



pain, redness, heat and swelling, and similar effects can be induced in a soft tissue injection such as tennis elbow. A full explanation of the possible side effects should be given and the patient advised to take appropriate measures to reduce the inflammation, such as rest, ice and non-steroidal anti-inflammatory drugs, or simple analgesics. The symptoms may resemble a septic arthritis and if these symptoms do not abate in the expected time, appropriate action should be taken for this more serious complication (see Chapter 2, page 000) (Stefanich, 1986; Grillet and Dequeker, 1990; Mezanec, 1995; Swain and Kaplan, 1995).

### **C: Local soft tissue atrophy and pigmentary changes**

Fat atrophy (lipotrophy), skin atrophy, senile purpura (which occurs more commonly with long term systemic use of corticosteroids) and depigmentation have all been documented. These changes occur more readily with the longer acting, less soluble drugs such as the triamcinolone preparations and/or through repeated injection into the same site. Causes have also been associated with misplaced injections i.e. an injection given subcutaneously before the target tissue is reached and/or as a result of leakage of the solution back along the needle track. The changes are more likely to occur with superficial soft tissue injections such as tennis and golfer's elbow and can appear at the site six weeks to three months after the injection. (Ponec et al, 1977; Marks et al, 1983; Cooper and Kirwan, 1990; Grillet and Dequeker, 1990; Pfenninger, 1991; Swain and Kaplan, 1995). Due to the possible unsightly cosmetic appearance, this potential complication should be discussed with the patient before the injection is performed.

### **C: Connective tissue (tendon) weakening**

A recognised effect of corticosteroid drugs is a change in the mechanical properties of connective tissue structures resulting in a loss of tensile strength due to reduced production of collagen and glycosaminoglycans. Following injection, the loss of tensile strength can last for up to two weeks and this highlights the importance of specific advice on relative rest following injection. Tendons in particular have a relatively poor blood supply and are prone to degeneration. Some are notoriously susceptible to rupture e.g. Achilles tendon, rotator cuff tendons, the long head of biceps and abductor pollicis longus and extensor pollicis brevis in their shared synovial sheath. It is difficult to find conclusive evidence that corticosteroid injection is directly responsible for tendon rupture, or whether the rupture is due to the degenerative disease process. (Kennedy and Baxter Willis, 1976; Kleinman and Gross, 1983; Mahler and Fritschy, 1992; Read and Motto, 1992).

Measures can be taken to minimise the risk of rupture following corticosteroid injection. Advice on relative rest for up to two weeks is important, accurate diagnosis and treatment should avoid the necessity for repeated injections and attention should be paid to technique itself.

The injection should NEVER be delivered directly into the body of the tendon and this is particularly important for weight-bearing tendons and those susceptible to rupture (see above). Bathing the tendon with the corticosteroid solution (see Achilles tendon page 000) or introducing the solution between a tendon and its sheath (see de Quervains page 000) avoids direct injection into the tendon.

The lesion commonly lies at the teno-osseous junction, where a peppering technique is used. Droplets of corticosteroid solution are delivered at the tendon-bone interface covering the whole area of the lesion and avoiding delivery en masse into one small area (see tennis elbow page 000).

Notification of tendon damage associated with quinolone antibiotics e.g. Ciproxin was delivered from the Committee on Safety of Medicines (1995). Inflammation and rupture of tendons is a rare complication of this association, but the elderly and those treated concurrently with corticosteroids are considered to be at risk.

### **C: Steroid arthropathy**

Although steroid arthropathy is a recognised side effect of repeated corticosteroid injections, particularly into weight-bearing joints, the evidence is inconclusive and based mainly on subprimate animal studies (mainly rabbits) and anecdotal case reports. Repeated intra-articular injections are thought to produce a Charcot\*-type arthropathy with destructive changes in the articular cartilage, although these changes are also seen with the natural progression of the underlying degenerative disease. Possible mechanisms for the development of steroid arthropathy include joint abuse following corticosteroid mediated analgesia, with a direct effect on the articular cartilage and ischaemic necrosis. (Stefanich, 1986; Cooper and Kirwan, 1990; Cameron 1995; Mazanec, 1995; Millard and Dillingham 1995). To minimise risk of steroid arthropathy, weight-bearing joints should not be injected more frequently than every 4-6 months.

Foot note \* A Charcot joint is a neurogenic joint where the joint is denervated by some disease process and suffers chronic damage as a result.

### **C: Iatrogenic (clinician induced) septic arthritis**

This is a rare, but avoidable, complication of corticosteroid injection occurring in 0.0001% of patients injected. The organism is typically *Staphylococcus aureus* and the route of infection may be contamination of the injected materials, penetration by skin organisms, haematogenous spread, infection such as respiratory or urogenital tract or re-activation of previous infection. (Grillet and Dequeker, 1990; Haslock et al, 1995; Hughes, 1996; Coombs and Bax 1996).

The joint becomes red, hot, swollen and painful, but the anti-inflammatory and immunosuppressive properties of the injected corticosteroid may mask the condition and make it difficult to distinguish from a post injection flare. If symptoms linger after the expected time for post injection flare (48-72 hours)

1. The first part of the document discusses the importance of maintaining accurate records for all transactions. It emphasizes that proper record-keeping is essential for financial transparency and accountability. This section also outlines the various methods used to collect and analyze data, ensuring that the information is reliable and up-to-date.

2. The second part of the document focuses on the implementation of these practices across different departments. It provides detailed instructions on how to integrate these procedures into existing workflows, ensuring that all staff members are aware of their responsibilities and the importance of following the guidelines. This section also addresses any potential challenges that may arise during the implementation process and offers solutions to overcome them.

3. The third part of the document discusses the ongoing monitoring and evaluation of the implemented practices. It highlights the need for regular audits and reviews to ensure that the procedures are being followed correctly and that the data remains accurate. This section also provides information on how to report any issues or concerns to the appropriate authorities.

4. The final part of the document concludes with a summary of the key findings and recommendations. It reiterates the importance of maintaining accurate records and following the established procedures to ensure the highest level of financial integrity and transparency. The document also provides contact information for any further inquiries or assistance.

sepsis should be suspected and treated accordingly. Corticosteroid injection into an already septic joint is contra-indicated, as it will aggravate the condition. If sepsis is suspected, aspiration of a swollen joint should be conducted to eliminate the presence of infection (see Chapter 2, page 000).

**Clinical tip:** The complication of septic arthritis can be avoided by screening for current or previous infections, avoiding injection in the presence of skin sepsis and by using a 'no touch' technique.

### **C: Suppression of the response to infection or injury**

The anti-inflammatory and immunosuppressive effects of corticosteroids affect the normal response to infection and injury, suppressing clinical signs. Wound healing is also impaired and this would have implications for patients undergoing surgery soon after corticosteroid injection. Steroid warning cards held by patients on long term corticosteroid therapy include advice on avoiding contact with infectious disease, particularly chickenpox or shingles (BNF, 2000).

### **C: Facial flushing**

Systemic absorption of corticosteroid may cause this benign, transient complication, occurring more readily with triamcinolone preparations in approximately one in 20 patients. Facial flushing can occur within a few minutes of the injection and last for a few hours or up to one or two days. (Neustadt, 1991; Nelson et al, 1995; BNF, 2000).

### **C: Menstrual disturbance**

With larger injected doses (e.g. in excess of 40 mg of triamcinolone acetonide) systemic absorption may cause menstrual irregularities and amenorrhoea (ABPI Compendium of Data Sheets and Summaries of Product Characteristics 1999-2000; Saunders and Cameron, 1997; Kesson and Atkins, 1998).

### **C: Hyperglycaemia**

Systemic absorption of the injected corticosteroid may produce a transient increase in blood glucose levels in diabetic patients (Mazanec, 1995).

### **C: Suppression of the hypothalamic-pituitary-adrenal axis (HPA axis)**

Adrenal function is regulated through the HPA axis and suppression of this mechanism reduces the production of endogenous cortisol. Although a more recognised side effect of long term oral intake of corticosteroids, a single local corticosteroid injection can suppress the HPA axis for two to four days (Cooper and Kirwan, 1990; Mazanec, 1995; Nelson et al, 1995; BNF, 2000). In long term corticosteroid therapy withdrawal should be phased and patients should carry a warning card which indicates that the treatment should not be stopped abruptly.

### **C: Iatrogenic Cushing's syndrome**

Cushing's syndrome is associated with prolonged use of glucocorticoid therapy, rather than 'one-off' local injections. Alterations occur in fat distribution producing trunk obesity, 'buffalo (dowager's) hump'; moon face, muscle wasting and osteoporosis (Cooper and Kirwan, 1990, Rang et al, 1995).

### **C: Osteoporosis**

Osteoporosis is a recognised side effect of long term use of oral corticosteroid therapy and depends on the dosage, duration of the therapy and the disease for which the drugs were prescribed (Cooper and Kirwan, 1990; Mazanec, 1995). Theoretically, repeated corticosteroid injections could also produce this effect, but this is unlikely to be significant in musculoskeletal injection therapy.

### **C: Mood changes**

These are typically euphoria, but may be psychosis, agitation, depression and suicidal tendencies. The mood changes are reversible and more likely to occur in patients with pre-existing personality disorders (Cooper and Kirwan, 1990; BNF, 2000).

### **C: Anaphylaxis**

Mace et al (1997) document a rare case of anaphylactic shock after intra-articular injection of synthetic methylprednisolone acetate.

### **B: Drug interactions**

The following drug interactions have been noted from the ABPI Compendium of Data Sheets and Summaries of Product Characteristics 1999-2000:

#### **Corticosteroids:**

- Antagonise the effect of hypoglycaemic agents including insulin
- Antagonise the action of anti-hypertensive agents and diuretics
- Enhance the potassium lowering effect of acetazolamide (Diamox), loop diuretics (e.g. frusemide) and thiazides (e.g. bendrofluazide)

Certain drugs (e.g. barbiturates, carbamazepine etc) enhance the metabolic clearance of corticosteroids, but this is not likely to be significant in injection therapy.

### **A: Local anaesthetics**

Local anaesthetic drugs produce a moderate to long lasting, reversible nerve block. With a few exceptions (see carpal tunnel page 000) corticosteroid injections are delivered together with local anaesthetic in musculoskeletal injections for the following reasons:

- Therapeutic pain relief, to allow immediate re-assessment to confirm diagnosis
- To increase the volume effect of the injection in certain conditions e.g. bursitis

The first known local anaesthetic was cocaine, extracted from coca leaves and used clinically for corneal anaesthesia in 1884, but its toxic effects were found to be excessive. The synthetic substitute procaine was discovered in 1905 and several other compounds were later developed (Rang et al, 1995).

Chemically, local anaesthetics consist of an aromatic group linked by an ester or amide bond to a basic side-chain (Rang et al, 1995). The ester type, e.g. procaine, usually comprises generally less stable compounds, whilst the amide type e.g. lidocaine, bupivacaine, comprises generally more stable compounds which have a longer plasma half-life.

#### **B: Mechanism of action**

Local anaesthetics penetrate the nerve sheath and axon membrane and block initiation and propagation of the action potential by specifically plugging sodium channels (Rang et al, 1995). Conduction is blocked more easily in the small diameter nerve fibres producing a reversible local nerve block. Not all fibres are equally susceptible to their action as seen below:

- |   |                       |
|---|-----------------------|
| • Small, myelinated axons (A $\delta$ fibres) | most readily blocked  |
| • Non-myelinated axons (C fibres)             | ⇕                     |
| • Large myelinated axons (A $\beta$ fibres)   | least readily blocked |

Nociceptive and sympathetic conduction is blocked first, therefore, pain sensation is blocked more readily than other sensations such as touch and proprioception. Motor axons, which are large in diameter, are relatively resistant to the action of local anaesthetics but it is difficult to be totally selective to affect pain sensation only and a transient local paralysis may occur.

The potency, toxicity, duration of action, stability and solubility of local anaesthetic drugs vary considerably and those suitable for use in musculoskeletal injections will now be discussed.

#### **B: Local anaesthetics used in musculoskeletal injection techniques**

Generic name	Trade name	Dosage per ml	Presentation
Lidocaine hydrochloride 0.5%	Non-proprietary 0.5%*	5mg/ml	10ml ampoule
Lidocaine hydrochloride 1%	Non-proprietary 1%*	10mg/ml	2ml, 5ml, 10 ml, 20ml ampoules
Lidocaine hydrochloride 2%	Non-proprietary 2%*	20 mg/ml	2ml, 5ml ampoules
Lidocaine hydrochloride 0.5%	Xylocaine® 0.5% **	5mg/ml	20 ml vial
Lidocaine hydrochloride 1%	Xylocaine® 1%**	10mg/ml	20 ml vial
Lidocaine hydrochloride 2%	Xylocaine® 2%**	20 mg/ml	20 ml vial
Bupivacaine hydrochloride 0.25%	Marcaïn® 0.25%**	2.5 mg/ml	10 ml Polyamp®
Bupivacaine hydrochloride 0.5%	Marcaïn® 0.5%**	5 mg/ml	10 ml Polyamp®

\* BNF No 39 March 2000

\*\* ABPI Compendium of Data Sheets and Summaries of Product Characteristics 1999-2000

#### B: Relative potency and duration of action

Lidocaine	Bupivacaine
Rapid rate of onset	Slow rate of onset
Medium duration of action (plasma $t_{1/2}$ of 2 hours)	Long duration of action (plasma $t_{1/2}$ of 3 hours)
Maximum dose 200mg	Maximum dose 150 mg
Medium potency	Four times as potent as lidocaine (Scott, 1989)
Risk: convulsions occur before cardiac arrest and give warning of impending serious toxicity	Risk: irreversible cardiac arrest may occur without preceding convulsions

#### B: Maximum doses

The maximum doses recommended above are for infiltration, not via the intravenous route, and apply to a fit adult of average weight (BNF, 2000). Systemic toxicity is related to blood levels and these vary according to:

- Rate at which the drugs are absorbed and excreted
- Potency
- Patient's age, weight, physique, clinical condition
- Degree of vascularity of the area to be injected
- Duration of administration

Maximum arterial plasma concentrations occur within 10-25 minutes and for this reason, patients should be carefully monitored for signs of toxic side effects for up to 30 minutes after administration of local anaesthetics (BNF, 2000).

### Fig 3.3 Maximum doses

The maximum safe dose of lidocaine is possibly higher than the data sheet figure quoted which gives the recognised figures for the UK and Europe. In the USA the recommended maximum dose for lidocaine is 300mg (Scott, 1989; Palva et al, 1995).

#### **B: Local anaesthetics combined with adrenaline**

Some preparations are combined with adrenaline, which acts as a vasoconstrictor diminishing blood plasma levels and permitting a higher dose of local anaesthetic to be given (Scott, 1989; BNF, 2000). Although the effect of the local anaesthetic will be prolonged, possible additional complications include potential ischaemic damage, and the combined use of local anaesthetics with adrenaline is absolutely contra-indicated in the digits. Susceptibility to cardiac arrhythmias may also be increased.

#### **B: Side effects and complications of injected local anaesthetics**

Adhering to the maximum recommended doses (see above) should avoid serious side effects and complications of local anaesthetic drugs. Inadvertent intravenous injection is most likely to cause problems, and for this reason it is recommended that once the needle is judged to be within the target tissue, aspiration is conducted to ensure that there is no flow back of blood to indicate placement within a blood vessel. Central nervous system toxicity tends to occur more readily with the ester-type local anaesthetics e.g. procaine, than with the amide-type e.g. lidocaine, bupivacaine (Rang et al, 1995, BNF, 2000).

#### **C: Central nervous system effects**

Local anaesthetics initially cause stimulation of the central nervous system, which may be seen as:

- A feeling of inebriation and light headedness



- Restlessness and tremor
- Confusion
- Extreme agitation

Further increases of the drug leads to depression of the central nervous system, which may be seen as:

- Sedation
- Twitching
- Convulsions
- Respiratory depression which is potentially life threatening

**Clinical tip:** Since procaine is more likely to cause central side effects, it has been replaced by lidocaine as the local anaesthetic of choice for musculoskeletal injections.

#### **C: Cardiovascular effects**

These are mainly:

- Myocardial depression, which is due to the blocking of sodium channels in the cardiac muscle, reducing calcium stores and, in turn, reducing myocardial contraction, which could potentially lead to cardiac arrest. However, lidocaine is useful, in the appropriate clinical setting, for its antidysrhythmic effect
- Vasodilatation, which is due partly to the drug's effect on the vascular smooth muscle and partly to sympathetic inhibition
- Hypotension, as a result of myocardial depression and vasodilatation, can be sudden and life threatening

#### **C: Allergic reactions**

These are covered in greater detail in Chapter 2. The most common is an allergic dermatitis due to hypersensitivity. Rarely, an acute anaphylactic reaction can occur which is life threatening.

#### **B: Drug interactions**

Cimetidine (Tagamet®), an anti-ulcer drug, may delay the metabolism of lidocaine, but this is probably of little significance with the doses advocated (ABPI Compendium of Data Sheets and Summaries of Product Characteristics 1999-2000). A metabolite of procaine (para amino benzoic acid) inhibits the action of sulphonamide antibiotics, but this is not relevant in this text since musculoskeletal injections in the presence of infection are contra-indicated (Rang et al, 1995).

## Conclusion

This chapter has given an overview of the principal drugs used in musculoskeletal injections with note of their mechanism of action, effects, side effects and possible complications. The following chapter will provide general injection principles and will complete the theory section that underpins the application of injection therapy.

## 4 General injection principles

### Chapter summary

This chapter provides the general principles of injection therapy by firstly addressing the absolute and relative contra-indications for the administration of injections. A discussion of general and specific techniques follows, with a guidance for a 'no touch' technique and notes on follow up management and advice to be given to the patient to enhance effectiveness. Key points of record keeping are listed and a suggested treatment regime is presented. A flow chart for the clinical decision making process towards the administration of an injection concludes the section.

#### **A: Contra-indications**

The reader is referred to the Chartered Society of Physiotherapy (CSP) Clinical Guideline for the Use of Injection Therapy by Physiotherapists (1999), that provides evidence for the following absolute and relative contra-indications to musculoskeletal injections:

#### **B: Absolute contra-indications**

- Infection in the joint
- Local sepsis or any infective illness
- Hypersensitivity/allergy to steroid or local anaesthetic
- Adjacent osteomyelitis

#### **B: Relative contra-indications**

- Recent history of trauma
- Anticoagulant therapy
- Bleeding disorders
- Poorly controlled diabetes
- Prosthetic joint
- Haemarthrosis
- Psychogenic or anxious patient
- Concurrent oral corticosteroid therapy

The following should also be considered cautiously:

- Pregnancy, especially in the first trimester (Silver, 1999), but the final risk benefit decision should be left to the doctor
- Recent history of malignancy
- Children and adolescents, may have an effect on skeletal growth and maturity (Nelson et al, 1995)

Musculoskeletal injections should only be delivered following a full assessment of the patient taking into account the history (subjective examination) and examination (objective examination) which lead to clinical diagnosis. If injection is judged to be the treatment of choice, the procedure, including benefits and risks, should be fully explained to the patient in order to obtain informed consent. The wishes of a patient to decline injection should be respected. The legal age for consent is 16.

At the time of writing, physiotherapists do not have prescribing rights under the terms of the Medicines Act (1968). However, as a step in that direction, group protocols have been put into place in some areas that allow physiotherapists to prescribe named drugs without getting individual prescriptions from doctors. Injections conducted by physiotherapists should be with the agreement of the patient's doctor, who is responsible for prescribing the injectable drugs, but the physiotherapist remains responsible for administering the injection (CSP Clinical Guideline for the Use of Injection Therapy by Physiotherapists, 1999).

The equipment required for injection should be assembled and checked. The area to be injected should be prepared taking into account the precise location of the target tissue, route of access to the lesion, avoidance of vulnerable structures such as nerves and blood vessels, and patient and operator comfort. The choice of needle will depend on the location and size of the target tissue, but in general terms this should be the finest needle that will reach the full extent of the lesion. The choice of syringe will depend on the volume of the injection to be delivered.

The dose to be administered will depend on the nature and size of the lesion, the severity of the condition and any response to previous injection. The reader is recommended to use the example doses from the regional section, which are intended as a guide and tend towards the conservative.

Using triamcinolone acetonide as an example of an injectable corticosteroid:

Adcortyl 10 mg/ml  
Kenalog 40 mg/ml

and lidocaine 1% as an example local anaesthetic

Structure	Corticosteroid dose	Corticosteroid volume	Local anaesthetic volume	Total volume
Small tendons E.g. tennis elbow	10 mg	0.25 ml Kenalog	0.75 ml 1% lidocaine	1 ml
Large tendons E.g. adductor longus	20 mg	0.5 ml Kenalog	1 ml 1% lidocaine	1.5 ml
Small joints E.g. acromioclavicular	5-10 mg	0.25 ml Kenalog	0.25 ml 1% lidocaine	0.5ml

Large joints E.g. hip	Up to 40 mg	4 ml Adcortyl	1 ml 1% lidocaine	5 ml
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The following guidance for a no touch technique is suggested to minimise the risk of infection:

**A:** Guidance suggested for a 'no touch' technique for musculoskeletal injections:

- Any previous allergic reaction to injections should be noted, since this will contra-indicate continuing with the procedure
- Check the drugs to be used, choose an appropriate sized needle and syringe. Note the expiry dates on the containers, needles and syringes
- Consider the precise location of the anatomical structure to be injected and the possible route of access to the lesion. Position the patient with the lesion and injection site accessible, bearing in mind the patient comfort and that of the operator
- Mark the injection site e.g. with the end of the needle sheath, retracted end of a ballpoint pen or fingernail or skin marker pen
- Wash and dry hands preferably with surgical scrub or antiseptic soap
- Clean the skin over the injection site with a suitable antiseptic e.g. chlorhexidine 0.5% in spirit or Mediswab™ (Cawley and Morris, 1992). Draw up the drug using single dose containers wherever possible
- Disposable needles are inexpensive, therefore change the needle after drawing up the drug, in case of contamination
- Deliver the injection using a 'no touch' technique. Neither the prepared injection site nor the needle should be touched. If withdrawing the needle to change to a different entry site, the needle should again be changed before the second insertion (e.g. injection of the Achilles tendon page 000)
- Once the needle is judged to be within the target tissue, aspiration should be carried out to ensure that it is not placed within a blood vessel
- Once the needle has been withdrawn, dispose of it and the syringe safely (see Chapter 2)
- Apply a suitable dressing, e.g. sticking plaster, having ensured that the patient is not allergic to such materials

An accurate knowledge of anatomy is vital. Needle entry should be made quickly through the skin using appropriate anatomical landmarks and guidelines to aim towards the target tissue (see Section 2).

The sensation of resistance imparted as the needle passes through the different tissues varies and allows the clinician to judge where the needle is placed. Injections should never be given directly into the body of a tendon, which will be felt as a fairly solid resistance. At the teno-osseous junction where the solution is delivered at the bone-tendon interface, the bony sensation will be appreciated. It is important to be gentle as the needle point contacts bone, as this can be painful

for the patient. Injection into a tendon sheath (tenosynovitis) should have a sensation of little or no resistance and the sheath may be seen to fill and swell slightly. Injection into a joint capsule or bursa will be experienced as a loss of resistance to the needle, indicating placement in a space. The patient may be aware of the needle reaching the target tissue and report a provocation of their symptoms. For nerve entrapment syndromes (e.g. carpal tunnel) the solution is delivered to bathe the inflamed nerve. Any reports of paraesthesia indicate that the needle is in the nerve and must be immediately withdrawn.

Once the needle is judged to be in the target tissue, the plunger should be drawn back slightly to check that placement is not within a blood vessel. If there is a back flow of blood, the needle should be withdrawn and firm pressure applied to the area before repositioning the needle and checking again before injecting.

A joint injection should be checked for the presence of infection. Once in situ, the plunger should be drawn back slightly and the fluid drawn into the syringe inspected. If this is a clear, straw coloured solution it is normal, and the injection can proceed. If the withdrawn fluid is opalescent or cloudy, this indicates possible infection and the injection of corticosteroid should not proceed. Doctors may wish to aspirate the joint and send the fluid for culture. Physiotherapists should refer the patient back to the Doctor.

#### **A: Injection technique**

Accurate delivery to the target tissue is important to prevent soft tissue changes and subcutaneous leakage. The technique used to deliver the injection will depend on the structure:

#### **B: Peppering technique**

This is a technique used to inject at the teno-osseous junction. The aim is to deliver small droplets of corticosteroid solution over the whole extent of the lesion. These are delivered at the tendon-bone junction. The hard sensation of bone is experienced and the needle is withdrawn very slightly from the bone to deliver each droplet. This ensures that the droplets of solution are evenly distributed throughout the lesion, rather than a concentrated bolus at one location. The body of the tendon itself should not be injected.

#### **B: Bolus technique**

This technique is used to inject bursae, joints, tendon sheaths and other areas such as the carpal tunnel. The aim is to deliver the corticosteroid solution as a whole, with one continuous squeeze of the plunger, into the bursal or joint space, where there should be no resistance to the needle.

#### **A: Subsequent management**

Once the injection has been delivered, the patient may rest for a few minutes before the positive objective findings are re-assessed. The use of local anaesthetic should temporarily abolish symptoms which allows the clinician to check diagnosis and accurate needle placement. Ideally, the patient should be kept under further observation for up to 30 minutes after the injection to monitor for any adverse reaction, particularly anaphylaxis (see Chapter 3) (CSP Clinical Guideline for the Use of Injection Therapy by Physiotherapists, 1999; BNF, 2000).

The patient should be instructed in the self-management of their condition. Relative rest from causative and aggravating factors is advised for up to two weeks following injection. The injection may form part of a rehabilitation programme and appropriate physiotherapy may be required once the injection has had its effects. The cause of overuse lesions must be established to prevent recurrence.

The patient should be reviewed between one and two weeks after the injection. The injection can be repeated if the patient is partially improved, but not if the first injection failed to benefit the condition. It is recommended that no more than two corticosteroid injections be given into one structure per annum, except for the glenohumeral joint where a maximum of three injections may be necessary for the treatment of traumatic arthritis (frozen shoulder). Due to the risk of steroid arthropathy (see Chapter 3), weight-bearing joints should not be injected more frequently than every 4-6 months.

As mentioned previously in Chapter 3, it is important to highlight the recommendation that if two structures require injection in one treatment session, the total dose of corticosteroid should not exceed 60 mg of triamcinolone acetonide (or the equivalent for other corticosteroid drugs). If a dose exceeding 40 mg steroid is given, it may be advisable to issue a steroid card to the patient. In order to keep within the safety margins for local anaesthetic, it is recommended that no more than 5 ml of 1% lidocaine or 15 ml of 0.5% lidocaine be given on one occasion. These figures are well below the maximum recommended doses and deliberately err on the side of caution, whilst permitting effective treatment.

#### **A: Record keeping**

Detailed clinical records should always be maintained whatever the treatment of choice for the patient. When considering the use of a musculoskeletal injection, questions relating to the following need particular consideration:

- Details of current medications, particularly anticoagulants, insulin or oral diabetic medication
- Any significant medical conditions which may contra-indicate the injection, produce specific side effects or lead to the possibility of drug interactions

- Past allergic reactions particularly those relating to corticosteroids, local anaesthetics (e.g. following dental procedures) or sticking plaster
- Past history of previous problems with joint or soft tissue injections. Recent or recurrent infections e.g. tuberculosis

The injection site should be examined for evidence of local infection e.g. boils. Any such infection should be noted in the records and would constitute a contra-indication to injection.

The details of the drugs used should be noted:

- Prescribing doctor
- Name of the drug
- Strength of the solution if relevant (e.g. lidocaine 0.5% or 1%)
- Dose given
- Manufacturer\*
- Batch number\*
- Expiry date

\*This information is relevant if problems arise from a defective preparation in which case the manufacturer will be liable. Without this information, liability remains with the prescriber and injector.

Any post injection advice to the patient should be noted and the date for follow up recorded. At the follow up appointment, findings on re-assessment should be noted. In particular any adverse reaction reported or observed should be recorded and physiotherapists should inform the patient's doctor.

The general principles to be applied in the application of injection therapy are summarised in the following suggested treatment regime:

#### **A: Suggested treatment regime**

1. Take a full history and perform a physical examination of the patient to reach a clinical diagnosis and to be able to formulate a treatment plan.
2. Discuss the possible alternative treatment choices with the patient.
3. Explain the procedure fully to the patient, including any risk and obtain informed consent (Gilberthorpe, 1996). Allow the patient time to consider the injection so that consent can be freely given; the legal age for consent is 16.
4. If injection is the treatment of choice, the physiotherapist should liaise with the patient's doctor to discuss the prescription for the drugs (at the time of writing the introduction of prescription rights for physiotherapists is under discussion).
5. Prepare for the injection procedure; with strict adherence to the no touch technique described above.
6. Deliver the injection.

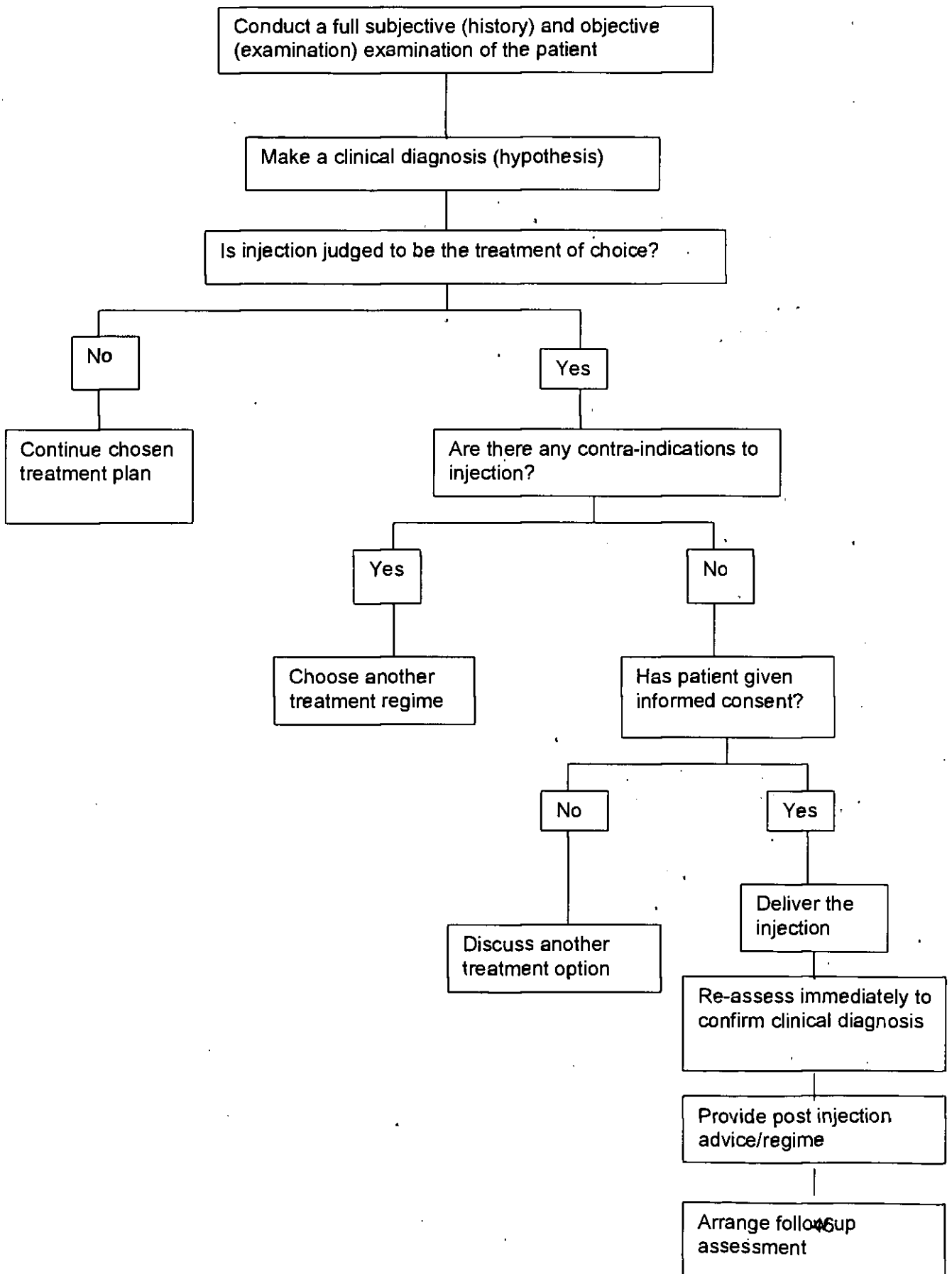


7. Re-assess the patient where appropriate, approximately five minutes after the injection, using the positive findings on examination to assess the successful placement of the injection.
8. Give advice on suitable relative rest and rehabilitation.
9. It is recommended that the patient should be asked to remain at the surgery/practice for 30 minutes following the injection (see Chapter 3, page 36)
10. Make a follow-up appointment.
11. Complete the patient's medical records.

## Conclusion

This chapter has concluded Section 1 by presenting an overview of the general principles of administering musculoskeletal injections. Guidance for a 'no touch' technique has been included to minimise the risk of infection and the key points of record keeping and a suggested treatment regime draws the principles for the application of an injection together. The clinical decision making process to be applied in making the decision to inject is presented as a flow chart (Fig 4.1), that guides the operator through by steps to the stage of administration of the injection, and beyond, to the advice on management to be given to the patient and the subsequent reassessment of treatment outcomes. Section 2, following, will provide information and suggestions for the application of specific injection techniques and will build on the theory developed within this and the preceding chapters.

### The clinical decision making process



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**SECTION 2 Practice of musculoskeletal injections - regional injection techniques**



## Introduction to Section 2

This section presents intra-articular and intralesional injection techniques for peripheral musculoskeletal lesions encountered within clinical practice. A regional approach is adopted, with the injections being categorised into those of the shoulder, elbow, wrist and hand, hip, knee, ankle and foot. For clarity, each of the injections described will be presented in a consistent format detailing indications, presentation, needle size, dosage, patient position, palpation of the site, technique of the injection and aftercare advice for the patient. The injection dosages are given as guidelines throughout, and the reader is encouraged to adapt and develop those suggested on the basis of clinical experience. Preparation of the skin for injection and the guidance suggested for a 'no touch' technique can be found in Section 1, Chapter 4.

Patient presentation of the various conditions is detailed according to an examination procedure using selective tension, devised by Dr James Cyriax (Cyriax and Cyriax, 1983; Cyriax, 1984; Kesson and Atkins, 1998). Lesions are described as capsular, in which the specific range of limited movement indicates an arthritis in the joint, non-capsular which may indicate a bursitis or ligamentous lesion, or contractile indicating tendinitis or muscle belly where pain is reproduced on the appropriate resisted testing.

Throughout this section, triamcinolone acetonide is used as an example of an injectable steroid, but an equivalent dose of any other corticosteroid preparation may be substituted. The longer acting corticosteroid preparations have relatively more potent anti-inflammatory properties compared to the shorter acting preparations and for this reason equivalent doses will vary, e.g. 4 mg Triamcinolone is equivalent to 20 mg Hydrocortisone, 5 mg Prednisolone and 0.75 mg of Dexamethasone, see Chapter 3, or refer to the relevant manufacturer's data sheet for further information (Kerlan and Glousman, 1989; Nelson, et al, 1995, BNF, 2000). Accuracy in the initial diagnosis and in needle placement is paramount and the tips for palpation and technique aim to facilitate and ensure the effectiveness of the injection.

## 5. The shoulder

### A: Glenohumeral Joint

#### B: Indication

Capsulitis or 'frozen shoulder'. This may present as either primary or secondary frozen shoulder. Primary or idiopathic frozen shoulder is sometimes known as steroid sensitive or monarticular rheumatoid arthritis (Cyriax and Cyriax, 1983; Cyriax, 1984) and occurs without obvious causative trauma. The more common secondary frozen shoulder may be a progression from traumatic arthritis, or may be associated with other lesions including cervical spine disorders, thoracic immobility, surgery, neurological disease or systemic disease, such as diabetes mellitus (Anton, 1993; Grubbs, 1993; Stam, 1994). Changes in anatomical structures closely related to the glenohumeral joint, e.g. the subdeltoid bursa, rotator cuff tendons or the long head of biceps, may have a secondary effect on the joint capsule (Kesson and Atkins, 1998).

#### B: Patient presentation

The patient describes pain, gradually increasing over several weeks, which is usually felt in the deltoid region but may refer further into the area of the C5 dermatome (the anterolateral aspect of the arm and forearm as far as the base of the thumb), depending on the irritability of the condition. There is stiffness and loss of functional movement, and the patient may be unable to sleep on the affected side, also indicating a high level of irritability.

On examination, passive movements are limited in the capsular pattern, with a greater proportional loss of lateral rotation, less limitation of abduction and least limitation of medial rotation. The loss of medial rotation has the most functional significance for the patient and restricts such activities as reaching into the back pocket or doing up the bra. The overall limitation of passive movements reduces the range of active elevation and the restricted movements have an abnormal hard end-feel.

#### B: Treatment by injection

The aim of corticosteroid injection is to relieve inflammation and pain, allowing the range of functional movement to be restored. Cyriax and Cyriax (1983) and Cyriax (1984) suggested a course of corticosteroid injections given over increasing intervals. As a general rule one, two or a maximum of three injections may be needed for the symptoms to fully subside, depending on the irritability of the condition at assessment. Typical time intervals would be 10-14 days between the first and second injections and 3-4 weeks between the second and third, aiming to give the follow up injection before the effect of the previous one has completely worn off.

Dacre et al (1989) compared the use of local injection, physiotherapy or the combination of the two to treat painful, stiff shoulders. Their results suggested that injection of corticosteroid plus local anaesthetic is as effective and less expensive than physiotherapy alone, or a combination of both treatments. In a systematic review of the literature, Van der Heijden et al (1996), found scarce evidence in favour of the efficacy of corticosteroid injections for shoulder lesions, and the methods of most studies were deemed to be of poor quality.

Cameron (1995a) suggested that injections of corticosteroid are efficacious in treating frozen shoulder providing the patients selected fulfil the diagnostic criteria based on the Cyriax assessment and the patient presentation summarised above (for more detail see Kesson and Atkins, 1998).

**B: Needle size**

21Gx11/2 in (0.8x40mm) or 2 in (0.8x50mm) green needle

**B: Dose**

20-30 mg triamcinolone acetonide, 1 ml local anaesthetic  
e.g. 2-3 ml Adcortyl®, 1 ml 1% lidocaine

The evidence suggests that the corticosteroid is the most important component of the injection (Jacobs et al 1991). Some authorities advocate the use of much larger volumes of local anaesthetic to cause distension of the joint capsule (Gam et al, 1998). De Jong et al (1998) conducted a comparative study which showed that in the treatment of frozen shoulder, greater symptom relief was gained in a group of patients receiving 40 mg of triamcinolone acetonide, compared with a group receiving 10 mg.

**B: Patient position**

Place the patient in sitting or lying. A posterior approach is recommended. Rest the arm with the elbow in flexion across the front of the waist to position the shoulder into medial rotation, so opening out the posterior aspect of the joint.

**B: Palpation:**

Stand behind the patient and place the thumb of your 'non injecting' hand on the posterior angle of the acromion, with your index or middle finger placed anteriorly on the coracoid process. Mark a point approximately 1 cm below your thumb.

**B: Technique**

Insert the needle at the marked point and direct the needle forward aiming towards your finger placed on the coracoid process (Fig 5.1). Proceed steadily

through the different tissue layers and once you have felt either the needle piercing the slightly tougher joint capsule, or coming to rest against the 'sticky' articular surface of the humerus, deliver the injection as a bolus (Fig 5.2). If resistance is felt as the plunger is pressed, the needle tip may be within the articular cartilage. Withdraw slightly and continue with the injection.

**Clinical tip:** Note that the suprascapular artery and nerve pass through the suprascapular notch and posteriorly around the neck of the scapula. Avoid injecting into these structures by ensuring accuracy in palpation and the angle of needle entry.

**Alternative technique:** An anterior approach can be used. Position the patient in sitting or lying and palpate the coracoid process. Insert the needle below and lateral to the coracoid process aiming towards the glenohumeral joint. Deliver by a bolus technique when there is no resistance to the injection.

**Clinical tip:** Note that the axillary artery and brachial plexus lie medial to the coracoid process, deep to pectoralis minor, and the cephalic vein passes between the antero-medial border of deltoid and pectoralis major.

#### **B: Patient Advice**

The patient should be instructed to begin gentle mobilisation as early as pain relief allows. Injection, together with physiotherapeutic advice on an appropriate exercise regime, to include scapular stabilisation and normal movement patterns, is helpful. The loss of movement in the capsular pattern prevents normal scapulothoracic rhythm with the scapula moving abnormally early during glenohumeral movement.

#### **A: Subdeltoid bursa (synonymous with subacromial bursa)**

#### **B: Indication**

Chronic subdeltoid bursitis and acute subdeltoid bursitis. Chronic subdeltoid bursitis is an extremely common cause of pain at the shoulder, but it may present a challenge to diagnosis through the muddled picture presented on examination (Kesson & Atkins, 1998). The close anatomical relationship this bursa has with surrounding structures means that it is common for lesions such as bursitis, tendinitis and capsulitis to co-exist at the shoulder. Congenital abnormalities of the acromion or degenerative changes in the acromioclavicular joint may reduce the subacromial space and surgery may be an option if the bursitis is resistant to treatment.

Acute subdeltoid bursitis is a completely separate entity from the common chronic subdeltoid bursitis, and has a characteristic onset, which is described below.

#### **B: Patient presentation**

Chronic subdeltoid bursitis is generally due to repeated impingement of the bursa. The patient complains of a gradual onset of low-grade aching over the deltoid area with increased pain on reaching movements with the arm at shoulder height, such as putting on a coat or car seat belt. They may have trouble sleeping on that side and may find pushing down through the arm painful since this action increases impingement of the bursa under the coraco-acromial arch.

On examination a non-capsular pattern with a full range of active and passive movement is usually present. Full passive elevation may increase the symptoms, but the normal elastic end-feel exists. A painful arc may be present on active abduction indicating impingement of the inflamed bursa under the acromion. The application, or release, of resisted tests may compress the bursa and produce symptoms, hence the 'muddle' of signs mentioned above. A similar pattern of signs may be found with rotator cuff lesions, especially if more than one tendon is involved, for example, both supraspinatus and infraspinatus.

Acute subdeltoid bursitis is a rarer condition and typically presents with a rapid onset of severe pain over several hours, the pain gradually referring through the extent of the C5 dermatome (the antero-lateral aspect of the arm and forearm as far as the base of the thumb). Sleep is disturbed by the acute nature of the pain leaving the patient looking tired and unwell. Voluntary muscle spasm ensures that the patient holds the arm in an antalgic, pain avoiding, posture to avoid the severe twinges of pain that are experienced on active movement. Acute subdeltoid bursitis has a similar presentation to acute calcific tendinitis and it may be debated that both terms are describing the same underlying condition.

On examination the patient will tolerate very little movement, particularly towards abduction. The condition is usually self limiting with the severe pain decreasing in approximately 7-10 days, but the condition may not settle completely for up to six weeks.

#### **B: Treatment by injection**

The treatment for chronic subdeltoid bursitis is an injection of a large volume of low dose local anaesthetic with an appropriate amount of corticosteroid. However, this is unlikely to have a lasting effect in itself, unless the mechanisms by which the bursa becomes inflamed are addressed (see below).

In acute subdeltoid bursitis a smaller overall volume of fluid is delivered to the already swollen bursa. This may initially increase the symptoms before the anti-inflammatory effects of the corticosteroid lead to a reduction in the pain.

**B: Needle size**

21Gx1 1/2 in (0.8x40mm) green needle

**B: Dose**

**C: Chronic subdeltoid bursitis:**

20 mg triamcinolone acetonide, 5 ml local anaesthetic  
e.g. 2 ml Adcortyl®, 5 ml 0.5% or 1% lidocaine

**C: Acute subdeltoid bursitis:**

20 mg triamcinolone acetonide, 1 ml local anaesthetic  
e.g. 2 ml Adcortyl®, 1 ml 1% lidocaine

**B: Patient position**

Seat the patient with the arm resting pendant by the side.

**B: Palpation**

Palpate the lateral border of the acromion to locate the groove between the acromion and head of the humerus. The subdeltoid bursa caps the greater tuberosity and extends under the acromion as far as the acromioclavicular joint line; it is this subacromial portion of the bursa that you aim to inject. Mark a point approximately mid point of the acromion.

**B: Technique**

Insert the needle just below the mid point of the acromion angling it slightly upwards until it lies between the acromion and head of the humerus (Fig 5.3). Deliver the injection as a bolus when a loss of resistance is identified (Fig 5.4). In chronic bursitis, synovial folds and adhesions may prevent this bolus delivery and it may be necessary to deliver the injection by a horizontal peppering technique. Reproduction of the patient's pain as you inject is usually an indication of accuracy of positioning of the injection.

Alternative techniques: (1) A posterior approach: the needle is inserted just below the posterior angle of the acromion (the posterior 'eye' of the shoulder in acupuncture) and angled forward. (2) An anterior approach: the needle is

inserted under the anterior edge of the acromion, lateral to the acromioclavicular joint.

**B: Patient advice**

After the injection for either the chronic or acute conditions, the patient should be advised to rest from overuse activities. In the case of chronic subdeltoid bursitis, the cause of impingement should be identified. The restoration of normal muscle balance forces around the shoulder is important to normal movement and prevents excessive superior translation of the humerus, which is a key factor in the development of 'impingement syndrome'.

**A: Acromioclavicular joint**

**B: Indication**

Arthritis. Due to overuse or degeneration of the acromioclavicular joint, or strain following trauma.

**B: Patient presentation**

The patient complains of pain specifically localised to the acromioclavicular joint at the point of the shoulder. Usually the patient points to the pain with a single finger rather than using the whole hand.

On examination of the glenohumeral joint, there is a non-capsular pattern of movement with pain felt at the end of range of all passive movements i.e. passive elevation, medial and lateral rotation. Diagnosis is confirmed by a positive 'scarf test' i.e. pain on combined passive, horizontal flexion and adduction.

**B: Treatment by injection**

Injection may be successful in minor sprains of the acromioclavicular joint or arthritis (Jacob and Sallay, 1997). Dislocation or recurrent subluxation of the joint may require surgical intervention.

**B: Needle size**

23G x 1 in (0.6x25 mm) blue needle or 25G x 5/8 in (0.5 x 16 mm) orange needle

**B: Dose**

10 mg triamcinolone acetonide, 0.25 ml local anaesthetic  
e.g. 0.25 mg Kenalog®, 0.25 ml 1% lidocaine

**B: Patient position**

Place the patient in sitting or half lying.

**B: Palpation**

Palpate for the superior aspect of the acromioclavicular joint line which will lie approximately 1-2 cm medial to the lateral border of the acromion. The clavicle tends to override the acromion and a bump or step may be felt. Gentle superior/inferior movement of the clavicle may aid the localisation of the joint line.

**B: Technique**

Insert the needle, angled inferiorly and slightly medially, through the superior capsular ligament, and once in the joint deliver the injection as a bolus (Figs 5.5 and 5.6).

***Clinical tip:*** This joint can be difficult to inject because it may be narrowed due to degenerative changes and surrounding osteophytes. An articular disc dropping down into the joint space from the superior capsular ligament can also impede entry. Skill may be required in 'palpating' for the joint space with the needle, involving consideration for the angle of entry. The superior ligament can be injected using a peppering technique if entry into the joint is not possible.

***Alternative technique:*** An anterior approach can be used where the needle is inserted into the anterior "v" shaped notch between the clavicle and acromion, aiming backwards, in a horizontal line with the joint surfaces.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection.

**A: Rotator cuff tendons****B: Indication**

A contractile lesion at the shoulder may involve one of the rotator cuff tendons, supraspinatus, infraspinatus or subscapularis. The lesion can vary from simple strain to degeneration involving full or partial thickness tears. The cause is usually overuse resulting in cumulative microtrauma of the tendon. Fatigue and degeneration may then result in muscle imbalance and abnormal movement



patterns. The head of the humerus is no longer effectively depressed by the action of the rotator cuff muscles, resulting in abnormal superior translation and further trauma to the tendons through impingement.

#### **B: Patient presentation**

The patient describes pain of gradual onset with single traumatic incidents being possible, but less common. Pain is felt over the deltoid area of the shoulder and is increased by activity, particularly involving the use of the hands above shoulder level. Chronic, long term lesions can lead to involvement of the other closely related anatomical structures, i.e. the subdeltoid bursa and/or the joint capsule.

On examination, an uncomplicated tendinitis presents with pain on the appropriate resisted test and possibly pain on the opposite passive movement. However, the principal signs are:

- supraspinatus: pain on resisted abduction
- infraspinatus: pain on resisted lateral rotation
- subscapularis: pain on resisted medial rotation

Localising signs may exist which help to locate the exact site of the lesion. In the case of supraspinatus and infraspinatus, the presence of a painful arc incriminates the teno-osseous junction of the tendon. In subscapularis, a painful arc incriminates the upper fibres, and a positive 'scarf' test (combined, passive horizontal flexion and adduction of the shoulder) incriminates the lower fibres. Ultimately palpation of the identified structure will reveal the exact site of the lesion.

#### **B: Treatment by injection**

Injection of simple tendinitis can be curative provided that the exact site of the lesion is located. Establishing and eliminating the cause of the problem is also important. Complicated cases can be more resistant to treatment, especially if partial or full thickness tears exist, and the patient may require surgical investigation. Ultrasound scanning can be useful in identifying the exact pathology present. More chronic lesions may lead to secondary capsulitis, in which case the joint itself may require injection as described for capsulitis or 'frozen shoulder' above.

**Clinical tip:** Some authorities disagree with injecting individual rotator cuff tendons. Degenerative tears of these tendons are relatively common and there are some reported cases of tendon rupture following corticosteroid injection (see Kesson & Atkins, 1998, Chapter 3). An 'umbrella' injection under the acromion may effectively bathe these lesions, as described for the injection of subdeltoid bursitis (page 000).

**A: Supraspinatus**

**B: Needle size**

25G x 5/8 in (0.5x16 mm) orange needle or 23G x 1 in (0.6x25 mm) blue needle

**B: Dose**

10 mg triamcinolone acetonide, 0.75 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine

**B: Patient position**

Position the patient in sitting supported at an angle of approximately 45 degrees. Medially rotate the shoulder and extend the arm behind the back to expose the superior facet of the greater tuberosity, anteriorly.

**B: Palpation**

Supraspinatus inserts into the superior facet of the greater tuberosity. Palpate the anterior border of the acromion and the superior facet on the greater tuberosity. The tendon of supraspinatus runs forward between these two bony points and is approximately as wide as the patient's index finger. Locate the exact site of the lesion by palpation for tenderness along the tendon. Mark a point approximately mid point of the tender site.

**Clinical tip:** To locate supraspinatus and infraspinatus (see below), the greater tuberosity provides a useful bony landmark. The greater tuberosity lies in line with the lateral epicondyle at the elbow and this may be used as a point of reference if locating the greater tuberosity proves difficult.

**B: Technique**

Insert the needle perpendicular to the teno-osseous junction and deliver the injection by a peppering technique (Figs 5.7 and 5.8).

**A: Infraspinatus**

**B: Needle size**

23G x 1 in (0.6x25 mm) or 23G x 1 1/4 in (0.6x30 mm) blue needle or 21G x 1 1/2 in (0.8x40 mm) green needle

**B: Dose**

10 mg triamcinolone acetonide, 0.75 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine

**B: Patient position**

Place the patient into prone lying, propped up on the elbows; or side lying with the painful side uppermost. In both positions place the shoulder joint into adduction and lateral rotation to expose the middle facet of the greater tuberosity posteriorly.

**B: Palpation**

Infraspinatus inserts into the middle facet of the greater tuberosity. Palpate the posterior angle of the acromion and locate the greater tuberosity. The tendon of infraspinatus runs parallel to the spine of the scapula, inserting into the greater tuberosity just below the acromion. It is approximately two fingers wide. Locate the exact site of the lesion by palpating for tenderness along the tendon and mark this point.

**B: Technique**

Insert the needle perpendicular to the tendon and deliver the injection by a peppering technique, being sure to cover the whole extent of the lesion (Figs 5.9 and 5.10).

**A: Subscapularis**

**B: Needle size**

23G x 1 in (0.6x25 mm) or 23G x 1 1/4 in (0.6x30 mm), blue needle

**B: Dose**

10 mg triamcinolone acetonide, 0.75 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine

**B: Patient position**

Seat the patient with the arm in the anatomical position and supported on their lap.

**B: Palpation**

Subscapularis inserts into the lesser tuberosity and it is approximately three fingers wide, although the thin membranous tendon is not easy to feel. Palpate for the coracoid process and move laterally and slightly down, or identify the bicipital groove and move medially. Both methods will locate the lesser tuberosity. Locate the exact site of the lesion by palpation for tenderness along the tendon. Mark a point approximately mid point of the tender site.

**B: Technique**

Deliver the injection by a peppering technique being sure to cover the full extent of the lesion (Figs 5.11 and 5.12).

Injection of the rotator cuff tendons is just one treatment option and another is transverse friction massage by a physiotherapist. Whatever the choice of treatment, the cause of the overuse activity and/or reason for impingement must be addressed to prevent recurrence.

**B: Patient advice**

The patient should be instructed to rest from aggravating activities for a period of up to two weeks following the injection.

**A: Long head of biceps in the bicipital groove (intertubercular sulcus)**

**B: Indication**

Tenosynovitis, which may affect the tendon in the bicipital groove. The long head of biceps originates within the capsule of the glenohumeral joint and exits the joint behind the transverse humeral ligament taking with it an extension of synovial lining into the bicipital groove.

**B: Patient presentation**

Pain is felt in the anterior shoulder region usually associated with a history of overuse. On examination resisted elbow flexion and resisted supination reproduce the pain felt at the shoulder.

**B: Treatment by injection**

Tenosynovitis involves inflammation of the double layered synovial sheath rather than the tendon itself, and adhesions may form between the two layers of the sheath, interfering with function (Cyriax, 1982). An accurately placed injection of corticosteroid may be curative.

**B: Needle size**

23G x 1 in (0.6 x 25 mm) or 23G x 1 1/4 in (0.6 x 30 mm) blue needle

**B: Dose**

10 mg triamcinolone acetonide, 0.75 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine

**B: Patient position**

Position the patient in sitting with the arm supported in the anatomical position.

**B: Palpation**

In the anatomical position the bicipital groove faces forward, lying between the greater and lesser tuberosities of the humerus. If in doubt, locate the coracoid process, move down and laterally onto the lesser tuberosity. Lateral to this is the bicipital groove. Mark the area of tenderness, as located by palpation.

**B: Technique**

Insert the needle parallel and close to the bicipital groove approaching from above downwards (Fig 5.13). The injection is delivered as a bolus into the synovial sheath of the tendon, not into the body of the tendon (Fig 5.14).

**B: Patient advice**

Advise a period of relative rest from aggravating factors for a period of up to two weeks.

## 6. The elbow

### A: Elbow joint

### B: Indication

Arthritis at the elbow joint which may be degenerative, traumatic or inflammatory. Inflammatory arthritis, such as rheumatoid, is probably the most common condition to be injected.

### B: Patient presentation

Pain is felt over the elbow and, depending on the severity, may be referred into the forearm. If traumatic in origin the possibility of fracture will need to be excluded.

On examination there will be a capsular pattern of more limitation of flexion than extension, with the flexion having an abnormal hard end-feel. The superior radio-ulnar joint may be involved, since it shares a common capsule with the elbow joint proper. The capsular pattern at the superior radio-ulnar joint is pain felt at the end of range of both rotations.

### B: Treatment by injection

Despite the complicated anatomical structure of the elbow joint, a bolus injection via the radiohumeral articulation is the easiest intra-articular route. The corticosteroid injection will reduce pain and inflammation, allowing some recovery of the range of movement.

### B: Needle size

25G x 5/8 in (0.5x16 mm) orange needle for the lateral approach  
23G x 1 in (0.6 x 25 mm) or 23G x 1 1/4 in (0.6 x 30 mm) blue needle for the posterior approach

### B: Dose

20 mg triamcinolone acetonide, 1ml local anaesthetic  
e.g. 2ml Adcortyl®, 1ml 1% lidocaine

### B: Patient position

Seat the patient with the forearm supported into mid pronation with the elbow at approximately 45 degrees of flexion.

### B: Palpation

Palpate the head of the radius and locate the radiohumeral joint line on the posterolateral aspect. Mark a point at the approximate mid point of the joint line.

**B: Technique**

Insert the needle to lie between the head of the radius and the capitulum (Figs 6.1 and 6.2). Deliver the injection as a bolus.

Alternative technique: Position the patient with the elbow flexed to 70 degrees. Locate the depression between the olecranon and lateral epicondyle on the posterolateral aspect of the elbow joint. Direct the needle forward and slightly downward and deliver the injection as a bolus.

**B: Patient advice**

The patient should be advised to maintain a period of relative rest for approximately two weeks following the injection.

**A: Olecranon bursitis**

**B: Indication**

Olecranon bursitis (student's elbow). This is inflammation of the subcutaneous bursa which is positioned between the upper end of the posterior aspect of the ulna and the skin. Bursitis may be idiopathic, related to trauma, repetitive injury, gout or arthritis, such as rheumatoid (Kumar and Clark, 1994). Superficial bursitis such as this may have an infective origin since it is vulnerable to unrecognised perforating injuries. Diagnosis of this is important before proceeding with the injection.

**B: Patient presentation**

Pain is felt over the posterior aspect of the elbow and swelling is both visible and palpable.

On examination there are usually no clinical findings and the condition is diagnosed by the obvious swelling over the olecranon.

**B: Treatment by injection**

Injection can be curative, but aspiration to check for the presence of infection is important before proceeding. Clear aspirate is normal; cloudy aspirate indicates possible infection, but bacteriological confirmation may be required.

**B: Needle size**

21G x 1 1/2 in (0.8x40 mm) green needle

**B: Dose**

10 mg triamcinolone acetonide, 1ml local anaesthetic  
e.g. 1ml Adcortyl®, 1ml 1% lidocaine

**B: Patient position**

Seat the patient with the elbow supported in a degree of flexion.

**B: Palpation**

Palpate the obvious swollen bursa and mark a convenient point for inserting the needle.

**B: Technique**

Insert the needle into the bursa (Figs 6.3 and 6.4). Aspirate first to check for the presence of infection and if clear, the injection can be delivered as a bolus.

**B: Patient advice**

The patient should be advised to avoid further trauma to the bursa.

**A: Tennis elbow (lateral epicondylitis)****B: Indication**

Tennis elbow is strain of the wrist extensor muscles at their origin (enthesis) from the anterior aspect of the lateral epicondyle. The tendon most commonly involved is extensor carpi radialis brevis. Repeated gripping actions may produce traction of fibres at the common extensor origin leading to microtrauma and inflammation (Foley, 1993). Micro- and macroscopic tears lead to the development of fibrous scar tissue and contracture, eventually resulting in degenerative foci and calcification (Coonrad and Hooper, 1973; Emst, 1992; Gellman, 1992; Noteboom et al, 1994). Initial changes in the tendon would seem to be inflammatory and therefore true tendinitis. In chronic long term lesions the degenerative changes of tendinosis may be more pronounced making the condition more difficult to deal with. Early treatment, whatever the choice, may prevent the development of chronic lesions and ease pain (Hay et al, 1999).



**B: Patient presentation**

The patient complains of a gradual increase in pain on the lateral aspect of the elbow, which may radiate into the forearm and sometimes into the dorsum of the wrist and hand. Repeated gripping actions aggravate the symptoms and a twinge of pain is often experienced, when the grip will feel weak.

On examination, resisted wrist extension with the elbow extended provokes the symptoms. The exact site of the lesion is located by palpation.

**B: Treatment by injection**

There are several possible sites for the lesion, which will be determined by palpation. Involvement of the origin of the common extensor tendon, mainly extensor carpi radialis brevis at the anterior facet of the lateral epicondyle is the most common, and is the site that may best respond to injection. However, alternative treatment techniques will be discussed below.

Corticosteroid injection aims to reduce the inflammation and pain. Once pain is reduced, normal movement will encourage alignment of fibres and reduce scarring. Given that the condition can progress to being mainly degenerative, treatment, particularly by corticosteroid injection, would seem to be most efficacious in the early inflammatory phase where good results have been shown in the short term (Price et al, 1991; Haker and Lundeberg, 1993; Sölvebom et al, 1995; Assendelft et al, 1996; Verhaar et al, 1996).

Price et al (1991) reported a more rapid relief of pain and a reduced need for repeated injections with 10mg triamcinolone over 25mg hydrocortisone or lidocaine alone in the short term. Injection of 20 mg triamcinolone produced similar results to 10 mg with the higher dosage more likely to produce skin atrophy. The results of their study were not statistically significant.

**B: Needle size**

25G x 5/8 in (0.5x16 mm) orange needle

**B: Dose**

10 mg triamcinolone acetonide, 0.75 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine

**B: Patient position**

Seat the patient with the forearm supported in full supination, the elbow flexed to approximately 90 degrees. This positions the tendon to run directly forwards from the anterior facet of the lateral epicondyle.

#### **B: Palpation**

Palpate the lateral epicondyle of the humerus. Roll onto the anterior surface and palpate the insertion of the tendon, which should be tender, compared with the other side. Mark a point at the mid point of the tender site.

#### **B: Technique**

Insert the needle from an anterior direction, perpendicular to the facet, and deliver the injection by a peppering technique (Figs 6.5 and 6.6). Ensure that the injection is delivered to the target tissue and not superficially, which could lead to the complication of local soft tissue atrophy and/or pigmentary changes.

The teno-osseous junction is just one possible site of the lesion, albeit the most common (Cyriax, 1982; Cyriax and Cyriax, 1983). The other possible sites are the origin of extensor carpi radialis longus from the lower third of the lateral supracondylar ridge, the body of the tendon lying over the head of the radius and the muscle belly. All traditionally respond to physiotherapeutic measures. Techniques such as deep transverse friction massage and Mill's manipulation, electrotherapy and acupuncture, to name a few, are other possible treatment approaches for the common extensor origin site (Cyriax and Cyriax, 1983; Cyriax, 1984; Kesson and Atkins, 1998).

#### **B: Patient advice**

The patient should be advised to maintain a period of relative rest for approximately two weeks following the injection. Addressing the cause of the problem is probably the most important issue. Sporting advice may be appropriate in terms of looking at training regimes and grip size. Workstations may need adjusting and breaks from repetitive activities should be strongly encouraged. Counterforce braces (clasps, bandages or strapping) may be helpful.

**Clinical tip:** A branch of the radial nerve, the posterior interosseous nerve, passes between the two heads of the supinator muscle at the elbow. Entrapment of the nerve may be a factor in the resistant tennis elbow. Full assessment to address all causes is essential.

#### **A: Golfers elbow (medial epicondylitis)**

**B: Indication**

Golfer's elbow describes a strain of the wrist flexor muscles at their origin from the anterior aspect of the medial epicondyle. The aetiology and disease process is similar to that of tennis elbow (see page 000) although Golfer's elbow is not as commonly encountered. The principal site of the lesion is at the teno-osseous junction (enthesis) of the common flexor tendon but, less commonly, the lesion may be seen a little further distally in the musculotendinous junction.

**B: Patient presentation**

The patient complains of a gradual onset of medial elbow pain, often well localised to the medial epicondyle, although symptoms may be referred more distally. Onset is associated with overuse activities and the symptoms are provoked by use.

On examination resisted testing of the wrist flexors with the elbow placed in extension is positive, and palpation will locate the exact site of the lesion.

**B: Treatment by injection**

Like tennis elbow, early injection can be curative, but the reason for the onset must be determined and the aggravating actions avoided to prevent recurrence. It is the teno-osseous site which responds well to injection (Cyriax and Cyriax, 1983).

**B: Needle size**

25G x 5/8 in (0.5 x 16 mm) orange needle or 23G x 1 in (0.6 x 25 mm) blue needle

**B: Dose**

10 mg triamcinolone acetonide, 0.75 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine

**B: Patient position**

Place the patient in sitting with the elbow extended over a pillow and in supination.

**B: Palpation**

Palpate the medial epicondyle of the humerus and move round onto its anterior aspect to palpate the origin of the common flexor tendon, identifying the area of

maximum tenderness, compared with the other side. Mark a point approximately at the mid-point of the tender site.

**B: Technique**

Insert the needle perpendicular to the anterior facet of the medial epicondyle and deliver the injection by a peppering technique (Figs 6.7 and 6.8).

**Clinical tip:** The ulnar nerve lies posterior to the medial epicondyle of the humerus but the suggested approach should prevent injection into the nerve itself. Stahl and Kaufman (1997) describe an accidental injury to the ulnar nerve following injection for medial epicondylitis in a patient with undetected recurrent dislocation of the ulnar nerve.

**B: Patient advice**

The patient is advised to rest from aggravating factors for up to two weeks. As with tennis elbow, it is most important to address the cause of the lesion. The teno-osseous junction (enthesis) is one site for Golfer's elbow, and physiotherapeutic modalities such as deep friction massage and electrotherapy are alternative techniques for treating this lesion. A lesion may exist at the musculotendinous junction, but this traditionally responds to physiotherapeutic modalities alone e.g. transverse friction massage (Cyriax and Cyriax, 1983; Cyriax, 1984; Kesson and Atkins, 1998).

**A: Biceps tendon insertion at the radial tuberosity**

**B: Indication**

Strain at the insertion of the biceps tendon at the radial tuberosity. This usually arises from overuse and may be difficult to differentially diagnose from inflammation of the subtendinous bursa at this site.

**B: Patient presentation**

The patient complains of pain localised to the elbow.

On examination of the elbow joint, resisted elbow flexion and resisted supination reproduce the patient's pain. Involvement of the subtendinous bursa may be indicated by a muddle of signs e.g. pain on resisted elbow flexion, passive elbow extension and passive pronation, all of which squeeze the inflamed bursa.

**B: Treatment by injection**

Since a lesion in either the tendon or the bursa lies deeply, injection of corticosteroid is the treatment of choice.

**B: Needle size**

23G x 1 in (0.6 x 25 mm) blue needle

**B: Dose**

10 mg triamcinolone acetonide, 0.75 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine

**B: Patient position**

Position the patient in prone lying with the arm at the side resting in the anatomical position. Fix the humerus to avoid changing the position of the glenohumeral joint and carefully pronate the extended forearm. This rotates the forearm to bring the radial tuberosity to lie posteriorly.

**B: Palpation**

Locate the radial tuberosity, which is lying between the radius and ulna approximately 2 cm distal to the radiohumeral joint line. Mark the principal point of tenderness.

**B: Technique**

Insert the needle between the radius and ulna, at the point of maximum tenderness, until the resistance of the tendinous insertion is felt (Figs 6.9 and 6.10). Deliver the injection by a peppering technique to cover both the insertion of the tendon and the subtendinous bursa.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection. As with all overuse lesions, eliminating the causative factors will prevent recurrence.

## 7. The wrist and hand

### **A:** Inferior (distal) radio-ulnar joint

### **B:** Indication

Arthritis. This joint is most commonly affected by rheumatoid arthritis, although degenerative and traumatic arthritis may also cause symptoms.

### **B:** Patient presentation

The patient complains of pain felt in the lower forearm.

On examination a capsular pattern is present, with pain reproduced at the end of both extremes of passive pronation and supination. Limitation of these movements is not usually found, except in advanced cases of arthritis.

### **B:** Treatment by injection

A bolus injection of corticosteroid aims to reduce inflammation and pain.

### **B:** Needle size

23G x 1 in (0.6 x 25 mm) blue needle

### **B:** Dose

10 mg triamcinolone acetonide, 0.75 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine

### **B:** Patient position

Position the patient in sitting with the forearm supported in pronation.

### **B:** Palpation

On the dorsal surface, the inferior radio-ulnar joint lies approximately 1.5 cm from the ulnar styloid process. The joint can be glided passively to confirm its position. Mark a point over the mid point of the joint line.

### **B:** Technique

Insert the needle via the dorsal surface of the inferior radio-ulnar joint line, angling it if necessary to allow for the curvature of the articular surfaces (Figs 7.1 and 7.2). Deliver the injection as a bolus once the needle is intracapsular.

**B: Patient advice**

The patient is advised to maintain a period of relative rest for up to two weeks following the injection.

**A: Wrist joint**

**B: Indication**

Arthritis. Inflammatory arthritis such as rheumatoid arthritis can affect the wrist joint. If the lesion is due to trauma, fracture of one of the carpal bones, usually the scaphoid, should be excluded.

**B: Patient presentation**

The patient presents with pain felt locally at the wrist. There may be a history of trauma, or if due to inflammatory arthritis, the patient may have other joint involvement.

On examination the joint may be swollen, and heat and synovial thickening may be palpated at the wrist. Assessment by selective tension will reveal a capsular pattern of equal limitation of flexion and extension.

**B: Treatment by injection**

The aim of treatment by corticosteroid injection is to reduce inflammation and pain.

**B: Needle size**

23G x 1 in (0.6 x 25 mm) blue needle.

**B: Dose**

20 mg triamcinolone acetonide, 1 ml local anaesthetic  
e.g. 2 ml Adcortyl®, 1 ml 1% lidocaine

**B: Patient position**

Position the patient in sitting with the forearm supported in pronation.

**B: Palpation**

Palpate the radiocarpal joint line on the dorsal surface of the wrist, select and mark a point on either side of the extensor carpi radialis brevis tendon.

**B: Technique**

Insert the needle into the joint at angled slightly proximally to allow for the curvature of the articular surfaces (Figs 7.3 and 7.4). The proximal carpal bones are slightly convex; the lower end of the radius is concave. Deliver the injection by a bolus technique once intracapsular.

Alternative techniques: (1) In the wrist affected by rheumatoid arthritis, it may not be possible to introduce the needle into the joint capsule. Palpate for the areas of tenderness around the wrist and use two or three separate needle insertions to pepper the areas of synovial thickening (changing the needle for each insertion). This technique may be painful for the patient. (2) Palpate the radio-ulnar joint line and insert the needle immediately distal to the ulnar styloid process; deliver the injection by a bolus technique.

**B: Patient advice**

The patient is advised to maintain a period of relative rest for up to two weeks following the injection. If pain is severe, a supporting splint may be worn.

**A: Trapezio-first metacarpal joint (first carpometacarpal joint)**

**B: Indication**

Arthritis. This may be inflammatory arthritis but, more commonly, it results from an overuse activity that precipitates a traumatic arthritis in an already degenerate joint.

**B: Patient presentation**

The patient complains of pain felt locally at the base of the thumb which is aggravated by activities that involve compression of the joint e.g. writing, gripping. The condition commonly affects middle-aged women (Livengood, 1992).

On examination the capsular pattern of limited extension at the trapezio-first metacarpal joint is present.

**B: Treatment by injection**



Injection may be successful for inflammatory, degenerative or traumatic arthritis of this joint. In the symptomatic degenerate joint, physiotherapeutic modalities such as mobilisation and transverse friction massage to the capsular ligaments can give good symptomatic relief (Cyriax and Cyriax, 1983; Cyriax, 1984; Kesson and Atkins, 1998).

**B: Needle size**

25G x 5/8 in (0.5 x 16 mm) orange needle

**B: Dose**

10 mg triamcinolone acetonide, 0.25 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.25 ml 1% lidocaine

**B: Patient position**

Position the patient in sitting with the forearm supported.

**B: Palpation**

Identify the first metacarpal Run your thumb down this bone to its proximal end in the anatomical snuffbox and locate the joint line. The patient may be able to help identification and facilitate the injection by applying a little distraction to the joint. Mark the mid point of the joint line.

**B: Technique**

Insert the needle perpendicularly into the joint and deliver the injection as a bolus once the needle is intracapsular (Figs 7.5 and 7.6).

*Alternative technique:* Position the thumb in extension and adduction, identify the joint line anteriorly on the palmar surface, through the thenar eminence. Insert the needle into the joint and deliver the injection by a bolus. This approach may be useful if the patient has had longstanding symptoms and some wasting of the thenar muscles.

**Clinical tip:** Osteophytes around the degenerate joint may impede the injection via either of the approaches given. The gentle distraction of the joint facilitates the needle insertion into the joint space.

**B: Patient advice**

Advise the patient to maintain a period of relative rest from the aggravating factors for up to two weeks.

**A: Metacarpophalangeal joints and the interphalangeal joints**

**B: Indication**

Arthritis. Degenerative, inflammatory or traumatic arthritis may affect these joints.

**B: Patient presentation**

The patient will be able to localise the symptom of pain to the particular joint(s) involved.

On examination, the capsular pattern of limitation of movement will confirm the diagnosis. For the metacarpophalangeal joints the capsular pattern is limitation of radial deviation and extension, whilst the interphalangeal joints demonstrate an equal limitation of flexion and extension.

**B: Treatment by injection**

Corticosteroid injection aims to reduce the inflammation and give effective pain relief.

**B: Needle size**

25G x 5/8 in (0.5 x 16 mm) orange needle

**B: Dose**

5-10 mg triamcinolone acetonide, 0.25 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.25 ml 1% lidocaine

**B: Patient position**

Position the patient in sitting with the hand supported comfortably.

**B: Palpation**

Locate the symptomatic joint by palpation and identify the joint line. Mark a point on the dorsolateral aspect of the joint line.

**B: Technique**

Insert the needle into the relevant joint via a dorsolateral approach, avoiding the dorsal digital expansion (Figs 7.7, 7.8, 7.9 and 7.10). Once intracapsular, the injection can be delivered as a bolus.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection.

**A: Radial and ulnar collateral ligaments**

**B: Indication**

Ligamentous sprain. A single traumatic incident or repetitive microtrauma through overuse may sprain these ligaments.

**B: Patient presentation**

The patient complains of pain well localised to the wrist joint.

On examination, a non-capsular pattern of pain on passive ulnar deviation will be positive in a sprain of the radial collateral ligament, whilst passive radial deviation will be positive in a sprain of the ulnar collateral ligament.

**B: Treatment by injection**

A corticosteroid injection may be curative or, alternatively, physiotherapeutic methods including mobilisation by transverse friction massage may be used.

**B: Needle size**

25G x 5/8 in (0.5 x 16 mm) orange needle

**B: Dose**

10 mg triamcinolone acetonide, 0.25 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.25 ml 1% lidocaine

**B: Patient position**

Position the patient comfortably in sitting with the hand supported.

**B: Palpation**

Palpate for the area of tenderness over the ligament and mark this point.

**B: Technique**

Insert the needle perpendicular to the ligament (Figs 7.11, 7.12, 7.13 and 7.14) and deliver the injection to the affected area by peppering technique.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection.

**A: Carpal tunnel**

**B: Indication**

Compression of the median nerve in the carpal tunnel. The median nerve passes through a fibro-osseous tunnel formed by the overlying flexor retinaculum and the underlying carpal bones. This is a restricted space, being occupied by the superficial and deep flexor tendons to the digits as well as the median nerve and vessels. Any reduction in the space causes compression of the median nerve and produces symptoms (see below). Intrinsic factors such as inflammation and swelling, or extrinsic factors such as trauma or repetitive occupational and leisure activities may be the reason for the condition. It is more common in women between the ages of 40-60 (Norris, 1993; Kumar and Clark, 1994) and the syndrome may also be associated with diabetes, myxoedema, pregnancy and rheumatoid arthritis. In advanced cases, the muscles of the thenar eminence may become weak, particularly abductor pollicis brevis, which causes the first metacarpal to fall back into the same plane as the other metacarpals.

**B: Patient presentation**

The history generally substantiates the diagnosis. The patient complains of aching and burning 'pain' with tingling or numbness of the fingertips. Paraesthesia is reported on the palmar aspect of the radial three and a half digits. Smith and Wemick, 1994, reported 70% of patients feeling numbness at night and 40% complaining of pain radiating proximally into the lower forearm with paraesthesia felt simultaneously in the fingers. The patient may be woken at night by the symptoms and gain relief by shaking or rubbing the hands (Cailliet, 1990).

On examination, wasting of the thenar eminence may be observed and weakness experienced in advanced cases. Traditionally Tinel's test, tapping over the flexor retinaculum and Phalen's test, the application of sustained compression to the median nerve by maintaining the wrist in a position of flexion, are used to elicit the reported paraesthesia and to diagnose carpal tunnel syndrome (Hoppenfeld, 1976; Otto and Wehbé 1986; Cailliet 1990; Vargas

Busquets, 1994). However, false-positive and false-negative results are not uncommon.

**B: Treatment by injection**

Injection of corticosteroid into the carpal tunnel may reduce the inflammation and swelling associated with the compressed nerve and reduce or eliminate the symptoms for the patient. The more advanced cases, with muscle weakness and wasting, should be referred on surgical opinion.

**B: Needle size**

23G x 1 in (0.6x25mm) or 23G x 1 1/4 in (0.6 x 30 mm) blue needle

**B: Dose**

20 mg triamcinolone acetonide  
e.g. 0.5 ml Kenalog®

The injection is not particularly painful for the patient and a small volume of concentrated corticosteroid is advised; the addition of local anaesthetic serves no purpose here and its addition would increase the volume of the injection unnecessarily.

**B: Patient position**

Position the patient in sitting with the wrist supported in extension and the forearm supinated.

**Palpation**

Observe the three skin creases, which are generally visible on the palmar aspect of the lower forearm. Note the position of palmaris longus, which gives an approximate position of the underlying median nerve.

**Clinical tip:** If palmaris longus is absent, ask the patient to oppose the thumb and little finger. The mid-line crease produced between the thenar and hypothenar eminences gives the approximate position of the median nerve in the carpal tunnel.

Mark a point between the middle and distal wrist creases, to the ulnar side of palmaris longus (or the middle crease as identified above).

**B: Technique**

Insert the needle between the middle and distal wrist creases, to the ulnar side of the palmaris longus tendon which ensures that you do not make contact with the median nerve (Fig 7.15). Angle the needle approximately parallel with the direction of the flexor tendons in the carpal tunnel. Advance the needle between the flexor tendons until you judge it to rest beyond the distal wrist crease and therefore within the carpal tunnel (Fig 7.16). Deliver the injection as a bolus.

**Clinical tip:** If you grip the syringe gently, the needle will glide into the carpal tunnel parallel to the tendons. As you position the needle for injection, check with the patient that they are not experiencing paraesthesia, to avoid injecting into the nerve itself.

**Alternative techniques:** (1) Position the patient with the forearm supinated and insert the needle ½ inch distal to the distal wrist crease aiming down and towards the wrist joint. Once under the flexor retinaculum, inject as a bolus. (2) Position the patient with the wrist in a degree of extension and the forearm supinated. Insert the needle just proximal to the distal wrist crease immediately to the radial side of palmaris longus (if palmaris longus is absent, see above). Advance the needle between the flexor tendons until you judge it to rest within the carpal tunnel. Deliver the injection as a bolus.

#### **B: Patient advice**

It is most important to ascertain the cause of this lesion and to eliminate these factors to prevent recurrence. The patient should maintain a period of relative rest for up to two weeks following the injection and avoid all aggravating factors. A wrist-supporting splint may be helpful.

Carpal tunnel syndrome may be part of a wider scenario and it may be necessary to eliminate causes in the cervical spine and those involving adverse neural tension (pathoneurodynamics).

**Clinical tip:** the use of corticosteroid injection for carpal tunnel syndrome in pregnancy is not recommended.

#### **A: Trigger finger or trigger thumb**

##### **B: Indication**

A 'catching' or 'triggering' phenomenon of a flexor tendon in its sheath. The superficial and deep flexor tendons pass through osseo-aponeurotic canals, which are formed by the phalanges, their joints and the digital fibrous sheaths. Midway between the proximal and intermediate phalanges is a stronger thickening of transverse fibres known as an annular pulley (Williams et al, 1989).

These pulleys prevent bowstringing of the tendons and enhance tendon efficiency. The flexor tendons receive maximum stress at the pulley level with the metacarpophalangeal joint and nodules form in longstanding conditions (Otto and Wehbe, 1986; Lloyd Davies, 1998).

**B: Patient presentation**

The patient complains of a localised, painful, snapping sensation as a flexor tendon catches in a thickened area of its sheath on flexion, and is suddenly released during forced extension (Smith and Wernick, 1994; Murphy et al, 1995).

There may be little to find on examination, but an area of thickening may be observed or there may be a palpable nodule.

**B: Treatment by injection**

Injection of corticosteroid may be curative and aims to restore painless, smooth movement at the finger (Murphy et al, 1995).

**B: Needle size**

25G x 5/8 in (0.5 x 16 mm) orange needle

**B: Dose**

10 mg triamcinolone acetonide, 0.25 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.25 ml 1% lidocaine

**B: Patient position**

Position the patient in sitting with the hand supported.

**B: Palpation**

Palpate the symptomatic digit for the area of pain and thickening. Mark the mid-point.

**B: Technique**

Insert the needle into the thickened nodule of the affected tendon on the palmar surface, this is usually just distal to the mid-palmar flexor crease (Figs 7.17 and 7.18). Angle the needle approximately 45° distally or proximally with the bevel of the needle parallel to the tendon. Avoid injecting into the tendon itself by withdrawing back from the tendon slightly until a loss of resistance is appreciated.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection.

**A: De Quervain's tenosynovitis****B: Indication**

Inflammation of the shared synovial sheath of abductor pollicis longus and extensor pollicis brevis in the first extensor compartment at the wrist. The condition may be complicated by thickening and scarring of the sheath and occasionally a ganglion may be associated with the chronic condition (Tan et al, 1994; Klug, 1995).

**B: Patient presentation**

The onset can be due to trauma, but overuse more commonly causes a gradual onset of pain felt on the radial side of the wrist. The radial styloid area may feel tender to palpation. An audible crepitus may be present on movements of the thumb.

On examination, a localised, thickened area over the tendons may be observed. Symptoms will be reproduced on testing resisted abduction and extension of the thumb. Passive movements may also be painful as the tendons move through the thickened, inflamed sheath. Finkelstein's test (flexion of the thumb across the palm with ulnar deviation at the wrist increasing the angulation of the tendon) produces the pain and is said to be pathognomic of de Quervain's tenosynovitis (Otto and Wehbé, 1986; Shea et al, 1991; Livengood, 1992; Elliott 1992; Rettig, 1994).

**B: Treatment by injection**

An injection of corticosteroid aims to reduce inflammation, swelling and pain. If the condition is resistant to treatment by injection, physiotherapeutic modalities may be considered or the patient may need a surgical opinion.

**B: Needle size**

25G x 5/8 in (0.5 x 16 mm) orange needle

**B: Dose**

10 mg triamcinolone acetonide, 0.75ml local anaesthetic



e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine

**B: Patient position**

Position the patient in sitting with the wrist supported. Hold the thumb in a degree of flexion and the wrist in ulnar deviation and slight extension.

**B: Palpation**

Locate the triangular 'gap' between abductor pollicis longus and extensor pollicis brevis tendons at the base of the first metacarpal. Mark this point.

**B: Technique**

Insert the needle between and parallel to the two tendons, delivering the injection as a bolus, into the common sheath (Figs 7.19 and 7.20).

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection. As the lesion is due to overuse activities, the causative factors should be addressed to prevent recurrence.

**A: Wrist extensor and flexor tendon lesions**

**B: Indication**

Tenosynovitis or tendinitis. Tenosynovitis may affect the tendons as they cross the wrist and hand protected by their synovial sheaths. Tendinitis may be present at the teno-osseous junction, i.e. the point of insertion of the tendon into the bone.

**B: Patient presentation**

These are most frequently overuse lesions, with the patient complaining of a gradual onset of pain which is well localised.

On examination a resisted test, appropriate for the individual tendon, will be positive. In the case of tenosynovitis, the opposite passive movement may also be painful as the tendon is pushed or pulled through its inflamed sheath.

**B: Treatment by injection**

Injection of corticosteroid solution aims to reduce inflammation and relieve pain.

**B: Needle size**

25G x5/8 in (0.5 x 16 mm) orange needle

**B: Dose**

10 mg triamcinolone acetonide, 0.75 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine

**B: Patient position**

Position the patient in sitting with the hand supported.

**B: Palpation**

Locate the area of tenderness and mark the central point.

**B: Technique**

At the teno-osseous junction deliver the injection by a peppering technique. For tenosynovitis the injection is delivered as a bolus between the tendon and its sheath.

**A: Extensor carpi radialis longus and brevis**

Pain is reproduced on resisted wrist extension and resisted radial deviation. Extensor carpi radialis longus inserts into the radial side of the base of the second metacarpal and extensor carpi radialis brevis into the radial side of the base of the third metacarpal. At the teno-osseous site the injection can be delivered by a peppering technique (Figs 7.21 and 7.22). A lesion involving the common sheath of these tendons is not common, but if present, injection is delivered between the tendon and its sheath by a bolus technique (Figs 7.23 and 7.24).

**A: Extensor carpi ulnaris**

Pain is reproduced on resisted wrist extension and resisted ulnar deviation. The tendon inserts into the base of the fifth metacarpal where an injection may be delivered using a peppering technique. If the lesion is tenosynovitis, either as the tendon crosses the wrist or in the groove between the head of the ulna and the

ulnar styloid process, the injection is delivered between the tendon and its sheath using a bolus technique (Figs 7.25 and 7.26).

**A: Flexor carpi ulnaris**

Pain is reproduced on resisted wrist flexion and resisted ulnar deviation. The tendon may be affected at its teno-osseous junction either proximal or distal to the pisiform. Injection is delivered by a peppering technique to the area found to be tender to palpation (Figs 7.27 and 7.28).

**Clinical tip:** the ulnar artery and nerve pass into the hand lateral to the pisiform bone.

## 8. The hip

### A: Hip joint

### B: Indication

Arthritis. Most commonly for acute episodes of degenerative arthritis but may also be indicated in inflammatory arthritis or possibly traumatic arthritis. Primary degenerative osteoarthrosis is common and is said to occur in 50% of the population over the age of 60 (Kumar and Clark, 1994). Men and women are equally affected (Dieppe, 1995).

### B: Patient presentation

The patient complains of a gradual onset of pain and loss of mobility. The pain may be felt in the area of the L3 dermatome, i.e. the upper buttock, groin, or referred into the medial aspect and front of the thigh and leg as far as the medial malleolus. The more distally the pain is felt, the more irritable the lesion. Pain may be associated with activity and/or rest. X-ray changes are not a good indicator of the symptoms as joint changes may be seen long before symptoms present and vice versa.

On examination a capsular pattern of limited movement exists, limited medial rotation, flexion, abduction and extension. The limited movements will have lost their normal elastic end-feel and will feel hard at the end of range.

### B: Treatment by injection

Osteoarthrosis progresses with periods of exacerbation and remission (Dieppe, 1995). A corticosteroid injection may give symptomatic relief and improve function for the patient. It may postpone the need for surgical intervention. As mentioned above, inflammatory arthritis such as rheumatoid arthritis, may also benefit from an intra-articular injection.

### B: Needle size

20G x 3 1/2 in (0.9 x 90 mm) spinal needle

### B: Dose

40 mg triamcinolone acetonide, 1 ml local anaesthetic  
e.g. 4 ml Adcortyl®, 1 ml 1% lidocaine

Some authorities recommend the use of much larger volumes of local anaesthetic to cause distension of the hip joint capsule.

**B: Patient position**

Position the patient in side lying with the painful leg uppermost, supported in neutral by a pillow.

**B: Palpation**

Palpate the greater trochanter (the large quadrangular, bony prominence on the lateral aspect of the upper femur), approximately one hand's breadth below the iliac crest. Grasp the greater trochanter with thumb, index and middle fingers, lift the leg passively into abduction to relax the iliotibial tract and feel the dip above the top of the greater trochanter with your index finger. Mark this point and replace the leg into the neutral position.

**B: Technique**

Insert the needle at the point marked and aim vertically down toward the neck of the femur, until contact is made with bone (Figs 8.1 and 8.2). Since the fibrous capsule of the hip joint surrounds the neck of the femur, the needle will be intracapsular once this contact is made. Deliver the injection as a bolus.

**Clinical tip:** Since septic arthritis of the hip is a very serious complication, a no touch technique is absolutely essential to prevent infection. Some authorities advocate injecting the hip joint under surgical conditions.

**Clinical tip:** There is some controversy concerning repeated steroid injections into weight-bearing joints and the associated risk of developing steroid arthropathy (Parikh et al, 1993; Cameron 1995b). To minimise risk of steroid arthropathy, it is recommended that weight-bearing joints should not be injected more frequently than every 4-6 months.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection. Since Chakravarty and Pharoah (1994) showed that 24 hours of complete bed rest following injection of the knee joint for rheumatoid arthritis produced more prolonged benefit, it may also be appropriate to apply this regime to the hip joint.

**A: Psoas bursa (synonymous with iliopsoas bursa)****B: Indication**

Psoas bursitis. Repetitive minor trauma or a single traumatic incident may be the cause of the lesion, but the bursa's communication with the hip joint means that the condition may be associated with hip joint pathology such as rheumatoid arthritis (Armstrong and Saxton, 1972; Meaney et al, 1992).

**B: Patient presentation**

The patient may complain of a gradual onset of pain felt in the groin or referred into the L3 dermatome (the upper buttock, the medial aspect and front of the thigh and leg as far as the medial malleolus).

On examination a non-capsular pattern exists with a 'muddle' of signs characteristic of bursitis i.e. possibly pain on passive lateral rotation, passive extension and resisted flexion of the hip. Diagnosis is confirmed by combined passive flexion and adduction of the hip, which compresses the bursa against the front of the hip joint.

**B: Treatment by injection**

The treatment of choice for psoas bursitis is an injection of a large volume of low dose local anaesthetic together with an appropriate amount of corticosteroid. The injection aims to reduce inflammation and to relieve pain.

**B: Needle size**

20G x 3 1/2 in (0.9 x 90 mm) spinal needle

**B: Dose**

20 mg triamcinolone acetonide, 8 ml local anaesthetic  
e.g. 2 ml Adcortyl®, 8 ml 0.5% lidocaine

**B: Patient position**

Position the patient in supine lying with the groin area exposed.

**B: Palpation**

The psoas bursa is a large bursa measuring approximately 5-7 cm in length and 2-4 cm in width, in its normal collapsed state (Underwood et al, 1988; Toohy et al, 1990; Flanagan et al, 1995). It lies between the musculotendinous junction of the iliopsoas muscle and the front of the capsule of the hip joint, protecting the tendon as it winds around the front of the hip joint, to its insertion into the lesser trochanter.

Establishing the position of the bursa for injection is complicated, since it is also associated anteriorly with the neurovascular bundle in the femoral triangle which must be avoided. Locate and mark the femoral pulse, just distal to the mid-point of the inguinal ligament. The psoas bursa lies deep to the artery. To avoid the neurovascular bundle, move laterally 5 cm and 5 cm distally and mark this point.

#### Technique

Insert the needle at the marked point and angle it deeply, medially and proximally towards the bursa, to be deep to the neurovascular bundle (the initial point of palpation recommended above, located by the femoral pulse) (Figs 8.3 and 8.4). On making contact with bone, the needle is now at the front of the hip joint and should be withdrawn slightly so that it is positioned within the psoas bursa. If there is no resistance to the injection, inject using a bolus technique. Resistance to the injection may indicate that the bursa is multiloculated with well-defined walls, and it may also contain debris. In this case, deliver the injection by peppering technique, covering the area of the lesion determined by tenderness to palpation (Meaney et al, 1992, Cyriax and Cyriax, 1983, Kesson and Atkins, 1998). Kerry et al (2000) describe a collaborative approach to diagnosis and treatment of iliopsoas bursitis with corticosteroid injection, ultrasonography and physiotherapy.

#### **B:** Patient advice

Advise the patient to maintain a period of relative rest for up to two weeks following the injection. The causative factors should be ascertained and avoided to prevent recurrence.

#### **A:** Trochanteric bursa

##### **B:** Indication

Trochanteric bursitis. Repetitive overuse is the usual cause, although the condition may be associated with tight lateral structures at the hip, such as the iliotibial band, or with lumbar, sacro-iliac or hip joint pathology (Shbeeb et al, 1996).

##### **B:** Patient presentation

The patient presents with a gradual onset of pain felt in the lateral thigh.

On examination there may be little to find by way of physical findings, apart from tenderness to palpation over the greater trochanter. Resisted hip abduction and/or passive lateral rotation may provoke the symptoms (Rasmussen and

Fano, 1985; Shbeeb et al, 1996). There may be some muscle tightness on testing for range of joint movement or leg length inequality as a precipitating factor.

#### **B: Treatment by injection**

Providing the causative factors are also addressed, injection of corticosteroid may be curative and is therefore the treatment of choice (Schapira et al, 1986). Shbeeb et al (1996) conducted an observational study of 75 patients with trochanteric bursitis with an injection of either 6, 12 or 24 mg betamethasone. Their results indicated that most patients improved with a single injection, those that received the highest dose of corticosteroid reported longer term improvement.

#### **B: Needle size**

21G x 1 1/2 in (0.8 x 40 mm) or 21G x 2 in (0.8 x 50 mm) green needle

#### **B: Dose**

20 mg triamcinolone acetonide, 1-3 ml local anaesthetic  
e.g. 2 ml Adcortyl®, 1-3 ml 1% lidocaine

#### **B: Patient position**

Position the patient in supported side lying.

#### **B: Palpation**

The trochanteric bursa caps the greater trochanter separating the overlying gluteus maximus muscle from the bone as it passes to its insertion into the iliotibial tract and upper femur. The position is similar to the way in which the subdeltoid bursa caps the greater tuberosity of the humerus. Locate the large, quadrangular greater trochanter and palpate for an area of tenderness over its superolateral aspect. Mark this point within the tender area.

#### **B: Technique**

Insert the needle into the centre of the tender area, over the superolateral aspect of the greater trochanter, until the needle rests between the insertion of gluteus maximus into the iliotibial tract, and the underlying greater trochanter (Figs 8.5 and 8.6). This usually reproduces the patient's pain. Deliver the injection by a bolus technique if no resistance is felt, or if this is not possible a peppering technique, aiming to cover the full extent of the tender area within the bursa.

#### **B: Patient advice**



Advise the patient to maintain a period of relative rest for up to two weeks after the injection.

Causative factors should be addressed to prevent recurrence. It may be appropriate to introduce a regime of stretching techniques for the iliotibial tract.

**A: Origin of the hamstrings at the ischial tuberosity**

**B: Indication**

Hamstring tendinitis (enthesitis). The hamstring muscles are commonly strained during sporting activities. As two joint muscles they act to extend the hip and flex the knee and are relatively weak in comparison to the quadriceps (Sutton, 1984). The ballistic action of sprinting commonly leads to acute lesions in the muscle bellies, whilst overuse activities are more likely to produce strain of the common origin at the ischial tuberosity.

**B: Patient presentation**

The patient complains of a gradual onset of pain in the lower buttock area, localised to the ischial tuberosity.

On examination pain is reproduced on testing resisted knee flexion and on passively testing the straight leg raise.

**B: Treatment by injection**

Injection into the common origin of the hamstrings at the ischial tuberosity may be curative for chronic strain. Alternative treatment modalities may be considered such as mobilisation by deep transverse friction massage and electrotherapy.

**B: Needle size**

23G x 1 in (0.6 x 25 mm) blue needle (or larger if more appropriate for the patient)

**B: Dose**

20 mg triamcinolone acetonide, 1 ml local anaesthetic  
e.g. 0.5 ml Kenalog®, 1 ml 1% lidocaine

**B: Patient position**

Position the patient in prone lying over the side edge of a plinth with the hip and knee flexed to a right angle. The knee should be supported on a stool. As an alternative position, the patient may be placed in side-lying with the painful side uppermost and hips flexed to 90 degrees,.

**B: Palpation**

The positions described above expose the ischial tuberosity from under the gluteus maximus muscle. Locate the area of tenderness in the tendon, commonly found at its teno-osseous junction on the ischial tuberosity and mark this point.

**B: Technique**

Insert the needle perpendicular to the tendon and ischial tuberosity and deliver the injection by a peppering technique (Figs 8.7 and 8.8).

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks following injection. It is important to establish an appropriate training regime for full rehabilitation of the hamstrings and the causative factors of any overuse injury should be addressed.

**A: Origin of adductor longus**

**B: Indication**

Strain of the adductor longus tendon, commonly known as 'rider's strain'. Overuse of the adductors, e.g. whilst working a horse, may produce chronic tendinitis. A single traumatic incident, in which the tendon is overstretched, may be the cause of an acute lesion.

**B: Patient presentation**

The patient complains of pain localised to the groin area or referred to the medial aspect of the thigh.

On examination the symptoms will be reproduced by resisted adduction and on stretching, by passive abduction.

**B: Treatment by injection**

An injection at the teno-osseous junction of the origin of adductor longus with the body of the pubis (the enthesis) may be curative. Alternative physiotherapeutic modalities may also be considered.

**B: Needle size**

23G x 1 1/4 in (0.6 x 30 mm) blue needle

**B: Dose**

20 mg triamcinolone acetonide, 1 ml local anaesthetic  
e.g. 0.5 ml Kenalog®, 1ml 1% lidocaine

**B: Patient position**

Position the patient in supine lying on a plinth with the leg supported in a degree of abduction and lateral rotation.

**B: Palpation**

Locate the area of tenderness at the teno-osseous junction on the body of the pubis, in the angle between the crest and the symphysis pubis. Mark this area.

**B: Technique**

Insert the needle just distal to the teno-osseous junction angling obliquely upwards toward the body of the pubis (Figs 8.9 and 8.10). Deliver the injection by a peppering technique, covering the full extent of the lesion as identified by palpation.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks following the injection. Once the symptoms and signs have subsided, a full rehabilitation programme can be followed including stretching if necessary.

## 9. The knee

### **A: Knee joint**

### **B: Indication**

Arthritis. Arthritis of the knee joint may be due to an acute episode of degenerative osteoarthritis or inflammatory arthritis. Traumatic arthritis is usually a secondary response to a ligamentous lesion at the knee and should be treated as such (see Kesson and Atkins, 1998).

### **B: Patient presentation**

The patient may complain of a gradual or sudden onset of pain and swelling at the knee. The pain may be anterior and/or posterior since the knee lies within the L3,4 and S1,2 dermatomes. Symptoms are generally aggravated by weight-bearing activities and the knee may be stiff after rest.

On examination swelling and synovial thickening may usually be palpated. A capsular pattern of greater limitation of flexion than extension is present and flexion has a harder than normal end-feel.

### **B: Needle size**

21G x 1 1/2 in (0.8 x 40 mm) green needle

### **B: Dose**

30 mg triamcinolone acetonide, 1 ml local anaesthetic  
e.g. 3 ml Adcortyl®, 1ml 1% lidocaine

### **B: Treatment by injection**

An intra-articular injection of corticosteroid may be beneficial in the treatment of symptomatic osteoarthritis or inflammatory arthritis (Dieppe et al, 1980). The possible mechanical causes of traumatic arthritis (e.g. ligamentous lesion) should be addressed directly.

### **B: Patient position**

Position the patient in half lying and support the knee in the extended position.

### **B: Palpation**

Palpate the patella and glide it medially, pressing down on the lateral border to lift the medial edge. Mark a point at the approximate mid point of the medial border of the patellar.

#### **B: Technique**

Insert the needle at the mid point of the medial border of the patella, angling laterally and slightly posteriorly to allow for the convex shape of the posterior surface of the patella (Figs 9.1 and 9.2). Once intracapsular, and when there is no resistance to the injection, deliver by a bolus technique.

*Alternative techniques:* (1) Glide the patella laterally. Insert the needle at the mid point of the lateral border of the patella, aiming medially and slightly posteriorly with the needle parallel to the articular surface of the patella. Deliver by a bolus technique. (2) If a visible effusion is present, the needle may be inserted into the suprapatellar pouch and intra-articular placement confirmed by initial aspiration before injecting as a bolus. (3) Position the patient in supine or half lying with the knee flexed. Insert the needle below the apex of the patella on either the medial or the lateral side of the patellar tendon (in acupuncture, the "eyes" of the knee) and once intracapsular, deliver as a bolus.

**Clinical tip:** There is some controversy concerning repeated steroid injections into weight-bearing joints and the associated risk of developing steroid arthropathy (Parikh et al, 1993; Cameron 1995b). To minimise risk of steroid arthropathy, it is recommended that weight-bearing joints should not be injected more frequently than every 4-6 months.

#### **B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection. Chakravarty and Pharoah (1994) showed that 24 hours of complete bed rest following injection of the knee joint for rheumatoid arthritis produced more prolonged benefit.

#### **A: Baker's cyst**

This is a fluctuant swelling which appears on the posterior aspect of the knee joint line. It is associated with pathology in the knee joint such as degenerative or inflammatory arthritis and treatment should be directed at the knee joint itself.

#### **A: Bursitis associated with the patella**

**B: Indication**

Prepatellar bursitis (housemaid's knee) and superficial infrapatellar bursitis (clergyman's knee). These are usually associated with friction between the patella or patellar tendon and the skin. Since these are subcutaneous bursae they are vulnerable to unrecognised perforating injuries, therefore it is important that the patient is screened for possible infection before injecting with corticosteroid.

**B: Patient presentation**

The patient complains of a gradual onset of aching pain felt superficial to the patella or patellar tendon, depending on which bursa is involved.

On examination there are usually no clinical findings and the condition is diagnosed by the obvious swelling over the patella.

**B: Needle size**

21G x 1 1/2 in (0.8 x 40 mm) green needle

**B: Dose**

10 mg triamcinolone acetonide, 1 ml local anaesthetic e.g. 1 ml Adcortyl®, 1ml 1% lidocaine

**B: Treatment by injection**

An injection into the bursa can be curative.

**B: Patient position**

Position the patient in half lying and support the knee in the extended position.

**B: Palpation**

Palpate the tender, swollen area of the bursa on the anterior aspect of the patella or patellar tendon and mark a central point convenient for the injection.

**B: Technique**

Insert the needle at the mid point of the tender area and inject as a bolus when the bursa is identified by a loss of resistance to the needle insertion (Figs 9.3 and 9.4).

**B: Patient advice**

The patient should be advised to avoid further trauma to the bursa.

**A: Pes anserine bursa**

**B: Indication**

Bursitis, that is commonly due to overuse (Hutson, 1990) This bursa is located on the medial aspect of the knee deep to the pes anserine complex of the tendons of semitendinosus, gracilis and semimembranosus.

**B: Patient presentation**

The patient may complain of a gradual onset of aching pain felt on the medial aspect of the knee.

On examination, passive movements and resisted tests are generally negative, but swelling and tenderness to palpation are present on the anteromedial aspect of the tibia just below the joint line.

**B: Needle size**

23G x 1 in (0.6 x 25 mm) blue needle or 25G x 5/8 in (0.5 x 16 mm) orange needle

**B: Dose**

20 mg triamcinolone acetonide, 1 ml local anaesthetic  
e.g. 0.5 ml Kenalog®, 1ml 1% lidocaine

**B: Treatment by injection**

An injection into the bursa can be curative.

**B: Patient position**

Position the patient in half lying and support the knee in the extended position.

**B: Palpation**

Palpate the tender, swollen area of the bursa on the medial aspect of the tibia and mark a central point convenient for the injection.

**B: Technique**

Insert the needle at the mid point of the tender area and inject as a bolus when the bursa is identified by a loss of resistance to the needle insertion (Figs 9.5 and 9.6).

**B: Patient advice**

The patient should be advised to avoid further trauma to the bursa.

**A: Coronary ligaments**

**B: Indication**

Sprain of the coronary ligaments. A rotational or hyperextension injury at the knee can affect the coronary ligaments. The coronary (meniscotibial) ligaments attach the menisci to the upper surface of the tibia. The longer lateral coronary ligaments are less commonly involved, but the shorter medial coronary ligaments are vulnerable to sprain especially in association with medial meniscal damage.

Discussion here is of the more commonly affected medial coronary ligaments, but if the lateral coronary ligaments were involved, the same principles would apply.

**Patient presentation**

The patient complains of pain on the medial aspect of the knee possibly related to a rotational or hyperextension injury. On examination there is a non-capsular pattern of pain on passive lateral rotation of the knee.

**B: Treatment by injection**

This lesion responds very well to physiotherapeutic modalities, transverse friction massage in particular (Cyriax and Cyriax, 1983; Cyriax, 1984; Kesson and Atkins, 1998). In more chronic cases an injection may also be curative and is an alternative treatment to physiotherapy.

**B: Needle size**

23G x 1 in (0.6x25mm) blue needle

**B: Dose**

10 mg triamcinolone acetonide, 0.75 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine



**B: Patient position**

Position the patient in lying with the knee flexed and laterally rotated to expose the medial tibial condyle.

**B: Palpation**

Palpate the superior surface of the medial tibial plateau for the area of tenderness in the medial coronary ligaments. Mark the area of tenderness.

**B: Technique**

Insert the needle tangentially to the meniscus and deliver the injection by peppering technique along the affected area of the ligament (Figs 9.7 and 9.8).

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection.

**A: Infrapatellar tendon**

**B: Indication**

Infrapatellar tendinitis ('jumper's knee'). The condition may be due to repetitive overuse, particularly arising from activities that involve a jumping action, resulting in microfailure and fraying of the tendon fibres with areas of focal degeneration (Curwin and Stanish, 1984).

**B: Patient presentation**

The patient complains of a gradual onset of anterior knee pain, usually localised to the inferior pole of the patella.

On examination the pain is reproduced at the front of the knee by resisted knee extension.

**B: Treatment by injection**

An injection into the teno-osseous junction of the infrapatellar tendon may be curative, but the cause of the lesion should also be addressed to prevent recurrence.

**B: Needle size**

23G x 1 in (0.6 x 25 mm) blue needle

**B: Dose**

20 mg triamcinolone acetonide, 1 ml local anaesthetic  
e.g. 0.5 ml Kenalog®, 1 ml 1% lidocaine

**B: Patient position**

Position the patient in half lying with the knee supported in extension.

**B: Palpation**

Tilt the inferior pole (apex) of the patella upward by applying downward pressure over the superior pole (base) with the web space between your index finger and thumb. Palpate the teno-osseous junction of the infrapatellar tendon and mark the area of tenderness.

**B: Technique**

Insert the needle just distal to the inferior pole of the patella angling upward to make contact with the bone at the teno-osseous junction of the tendon (Figs 9.9 and 9.10). Fanning outwards from this mid position, deliver the injection by peppering technique, depositing two parallel rows of droplets of solution along the affected part of the teno-osseous junction.

**Clinical tip:** To avoid weakening of the collagen fibre content of this weight-bearing tendon the injection is NOT delivered into the body of the tendon but at the teno-osseous junction.

**B: Patient advice**

Advise the patient to maintain a period of relative rest from all aggravating and overuse factors for up to two weeks following the injection.

Alternative treatments for infrapatellar tendinitis may include physiotherapeutic modalities such as mobilisation by transverse friction massage Cyriax and Cyriax, 1983; Cyriax, 1984; Kesson and Atkins, 1998). The condition may be due to maltracking mechanisms of the patella and this may need to be addressed by corrective taping techniques and specific exercises.

**A: Suprapatellar tendon**

**B: Indication**

Suprapatellar tendinitis. This is not as common as infrapatellar tendinitis, but the cause, disease process and management, are the same (see above).

**B: Patient presentation**

The patient complains of a gradual onset of pain felt at the superior pole (base) of the patella.

On examination the pain is reproduced at the front of the knee by resisted knee extension.

**B: Treatment by injection**

An injection into the teno-osseous junction of the suprapatellar tendon may be curative, but the cause of the lesion should also be addressed to prevent recurrence.

**B: Needle size**

23G x 1 in (0.6 x 25 mm) blue needle

**B: Dose**

20 mg triamcinolone acetonide, 1 ml local anaesthetic  
e.g. 0.5 ml Kenalog®, 1 ml 1% lidocaine

**B: Patient position**

Position the patient in half lying with the knee supported in extension.

**B: Palpation**

Tilt the superior pole (base) of the patella upward by applying downward pressure over the inferior pole (apex) with the web space between your index finger and thumb. Palpate the teno-osseous junction of the suprapatellar tendon and mark the area of tenderness.

**B: Technique**

Insert the needle just proximal to the superior pole of the patella angling downward to make contact with the bone at the teno-osseous junction of the tendon (Figs 9.11 and 9.12). Fanning outwards from this mid position, deliver the

injection by a peppering technique, depositing two parallel rows of droplets of solution along the affected part of the teno-osseous junction.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection.

Alternatively, treatment for suprapatellar tendinitis may be by physiotherapeutic modalities including mobilisation by transverse friction massage (Cyriax and Cyriax, 1983; Cyriax, 1984; Kesson and Atkins, 1998). The condition may be due to maltracking mechanisms of the patella and this may need to be addressed by corrective taping techniques and specific exercises.

## 10. The ankle and foot

### **A:** Ankle (talocrural) joint

### **B:** Indication

Arthritis. This may be an acute episode of degenerative osteoarthritis, inflammatory arthritis, such as rheumatoid arthritis, or traumatic arthritis associated with fracture or ligamentous injury. Degenerative osteoarthritis in this joint is not common unless there has been a precipitating cause such as fracture, instability or postural overuse.

### **B:** Patient presentation

The patient complains of pain and swelling located locally around the ankle joint.

On examination a capsular pattern of limited movement will be evident, with a greater limitation of plantarflexion than dorsiflexion. Plantarflexion will exhibit an abnormal hard end-feel.

### **B:** Treatment by injection

An intra-articular injection may reduce the pain and swelling, allowing an increase in the range of mobility at the ankle joint.

### **B:** Needle size

23G x 1 in (0.6 x 25 mm) blue needle or 21G x 1 1/2 in (0.8 x 40 mm) Green needle

### **B:** Dose

20 mg triamcinolone acetonide, 1 ml local anaesthetic  
e.g. 2 ml Adcortyl®, 1ml 1% lidocaine

### **B:** Patient position

Position the patient in half lying with the knee flexed and the foot flat on the plinth. This places the ankle in a degree of plantarflexion, which opens the anterior aspect of the joint.

### **B:** Palpation

Palpate the anterior ankle joint line to locate a suitable entry point into the ankle joint. Generally this will be between the tendons of tibialis anterior and extensor

hallucis longus, but a point of entry may also be made at the upper, inner aspect of either malleolus. Mark the selected point of entry on the joint line.

**Clinical tip:** The dorsalis pedis artery and deep peroneal nerve lie just lateral to the extensor hallucis longus tendon at the ankle joint. These structures should be avoided when selecting the point for needle insertion.

**B: Technique**

Insert the needle at the point marked anteriorly and angle the needle upward to run parallel to the upper surface of the talus, which is slightly convex (Figs 10.1 and 10.2). Once the needle is intracapsular, deliver the injection as a bolus.

**Clinical tip:** There is some controversy concerning repeated steroid injections into weight-bearing joints and the associated risk of developing steroid arthropathy (Parikh et al, 1993; Cameron 1995b). To minimise risk of steroid arthropathy, it is recommended that weight-bearing joints should not be injected more frequently than every 4-6 months.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection.

**A: Subtalar (talocalcaneal) joint**

**B: Indication**

Arthritis. This can affect the subtalar joint, the commonest form being inflammatory rheumatoid arthritis.

**B: Patient presentation**

The patient complains of pain and swelling in the ankle region.

On examination a capsular pattern of limited movement is present i.e. limitation of supination, in advanced cases the foot fixes in pronation.

**B: Treatment by injection**

Corticosteroid injection may alleviate the symptoms.

**B: Needle size**

23G x 1 in (0.6 x 25 mm) blue needle

**B: Dose**

10 mg triamcinolone acetonide, 1 ml local anaesthetic  
e.g. 1 ml Adcortyl®, 1 ml 1% lidocaine

**B: Patient position**

Position the patient in half lying with the lower leg supported.

**B: Palpation**

Locate the subtalar joint by palpating the sustentaculum tali of the calcaneum which lies approximately one thumb's width directly below the medial malleolus. Just above this bony, horizontal ridge lies the subtalar joint line. This joint is wider posteriorly and more easily entered there.

**B: Technique**

The anatomy of the subtalar joint is complicated as the joint is divided into two compartments by an interosseous ligament. Insert the needle into the point marked (see above) and first angle it posteriorly, to deliver approximately half of the corticosteroid solution into the posterior compartment as a bolus (Figs 10.3 and 10.4). Withdrawing the needle slightly, re-position it anteriorly and deliver the remainder of the solution into the anterior compartment (Figs 10.5 and 10.6), also as a bolus.

**Clinical tip:** The posterior tibial artery and tibial nerve lie below and behind the sustentaculum tali. Locate the tibial artery pulse by palpation. Avoid these structures by accurately selecting the needle insertion point as indicated and by angling the needle as described above and below.

**Alternative technique:** Insert the needle laterally via the sinus tarsi which is located by palpation antero-inferiorly to the lateral malleolus. Deliver by a bolus technique.

**Clinical tip:** There is some controversy concerning repeated steroid injections into weight-bearing joints and the associated risk of developing steroid arthropathy (Parikh et al, 1993; Cameron 1995b). To minimise risk of steroid arthropathy, it is recommended that weight-bearing joints should not be injected more frequently than every 4-6 months.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks following the injection.

**A: Midtarsal (transverse tarsal) joints**

**B: Indication**

Arthritis. This may be acute episodes of degenerative osteoarthritis, inflammatory arthritis or traumatic arthritis.

**B: Patient presentation**

The patient complains of pain and swelling felt over the mid-foot region.

On examination the capsular pattern of limited movement will be present with limitation of adduction and supination. In advanced cases the foot fixes in abduction and pronation.

**B: Treatment by injection**

Symptomatic relief can be gained from an intra-articular injection of corticosteroid.

**B: Needle size**

23G x 1 in (0.6 x 25 mm) blue needle

**B: Dose**

10 mg triamcinolone acetonide, 0.5 ml local anaesthetic  
e.g. 1 ml Adcortyl®, 0.5 ml 1% lidocaine

**B: Patient position**

Position the patient comfortably supported in half lying.

**B: Palpation**

Themidtarsal complex consists of the calcaneocuboid joint laterally and the talocalcaneonavicular joint medially. Palpate the joints to identify the site of the lesion. The calcaneocuboid joint is located approximately one thumb's width behind and above the base of the fifth metatarsal. The talocalcaneonavicular joint is located by passively everting the foot and palpating along the talus in front of



the medial malleolus until the joint line is felt. Mark a convenient point over this joint.

**B: Technique**

Insert the needle perpendicular to the joint line and once intracapsular deliver the injection as a bolus (Figs 10.7 and 10.8).

**Clinical tip:** The dorsalis pedis artery and deep peroneal nerve lie on the dorsum of the foot lateral to the extensor hallucis longus tendon. Locate the dorsalis pedis pulse by palpation and avoid injecting into the artery or nerve by considering their positions in the foot.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection.

**A: First metatarsophalangeal joint**

**B: Indication**

Arthritis. This may be an acute episode of degenerative osteoarthritis, inflammatory arthritis or traumatic arthritis.

**B: Patient presentation**

The patient complains of pain, and often swelling, located locally over the big toe.

On examination a capsular pattern of limited movement will be present with gross loss of extension and some loss of flexion. The loss of extension can hamper function since is required for the toe-off phase of gait.

**B: Treatment by injection**

An injection of corticosteroid can give good symptomatic relief and allow mobilisation to restore the range of movement.

**B: Needle size**

25G x 5/8 in (0.5 x 16 mm) orange needle

**B: Dose**

10 mg triamcinolone acetonide, 0.25 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.25 ml 1% lidocaine

**B: Patient position**

Position the patient in half lying with the foot supported.

**Palpation**

The joint line is located dorsally by palpation, if this is difficult, add some distraction, which will also facilitate the injection. Mark a point on the joint line, selecting either side of the extensor tendon.

**B: Technique**

Insert the needle perpendicular to the joint line and once intracapsular deliver the injection as a bolus (Figs 10.9 and 10.10).

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection.

**A: Metatarsophalangeal joints and the interphalangeal joints**

**B: Indication**

Arthritis. Degenerative, inflammatory or traumatic arthritis may affect these joints.

**B: Patient presentation**

The patient will be able to localise their pain to the particular joint(s) involved.

On examination, the capsular pattern of limited movement will confirm the diagnosis. This pattern may vary, but generally there is a greater limitation of flexion at the metatarsophalangeal joints causing them to fix in extension, whilst the interphalangeal joints fix in flexion.

**B: Treatment by injection**

Corticosteroid injection reduces the inflammation and may achieve effective pain relief.

**B: Needle size**

25G x 5/8 in (0.5 x 16 mm) orange needle

**B: Dose**

10 mg triamcinolone acetonide, 0.25 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.25 ml 1% lidocaine

**B: Patient position**

Position the patient in half lying with the foot supported.

**B: Palpation**

Locate the symptomatic joint and identify the joint line. Mark a point on the dorsolateral joint line.

**B: Technique**

Insert the needle perpendicularly, into the relevant joint via the dorsolateral or dorsomedial surface to avoid the extensor tendon (Figs 10.11 and 10.12). Once intracapsular, the injection can be delivered as a bolus.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection.

**A: Sesamoiditis**

**B: Indication**

Bruising of the sesamoid bone of flexor hallucis longus or traumatic arthritis of the sesamo-first-metatarsal joint associated with deformity such as pes cavus (Cyriax, 1982).

**B: Patient presentation**

The patient complains of pain on the medial aspect of the plantar surface of the forefoot on walking. On examination pain may be provoked by resisted flexion of the big toe and there is an area of tenderness to palpation.

**B: Treatment by injection**

Injection may be curative (Cyriax, 1982).

**B: Needle size**

23G x 1 in (0.6x25mm) blue needle

**B: Dose**

10 mg triamcinolone acetonide, 0.75 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine

**B: Patient position**

Position comfortably in sitting or lying with the foot supported.

**B: Palpation**

Palpate and mark the area of tenderness on the plantar aspect of the big toe.

**B: Technique**

Insert the needle medially on the plantar surface of the big toe, aiming towards the area of tenderness between the first metatarsal and the flexor tendon (Figs 10.13 and 10.14). Deliver the injection by a bolus technique, avoiding direct injection into the tendon.

**Clinical tip:** The digital arteries and nerves run alongside the flexor tendons and need to be considered when administering the injection.

**A: Retrocalcaneal bursa**

**B: Indication**

Retrocalcaneal bursitis. This may be due to the existence of a bony exostosis (Haglund's deformity), or ill fitting footwear which exerts excessive pressure over the posterior aspect of the heel. The condition may be a manifestation of rheumatoid arthritis or one of the spondylarthropathies e.g. Reiter's disease (Hutson, 1990; Frey et al, 1992; Baxter, 1994)

**B: Patient presentation**

The patient complains of pain felt on the posterior aspect of the heel. Aggravating factors include sporting activities and footwear.

On examination the signs may be confusing and it may be difficult to differentiate the condition from Achilles tendinitis, with which it may co-exist. Passive dorsiflexion, passive plantarflexion and resisted plantarflexion may all squeeze the inflamed bursa, but palpation just anterior to either side of the Achilles tendon will localise the lesion.

**B: Treatment by injection**

An injection of corticosteroid may give symptomatic relief of pain, but the cause of the problem must be addressed to prevent recurrence.

**B: Needle size**

23G x 1 in (0.6x25 mm) blue needle

**B: Dose**

10 mg triamcinolone acetonide, 0.5 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.5 ml 1% lidocaine

**B: Patient position**

Position the patient in prone lying with the foot supported in slight plantarflexion over a pillow. Supine lying could also be used.

**B: Palpation**

Frey et al, (1992) used X-ray and contrast medium to demonstrate the existence of the retrocalcaneal bursa. It caps the superoposterior surface of the calcaneum as a horseshoe shaped bursa separating the calcaneum from the insertion of the Achilles tendon (Stephens, 1994). The tender bursa can be located by palpation anterior to the tendon either laterally or medially to the distal end of the Achilles tendon. Mark the identified point of maximum tenderness.

**B: Technique**

Insert the needle either medially or laterally between the distal end of the Achilles tendon and the upper third of the posterior surface of the calcaneum (Figs 10.15 and 10.16). Deliver the injection as a bolus.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks following the injection. The cause of the condition should be addressed by avoiding aggravating activities or replacing ill fitting footwear.

**A: "Dancer's heel"**

**B: Indication**

Posterior tibial periostitis. This may occur particularly in ballet dancers where the increased mobility into plantarflexion at the ankle joint, resulting from point work, causes the calcaneum to bruise the periosteum at the lower border of the posterior tibia (Cyriax, 1982). A similar condition can be seen in other athletes e.g. footballers, javelin throwers, hockey and squash players (Cyriax and Cyriax, 1983).

**B: Patient presentation**

The patient complains of pain felt locally at the back of the heel with symptoms reproduced at the end of range of passive plantarflexion (Cyriax, 1982).

**B: Treatment by injection**

Injection may be curative providing the cause of the lesion is addressed.

**B: Needle size**

21G x 1 1/2 in (0.8x40 mm) or 21G x 2 in (0.8x50 mm) green needle

**B: Dose**

10 mg triamcinolone acetonide, 0.75 ml local anaesthetic e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine.

**B: Patient position**

Position the patient in prone lying.

**B: Palpation**

Palpate and mark the area of tenderness on the posterior aspect of the lower tibia deep to the Achilles tendon.

**B: Technique**

Insert the needle either medially or laterally to the Achilles tendon aiming towards the posterior margin of the lower tibia which lies approximately 2 cm above a line joining the malleoli and deliver the injection by a peppering technique across the periosteum of the lower edge of the tibia (Figs 10.17 and 10.18).

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks following the injection. The patient should be made aware of the causative factors and measures should be taken to avoid overpointing.

**A: Plantar fascia****B: Indication**

Plantar fasciitis. This may be due to repetitive microtrauma of the longitudinal arch of the foot, producing focal tears and chronic inflammation at the insertion of the plantar fascia into the medial tuberosity of the calcaneum (Kibler et al, 1991, Karr, 1994, Gibbon and Cassar-Pullicino, 1994; Dasgupta and Bowles, 1995; Singh et al, 1997). Repeated intrinsic muscle activity against the stretched plantar fascia during gait activities may cause a traction injury of the plantar fascia at its insertion (Gibbon and Cassar-Pullicino, 1994). Both of these mechanisms may produce a heel spur. Obesity can be a predisposing factor, since it may lead to postural overuse of the foot, causing overpronation and stretching of the plantar fascia. A tight Achilles tendon may also produce overpronation, and inappropriate footwear may predispose to the condition (Evans, 1990; Karr, 1994).

**B: Patient presentation**

The patient complains of a gradual onset of pain on the medial aspect of the plantar surface of the heel. Characteristically, this is most painful when the first few steps are taken as the patient gets out of bed in the morning, but the pain then eases (Kibler et al, 1991; Karr, 1994).

On examination, positive signs may be lacking on routine examination of the foot and ankle. Passive extension of the toes may have a 'windlass' effect on the plantar fascia reproducing the pain; exquisite tenderness is present specifically over the medial calcaneal tuberosity.

**B: Treatment by injection**

A corticosteroid injection can be curative. Sellman (1994) suggested that an accurate injection abolishes pain and tenderness, preventing the need for repeated injections which have been associated with plantar fascia rupture. Singh et al (1997) suggests a comprehensive treatment programme, including corticosteroid injection, intrinsic muscle exercises, calf stretches, strapping and

heel cushions, and 'cock-up' night splints may be needed to address the problem.

**B: Needle size**

21G x 1 1/2 in (0.8 x 40 mm) or 21G x 2 in (0.8 x 50 mm) green needle

**B: Dose**

20 mg triamcinolone acetonide, 1 ml local anaesthetic  
e.g. 0.5 ml Kenalog®, 1 ml 1% lidocaine.

**B: Patient position**

Position the patient in prone lying with the knee flexed and the lower leg supported on a pillow. The position can be modified to allow the patient to lie supine.

**B: Palpation**

Locate the medial calcaneal tuberosity by deep palpation and mark the mid-point of the tender area.

**B: Technique**

Insert the needle through the soft tissues on the medial aspect of the foot anterior to the marked point (Fig 10.19). Angle the needle posterolaterally towards the junction of the plantar fascia with the medial calcaneal tuberosity (Fig 10.20), and deliver the injection by peppering technique. This indirect approach to the plantar fascia is more comfortable for the patient since the needle is inserted through soft tissue, rather than directly through the fat pad. It also avoids fat atrophy and the risk of infection from the sole of the foot.

***Clinical tip:*** the lateral plantar artery and nerve and the medial plantar nerves lie deep to the origin of the plantar fascia.

***Alternative techniques:*** Position as above (1) Insert the needle perpendicular to the sole of the foot aiming towards the area of tenderness where the injection is delivered by a peppering technique. (2) Insert the needle medially, perpendicular to the calcaneum, aiming towards the area of tenderness where the injection is delivered by a peppering technique.

**B: Patient advice**



Advise the patient to maintain a period of relative rest for up to two weeks after the injection. The causative factors should be addressed to prevent recurrence, including weight loss if appropriate.

**A: Peroneal tendons**

**B: Indication**

Tendinitis at the teno-osseous junction of peroneus brevis at the base of the fifth metatarsal, or tenosynovitis of peroneus longus and brevis in their shared synovial sheath at the ankle. An acute lesion may be associated with inversion sprain at the ankle; the chronic lesion may be due to overuse.

**B: Patient presentation**

The patient complains of either sudden pain felt on the lateral side of the ankle following an inversion injury, or a gradual onset of low-grade pain through overuse.

On examination the symptoms are reproduced by resisted eversion. In acute tenosynovitis, passive inversion may also be painful as the tendons are pulled through their inflamed sheath.

**B: Treatment by injection**

Corticosteroid injection into the shared synovial sheath or into the teno-osseous junction of peroneus brevis at the base of the fifth metatarsal may be curative. Alternative treatment may be by physiotherapeutic modalities including mobilisation by transverse friction massage and electrotherapy (Cyniix and Cyniix, 1983; Cyniix, 1984; Kesson and Atkins, 1998).

**B: Needle size**

25G x 5/8 in (0.5x16 mm) orange needle (teno-osseous junction) or 23G x 1 in (0.6x25 mm) blue needle (tendons in sheath)

**B: Dose**

10 mg triamcinolone acetonide, 0.75 ml local anaesthetic  
e.g. 0.25 ml Kenalog®, 0.75 ml 1% lidocaine

**B: Patient position**

Position the patient supine in half lying with the foot supported.

## **B: Palpation**

**B:** Locate the lesion by palpation.

If tenosynovitis is the lesion, the tendons run in a shared sheath behind and below the lateral malleolus. The peroneal tubercle (one finger's breadth below and anterior to the lateral malleolus) marks the distal end of the sheath and the point at which the tendons separate. Find the peroneal tubercle and mark a point between the two tendons.

If the lesion is at the insertion (teno-osseous junction) of peroneus brevis, locate the base of the fifth metatarsal and mark the tender point.

## **B: Technique**

For tenosynovitis, insert the needle at the distal end of the shared sheath (see above); angle it posteriorly and between the peroneal tendons (Figs 10.21 and 10.22). Deliver the injection as a bolus into the shared sheath.

**Clinical tip:** If tenosynovitis is due to inversion sprain, treatment using physiotherapeutic modalities such as friction massage and mobilisation usually achieves excellent results (Cyriax and Cyriax, 1983; Cyriax, 1984; Kesson and Atkins, 1998).

For tendinitis at the teno-osseous junction of peroneus brevis, deliver the injection by a peppering technique at the area marked as tender at the base of the fifth metatarsal (Figs 10.23 and 10.24).

## **Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks following the injection.

## **A: Achilles tendon**

### **B: Indication**

Achilles tendinitis. Early tendinitis involves reversible inflammation of the paratenon, which may respond well to corticosteroid injection. If the lesion becomes chronic, irreversible degenerative changes supersede the inflammatory changes and tendinosis is the main problem i.e. focal degeneration (Williams, 1986; Mahler and Fritschy, 1992). The lesion may be further complicated by partial or complete rupture.

Causes of Achilles tendinitis range from altered lower limb biomechanics, overpronation, ill fitting footwear, pressure from heel counters, and inappropriate or excessive training regimes, to an association with rheumatoid arthritis and the spondyloarthropathies (Smart et al, 1980).

**B: Patient presentation**

The patient complains of a gradual onset of pain localised to the posterior aspect of the heel. Characteristically pain and stiffness is present on first putting the foot to the floor after a night's rest, but this subsides after a few steps. The posterior location of the pain differentiates Achilles tendinitis from plantar fasciitis. The symptoms are aggravated by activity.

On examination the affected area of the tendon may be observed as thickened. Resisted plantarflexion, particularly against the patient's body weight and gravity, reproduces the symptoms.

**B: Treatment by injection**

Conflicting evidence exists over the use of corticosteroid injections and their relationship to tendon rupture (Kennedy and Baxter Willis, 1976; Smart et al, 1980; Kleinman and Gross, 1983; Mahler and Fritschy, 1992; Read and Motto, 1992). Early Achilles tendinitis, involving inflammation of the paratenon, should respond well to corticosteroid injection alongside, but NOT into the body of the tendon. Chronic lesions of tendinosis where degeneration is the main feature may not respond so readily and are prone to rupture whether or not they are injected. It remains questionable that rupture is due to a steroid effect or further manifestation of degenerate disease (Phelps et al, 1974). Ultrasound scanning can help to establish degenerative changes and partial tears within the tendon, especially if a tender focal nodule is palpable.

Since one of the effects of corticosteroid injection is to weaken collagen fibres initially, the enforcement of relative rest after injection is of paramount importance to prevent this complication.

**B: Needle size**

21G x 1 1/2 in (0.8x40 mm) green needle

**B: Dose**

20 mg triamcinolone acetonide, 1.5 ml local anaesthetic  
e.g. 0.5 ml Kenalog®, 1.5 ml 1% lidocaine

**B: Patient position**

Position the patient in prone lying with the lower leg supported and the ankle maintained in dorsiflexion.

**B: Palpation**

Two insertions need to be made, therefore palpate the distal tendon for the tenderness and mark a point on both sides of the tendon.

**B: Technique**

**Clinical tip:** Bend the needle slightly at the hub, using the needle sheath to achieve this, to facilitate the injection parallel to the tendon.

Insert the needle to one side of, and parallel to the Achilles tendon advancing it to its full length (Figs 10.25 and 10.26). Deliver the injection as a bolus depositing half the solution as the needle is withdrawn. Replace the needle and inject the remaining solution on the other side.

**Clinical tip:** As a weight-bearing tendon and with the likelihood of degenerative changes within the tendon predisposing it to rupture, this injection technique aims to 'bathe' the tendon in corticosteroid solution and is NOT an injection into the body of the tendon itself.

**B: Patient advice**

Advise the patient to maintain a period of relative rest for up to two weeks after the injection. This is most important for the Achilles tendon since it is a weight-bearing tendon, and any possible weakening of the collagen fibre content of the tendon could predispose it to rupture. The causative factors need to be addressed and a heel raise or orthotics may be appropriate.

**Conclusion**

Section 2 has adopted a regional approach in presenting injection techniques for the treatment of peripheral musculoskeletal lesions. The upper limb lesions have been covered first, working through the shoulder, elbow and wrist and hand regions. Lower limb lesions follow, relating to the hip, knee and ankle and foot regions. A consistent format has been used for each injection, providing details of indications, presentation, needle size, dosage, patient position, accurate palpation of the site, specific technique for the injection and the appropriate aftercare advice for the patient. Guidelines for injection doses have been given throughout and it has been highlighted that the guidance for the dosage of steroid refers to the use of triamcinolone acetonide as an example, with the

advice to consult the manufacturer's data sheet if another steroid is to be used. The necessity for the use of an 'no touch' technique when injecting has been emphasised and **Clinical tips** have been offered to both ensure safety and enhance effectiveness.

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## Appendix

The ***capsular pattern*** is a limitation of movement in a specific pattern that is peculiar to each joint and is a useful finding for clinical diagnosis since it indicates the presence of an arthritis. The pattern varies from joint to joint and is characterised by limitation of movement in a fixed proportion. It is the same whatever the cause of the arthritis (Cyriax, 1982; Cyriax and Cyriax, 1983) and the history and investigations will suggest and lead to confirmation of the specific form. The movements that become limited in the capsular pattern take on a defined 'hard' end feel.

### Capsular patterns

Joint	Capsular pattern
Shoulder joint	Most limitation of lateral rotation Followed by abduction Least limitation of medial rotation
Elbow joint	More limitation of flexion than extension
Radioulnar joints	Pain at end of range of both rotations
Wrist joint	Equal limitation of flexion and extension Eventual fixation in the mid-position
Trapezio-first metacarpal joint	Most limitation of extension
Metacarpophalangeal joints	Limitation of radial deviation and extension
Interphalangeal joints	Equal limitation of flexion and extension
Hip joint	Most limitation of medial rotation Followed by limitation of flexion and abduction and eventual limitation of extension
Knee joint	More limitation of flexion than extension
Ankle joint	More limitation of plantarflexion than dorsiflexion
Subtalar joint	Increasing limitation of supination Eventual fixation in pronation
Midtarsal joint	Limitation of adduction and supination Forefoot fixes in abduction and pronation

First metatarsophalangeal joint	Gross limitation of extension Some limitation of flexion
Other metatarsophalangeal joints	May vary; usually more limitation of flexion and extension
Interphalangeal joints	Fix in flexion

**SECTION 5**

# AN INVESTIGATION OF THE EXPERIENCE OF PHYSIOTHERAPISTS IN IMPLEMENTING THEIR INJECTION THERAPY SKILLS

Key words

Extended scope, injection therapy, musculoskeletal injections

## Summary

The scope of physiotherapy practice was extended to include intra-articular and intralesional injections within musculoskeletal therapy in 1995, provided that physiotherapists had undertaken 'appropriate training'.

The purpose of this study was to investigate the experience of physiotherapists in applying their injection therapy skills following training. A qualitative study was used, based on a phenomenological model to be able to explore the actual experience of physiotherapists. Participants volunteered to take part in the study and unstructured interviews were conducted, transcribed and analysed.

The investigation was performed as a step towards establishing facilitating factors and barriers to practice as experienced by physiotherapists in implementing their injection therapy skills. Four principal themes arose from the interviews relating to professional autonomy, professional relationships, affective factors and training issues. Extension of the investigation will aim to explore its findings further, to contribute to the theory underpinning the development of injection training programmes and to inform the profession as a whole.

## Introduction

The aim of the study was to explore the experience of physiotherapists in implementing their injection therapy skills, to administer the intra-articular and intralesional injections<sup>1</sup> used in orthopaedic medicine in the management of musculoskeletal lesions. A

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<sup>1</sup> 'Intra-articular' injections are administered into the joint cavity, and 'intralesional' injections are directed to the site of the lesion within the tissue structure, e.g. tendon, teno-osseous junction or ligament.

phenomenological approach was adopted using unstructured interviews to explore the experience of eleven participants, each of whom had undergone training in injection therapy since the introduction of injection therapy into the scope of physiotherapy practice in 1995. Following analysis, the data was categorised as a basis for the description of the physiotherapists' experience, and ensuing discussion.

Within the data, facilitating factors and barriers to practice emerged that it is my intention to explore further from a grounded theory perspective, to be able to establish recommendations for the development of training programmes and the continued implementation of this skill specialism into practice.

The Chartered Society of Physiotherapy (CSP), as a professional body, is responsible for the validation of education and skills training of its members. It has an important role in the consideration of the professional practice issues surrounding the application of techniques, including the articular and soft tissue injections used in the management of musculoskeletal lesions. Intra-articular and intralesional injections, normally of steroid and local anaesthetic, are applicable as a treatment option in the management of musculoskeletal lesions, but their inclusion within the scope of physiotherapy practice was initially resisted, since injections were not considered to be within the core skills of massage, remedial gymnastics and electrotherapy (Williams, 1986).

With the continued development of autonomy within physiotherapy came the extended role of the profession in orthopaedics and rheumatology, where orthopaedic and rheumatology 'assistants' or 'practitioners' were being created, whose role included the administration of local steroid injection. Hockin and Bannister (1994) examined the extended role of a physiotherapist in an outpatient orthopaedic clinic and identified that 22% of patients had received physiotherapist administered steroid injection. With the existence of such a *fait accompli* and the moves of continuing professional development in encouraging the process of developing practice towards skill specialism (Bergman, 1990), the CSP was pressed to extend the scope of practice of physiotherapy to include intra-articular and intralesional injections in December 1995, provided that the physiotherapist was 'appropriately trained'.

The definition of 'appropriate training' allowed for interpretation in that physiotherapists could be directly supervised, mainly in orthopaedic or rheumatology departments, or could attend dedicated injection therapy courses. Injection therapy courses are normally provided as a sequel to courses in orthopaedic medicine where the principles of intra-articular and intralesional injections are taught as part of the syllabus.

Orthopaedic medicine is a specialism in medicine that is dedicated to the examination, diagnosis and non-surgical treatment of disorders of the soft tissues of the musculoskeletal system. Courses in orthopaedic medicine are bi-disciplinary, and both doctors and physiotherapists have traditionally been taught the theory and practice of both manual and injection techniques, but with physiotherapists being unable to practice injection therapy following completion of the course. It was apparent that physiotherapists would require further training to be able to achieve both the competence and confidence to inject.

With respect to the relationship between education and implementation within postgraduate physiotherapy education, following demonstration of competence skills learned can be normally be applied immediately in the appropriate clinical setting and with autonomy. However, this has not always been apparent in the administration of injections, even after training, and several potential barriers to practice can be proposed.

For example, in common with other treatment techniques, competence does not necessarily imply confidence. The physiotherapist may not feel confident to administer injections, especially with the potential threat of the emergency situation of anaphylactic shock or introduction of sepsis via this invasive technique. Potential problems could also exist with medical colleagues who might not support the physiotherapist in injecting their patients, their reasons including lack of confidence in the physiotherapist's abilities, particularly in coping with emergency procedures when they have not had the experience in professional practice, and threat to financial and professional monopoly. Without the prescription of drugs and supportive relationships with medical colleagues, physiotherapists would be barred from implementing their skills.

In order to establish the availability of existing research in this area, a literature search was carried out using the databases CINAHL, MEDLINE, EMBASE: Physical Medicine and Rehabilitation, and the Chartered Society of Physiotherapy's library catalogue. For the purposes of this study, the review of the thousands of texts concerning the administration of injections as such was irrelevant, since it concentrated on the effects of the injections themselves. Issues of scope of practice, extended role/practice and theory of professionalism or autonomy were more related to my area of study, but only a few references were found that drew parallels within other professions including nursing (Head, 1988, Potter, 1990, Howie, 1992, Gilski, 1993 and the Nurse Project in



Wilcannia, Australia, 1994, paramedics (Garza, 1993) and chiropody (Society of Chiropodists, 1975), as well as within physiotherapy itself (Hourigan and Weatherley, 1995, Chartered Society of Physiotherapy, 1997, Owen, 1998), notably with the inclusion of acupuncture within scope of practice in 1985 (Alltree, 1992, 1993, and Hopwood, 1993).

Sociological issues were explored relating to professional development and the relationship of physiotherapy to other professions. Physiotherapy has been traditionally a female dominated profession and there may have been gender issues in moving the profession forwards. Macdonald (1995) and Davias (1995) were studied as a starting point in these respective areas, as a basis for themes that might arise within the study.

Injection therapy is innovative practice to which both intrinsic and extrinsic barriers might be encountered and the aim was to investigate that experience.

## **Methodology**

An exploratory qualitative study within the naturalistic paradigm was performed. The study was not based on theory, as such, but was intended to be an initial step towards generating theory as an outcome of the inductive reasoning within naturalistic inquiry.

The experience of physiotherapists was the prime area of interest. The focus of phenomenology is the investigation of everyday experience (Depoy and Gitlin, 1994), and phenomenological methods seek to 'understand, describe and interpret human behaviour from the perspective of the person being studied' (Finlay, 1999). In phenomenology the belief is that 'understanding is limited to knowing experience without interpreting that experience' and Finlay again supports this by stating that 'phenomenology is committed to describing, not explaining how and why meanings arise'. The person needs to be able to provide a comprehensive description of the experience from which the investigator can determine the meaning of the experience (Moustakas, 1994). A phenomenological approach is commonly used in nursing and midwifery studies to enhance understanding of practice skills and this was selected as the appropriate method for the investigation.

For the purposes of the initial investigation, the intention was not to generate theory as such from the data collected, as according to the principles of grounded theory (Glaser and Stauss, 1967), although this will be an aim for further associated studies. Some

integration of methods might exist but there was the determination to remain focused on that 'experience' to avoid the 'muddling, slurring and blurring' of methods identified as a potential pitfall by Wimpenny and Gass (2000), where no clear method may be defined. The physiotherapists' perceptions were the 'primary source of knowledge' (Moustakas, 1994), through their own description of their experience, in this instance concerning the implementation of their injection therapy skills.

Interviews were conducted with selected physiotherapists who fulfilled the criterion in that they had completed training in injection therapy, either through attending 'official' injection therapy courses or by direct medical supervision, normally by an orthopaedic or rheumatology specialist. Participants were recruited through advertising in 'Frontline', with a brief explanation of the project. By voluntarily applying to take part, the consent of participants was assumed.

Participants entered the study on a 'first come' basis from the self-selected group, after checks that the criteria were fulfilled for each individual entering the study. The sample selected in that way formed a convenience sample, and recruitment continued in the order that participants volunteered, until the required number was reached. For a study of this nature, the aim was to interview eleven participants, allowing for a pilot interview. Although arbitrary to a certain extent it was believed that this number would allow trends to be established in the experiences described and to reach a point of 'saturation' with no new themes emerging. The pilot interview allowed for practice with subsequent evaluation and refinement of the interview technique but since it was conducted without problems, was also used to contribute data to the study. The interviews were conducted at a convenient time and venue for each participant.

Participants represented a range of clinical backgrounds. Five were working for local health care trusts, one of whom was an extended scope practitioner in rheumatology, one based in a group general practice and one also linked to a University based private practice. Five were predominantly in private practice with two of those also having an extended scope practitioner role in orthopaedic services. The remaining participant was managing the physiotherapy service for a large occupational health department supporting the motor industry. Seven female and four male participants were interviewed and their experience ranged between five and thirty years of clinical experience in musculoskeletal therapy.

Before committing to interview, complete freedom of speech was assured with guaranteed confidentiality and the right to withdraw at any time. The aim from the

outset was to establish a sense of trust between the participants and the interviewer.

An overview of the project was given to each participant prior to the commencement of the interview. The research question was deliberately open to encourage the physiotherapists to relate their experiences of implementing their injection skills from their own perspective. With slight variation in wording the question was: 'Take me back to the beginning before you were able to inject and describe your experience in implementing your injection skills'. To this end the interview was unstructured, to be consistent with the purist view of phenomenology, but with prompt questions to explore the avenues suggested. Prior notice was given that each interview would be completed within one hour to avoid fatigue and encroaching on the participants' clinical time.

The assumptions of the interviewer had already been identified in that there was the expectation that physiotherapists would describe a range of experiences including lack of confidence in applying the skill, as well as encountering barriers to practice in not being able to prescribe drugs or in the inhibiting attitudes of medical colleagues. It was important to 'bracket' the assumptions (Ashworth, 1997) setting them aside at the time of interview to avoid leading the informant.

The interviews were recorded, with informed permission from the participant, and transcribed onto computer for subsequent analysis. As a check for accuracy, the data were analysed in a form of triangulation (DePoy and Gitlin, 1994), using observation of the informants at the time of interview, the interview itself and reflection on the written transcription. The possibility of knowing informants, coupled with any influence of previous assumptions, begged for demonstration of accuracy in the subsequent analysis of the data collected.

Notes were recorded on how the interview went as soon after its conclusion as possible, to include any objective and subjective comments based on the observations of the participant and the interviewer. DePoy and Gitlin (1994) acknowledge the difficulty in eliminating bias and describe the term 'reflexivity', suggesting that the investigator should reflect on their own perspective and the influence that this might have had on any stage of the research process.

Ashworth (1997) claims that 'description is already interpretative' and in transcribing the interviews, it was apparent that even at the initial stage of interpretation judgements would be made on the meaning of the views of the informants. It was important that

these coincided with what the informant had actually said in making their own sense of their experience. The transcriptions were forwarded to the participant as a further check for accuracy and each participant confirmed that the transcriptions were faithful to the interview from their own recollections. The reflections on the data collected, away from the interview situation, provided a further means of ensuring and checking for accuracy in that there should be a close correlation between the analyses made by using triangulation in this way.

### **Ethical Considerations**

The investigation was conducted with sensitivity for the ethical issues of confidentiality and anonymity. An assurance was given by the CSP, before the interviews were conducted, that supervision and advice would be received if unethical behaviour had become apparent in any of the participants interviewed.

### **Analysis**

A general view is that there is no single right way to analyse qualitative data and it might be suggested that qualitative data should present its own method of analysis. Within phenomenology, Morse (1992) propounds that 'the process of inquiry is moved along by writing and rewriting during the process of reflection'. In preparation for writing the report the data were systematically analysed drawing from the guidelines of Miles and Huberman (1994), Strauss and Corbin (1990) and Coffey and Atkinson (1996), applying identifying labels or 'codes' to each point of the transcript. Coffey and Atkinson (1996) suggest that 'many analyses of qualitative data begin with the identification of key themes and patterns' and this was the approach used in analysing the codes, avoiding any quantification of data.

Following completion of the coding process, four main categories were identified: professional autonomy, professional relationships, affective factors and training issues, with some overlap between the former two categories. The codes were clustered on the basis of personal analysis and the reader may arrive at another conclusion in analysing the codes as listed in Table 1

## TABLE OF KEY CATEGORIES

<p><b>Professional Autonomy</b></p> <p><b>Codes:</b>          Motivation to perform injections, frustration, freedom, expended scope, enhancement of practice, knowledge, limitations to practice, service to patients, rigour, responsibility, autonomy, increased efficiency, more effective management, professional development, private versus NHS, protocols, legal position, informed consent</p>	<p><b>Professional relationships</b></p> <p><b>Codes:</b>          Mutual respect, prescription, involvement, expectations, attitudes, collaboration, support, communication with colleagues, relationship, sociology of professions, deferring, gender issues, perceptions, knowledge of professional roles, education of colleagues</p>
<p><b>Affective factors</b></p> <p><b>Codes:</b>          Confidence, enjoyment, 'feel good factor', familiarity, comfort, fear of anaphylaxis, caution, positiveness, loss of control, uncomfortable, attitude to patient's pain, vulnerability, nervousness, possible catastrophe, fear of harming patient, invasiveness, threatened, unconscious ignorance, 'doing it right', insecurity</p>	<p><b>Training issues</b></p> <p><b>Codes:</b>          Interest, motivation for courses, clinical supervision, feedback, pharmacology, prescription rights, support for injection training, implementation, mentoring.</p>

Description and discussion follow using the categories as headings and using quotes as illustrations for the key points within each section. The bracketed number following each quote represents the identification number of the interviewee.

## ***Professional autonomy***

Participants tended to begin their account of their personal experience by identifying the factors that had led them to pursue injection therapy. There was generally a high level of motivation driven by an interest in the area as an extension of their existing skills in musculoskeletal therapy in support of their autonomy.

*'I think I have manufactured (support) because of my need and desire to develop.'* (1)

*'I wanted to have a better understanding of what it felt like to be an injector'* (5)

*'...my interest in injection therapy came at a very early stage as soon as I was aware that it had a role to play in the kind of conditions that I was involved with on a daily basis. ...I soon became acutely aware that there were areas that I couldn't treat effectively'* (7)

There were also extrinsic factors towards motivation where the requests were made of physiotherapists by physiotherapy managers or medical colleagues to introduce an injection clinic. The development of injection therapy skills was seen as part of professional development and enhanced practice and was intertwined with extension of scope of practice.

*'I was working in rheumatology with a consultant who was injecting quite a lot... (he) felt he would like a physiotherapist to develop the skills... it incorporated into my practice of extended scope practitioner...'* (1)

*'...we had a fund holding practice that ... couldn't get the injections done, was there anything that physiotherapists could do?...'* (3)

*'I qualified in injection therapy... with the idea that we would set up injection therapy involving the ... health care trust'* (4)

Frustration was mentioned, linked to motivation, in recognising conditions suitable for injection but not being able to either get the injections done, or if so, not accurately, and limitations to autonomous practice in not being able to do them themselves.

*'All of us got and still do get frustrated by some of the injections that are given*

*by GPs and if only they'd put it in the right place the response could have been much better, so... for most of us it was really good to be given the chance to inject' (11)*

*'I was always interested in it from when I did my Part A, Part B and Part C (Society of Orthopaedic Medicine Membership Course)... and it seemed terribly frustrating being taught something I couldn't apply' (3)*

Implications for service to patients featured, again with frustration at not being able to bypass potential waiting lists faced by patients who were referred for consultant opinion.

*'We see an awful lot of patients that at the moment are frustrating me because I think they would benefit but at the moment we're having to send them back' (4)*

*'Trying to get a consultant's appointment round here can be three, four, six months which I think is detrimental to the patient's treatment whereas we know that injection can help – so that's the frustration part of it' (4)*

Once the service had been set up it was viewed as an improved service in the management of patients.

*'It has expanded the way I manage patients, its another skill that is available. It has allowed me to explore effectiveness of treatment and how I can effectively manage patients and, if we use the shoulder patients as an example again, I think my overall management of shoulder pain has been enhanced as a result of using injection therapy because I have been able to select through experience and seen the response of patients to physiotherapy and to injection therapy. It has allowed me to select the types of presentations that would be more effectively managed by physiotherapy or more effectively managed by injection therapy' (1)*

*'It would just shorten that person's treatment time really' (9)*

The opinion was expressed that it was important that physiotherapists who were implementing their injection therapy skills should not become known as only applying that technique and that it should remain as an integral component of physiotherapy practice in the management of musculoskeletal lesions.

*'They're saying 'can you come and do a clinic at ... which is in the PCT (primary care trust), and I say 'No – get other physios trained up' – I don't want to get a reputation, which I think I'm in danger of doing already, and end up doing everybody else's injections' (9)*

*'One of my concerns... is that my name will become synonymous with injections and that you suddenly become 'Mr Injector' and your manual skills are ignored and that's what you're known for' (7)*

Freedom to practice was implicit within all of the interviews where injection therapy had been implemented, but responsibility was acknowledged as a recognised accompaniment within professional autonomy.

*'...they never really interfere and it's very much left to with me' (4)*

*'...usually they (doctors) say 'on to physio – they'll manage you'*

*'I'm never laid back with injection therapy... I probably ask people too often if they're happy for me to go ahead... Although we have to be 'squeaky clean', I think that's how it should be'(9)*

*'I was at pains to say 'Look, I really want to take responsibility so that it falls on my shoulders...'(10)*

*'But I don't want to stop thinking about it (anaphylactic shock) because of my professional responsibility' (10)*

Local protocols linked to local legal implications provided a barrier to injection practice and therefore to professional autonomy. An example was provided by the experience of one participant who had undergone training specifically to set up an injection service within his local health area but had been debarred from proceeding for eighteen months whilst protocols were being considered. Paradoxically, he had been able to apply his skills in the neighbouring health service whilst completing his period of clinical supervision, and had continued to deliver injections in his secondary role within the private sector. If the latter facility had not been available to him, he would have been barred from applying his skills since completing his training and a debate would have emerged in terms of his maintained competence and confidence.



*'If I was purely working in the health service would I have to have an update? Somebody who hasn't been able to do that (inject) for a year would be struggling' (4)*

The inability to prescribe the drugs administered was acknowledged by participants, but systems had been put in place to facilitate access to the drugs required. It was apparent that in some situations relevant parties had the facility to sign up to 'group protocols' as according to clear guidelines, such that physiotherapists were able to deliver drugs without the general practitioner having to sign a prescription each time. This was acknowledged as a helpful step towards prescribing rights and thence to full autonomy in the administration of musculoskeletal injections.

### ***Professional relationships***

Support was acknowledged as a major facilitating factor in being able to implement injection therapy skills. The support was principally from medical colleagues but also from physiotherapy managers and physiotherapy colleagues.

*'He (the rheumatologist) was very encouraging for me to develop these skills. We decided he would support me to go on a course and also be very supportive watching me doing injections here and closely supporting me whenever I needed it' (1)*

*'...because I'd started on this new job – our boss was very supportive at the time so we started doing some injections and this was brought into vicarious liability at work' (6)*

*'Everyone I've spoken to has been really positive – I haven't had a negative response from any of the professionals I've spoken to – the GPs or the surgeons...' (10)*

Several contributing factors towards that support could be identified within the interviews. A 'good relationship' with medical colleagues was mentioned and this was felt to have come about through effective communication, education, mutual respect, conscious involvement, knowledge of professional roles and a willingness to collaborate in the management of patients.

*'...relationships that we've had with the GPs have always been excellent and I think there's been a gradual building up of respect between professions and acknowledgement of what physiotherapists can do rather than 'people who do a bit of massage'. So I think the GPs maybe over the past ten years have become progressively more supportive and more aware of what physiotherapy can offer' (6)*

Whilst accepting the several references to the good relationships with medical colleagues and their acknowledgment of the role of physiotherapists, there was some deferral to both general practitioners and consultants. Macdonald (1995) considers how the medical profession itself has attained its autonomy and the way in which this has extended into 'dominance' over 'kindred occupations'. Parallels may be drawn between physiotherapists and midwives who he later describes as needing the sanction of the medical profession as one of the bases for their legitimacy, but not wanting to be dominated by it, acting as 'low status assistants'.

*'A. and I stood up in front of 16 orthopaedic consultants and said we were expert injectors that we'd developed this orthopaedic screening service city wide and was that okay? A. did it actually – I was at the back – cowering - but they were unanimously supportive' (7)*

*'I've spoken to other extended scope practitioners who've tried to set up an orthopaedic screening service up and down the country and they say – orthopaedic surgeons are a nightmare and the GPs are very destructive - so there are plenty of people out there who can make things very difficult' (7)*

Support for the medical profession's perception of physiotherapists is provided in a study by Sole et al (2000), that surveyed perception of orthopaedic surgeons, sports physicians, biokineticists and physiotherapists on the role of physiotherapists in sports medicine, based on 36 competencies. A general finding was that the orthopaedic surgeons, sports physicians and biokineticists perceived the importance of the competencies that overlapped with their respective scope of practice, and the competence at which these were performed by physiotherapists, significantly lower than the physiotherapists. There was some suspicion of this within the interviews in terms of the medical practitioner's perceptions of the physiotherapist's knowledge and competence.

*'We did try initially to contact the consultants in W..., which is our acute trust, and did have some very negative response from the rheumatologists in as much as no way did they want physiotherapists to do injections' (9)*

*'I do remember one group of GPs who I didn't know got very upset about one of the patients being given an injection because actually I'd spoken to a locum there and it was a sticky situation – they did write and express their concern that physiotherapists were doing this' (6)*

*'GPs, or some of them are actually reluctant for me to do it, they would rather do it themselves... Two reasons for that, the first one is that the GPs don't realise that you can inject and secondly some of them are a bit touchy about having their toes trodden on. I do ring up GPs and generally they're quite happy, I think the main concern is that they don't realise that we're qualified to do it' (8)*

Effective communication was highlighted as a means of moving the professional relationship forwards.

*'I suppose looking back to when we started the things that I've just spoken about there have made me much more inclined to communicate with people and actually phone and say look this is what I'm intending to do, I've discussed it with the patient...so it's not cowering just showing a level of professional respect really and acknowledging that particularly in primary care the GP is responsible for the patient and they are the person that you do need to communicate with, and I think most GPs will respond to that and there aren't many that start calling you 'm'dear' and treating you like a handmaiden... I do think that as a profession we're not very good at doing that historically and we tend to get a bit strident and a bit protective of our professional competence but actually communicating that, we don't do terribly well' (6)*

Intra-professional opposition had been noted.

*'The most resistance we've had is from other physiotherapists' (6)*

*'She went to see this other physio who said 'you shouldn't have injections, you shouldn't have this, it's bad practice...' (2)*

### ***Affective factors***

The term 'affective' is intended to encompass the physiotherapists' emotions or attitudes whilst going through the process of implementing their injection therapy skills following training.

Frustration and motivation have been mentioned above with respect to professional autonomy. Both can be considered to overlap into the affective factors, but the points identified as relating to them were generally more pertinent to professional autonomy.

Confidence was apparent in all of those participants who had successfully applied their skills. There were statements supporting that confidence that included terms such as 'comfort', enjoyment and 'feel good factor'. Participants claimed that their level of confidence had stemmed from their sound knowledge underpinning the approach, quality of their training programme including supervision, and a familiarity with the technique following practice and consolidation.

All participants volunteered that they had been nervous before and during the application of their first few injections. In exploring this further there had been a fear that they might not 'do it right', that they might harm the patient and that they were aware that the injection might be painful for the patient.

*'I can remember having a complete mental block about how much of each drug you used and when you washed your hands and whether you needed to wash your hands two or three times and - like faffing around generally and forgetting the drug and going back and forwards an feeling very hot and sweaty and trying to look confident in front of the patient and from what I remember the injection went well. I can't think that anything terrible happened, but I do remember that for quite a long time after I'd started injecting I really did think that everybody was going to get an infection there was going to be some serious consequences to every injection I did' (6)*

They had felt 'uncomfortable' with a 'loss of control'. The continuing fear of the occurrence of adverse reactions, particularly anaphylactic shock, was persistent and was associated with expressions of 'vulnerability', 'insecurity' and 'threat'. One participant had felt that her confidence had actually decreased in the three year period that she had been applying the skill as she had moved from a state of 'unconscious

ignorance' to 'conscious ignorance' of the scope of possibilities in terms of side effects and possible consequences e.g. septic arthritis or steroid arthropathy.

In spite of the more negative affective factors, these had generally been perceived as 'hurdles' rather than barriers although participants did acknowledge that a general discomfort and fear of catastrophe had prevented them from proceeding with injection therapy within their specific clinical situation, normally within the private sector.

*'But I have to say that my confidence in the private setting is less – I just don't feel that the structure is there' (6)*

*"I can't inject private patients because we see them at a different site where we don't have the back up for things like anaphylaxis' (10)*

### **Training issues**

Participants had had varying experiences in their training, particularly with respect to their period of clinical supervision. Some felt that they would have liked closer supervision and felt the need for more support during the period of supervision.

*'I felt that actually, because I was a novice, that I really needed to be taken back to basics and be stood over and told that's right, and come and put it in here, and that sort of thing and have him watch over me, but all he did was ask me what I was going to put in which I said, and then left me to draw it up with the nurse and then left me to actually do the injection on my own' (5)*

*'During the training my own theory was that ten injections wasn't enough for me to get to the point where I felt competent and so there was a period post qualifying where I felt uncertain and nervous about using injection therapy' (7)*

The quality of the supervision had also been inconsistent and appeared to link directly to the level of confidence experienced by the physiotherapists after completion of training.

*'... all he did was ask me what I was going to put in which I said, and then left me to draw it up with the nurse and then left me to actually do the injection on my own' (5)*

*'When I did one of the injections with one of the GPs in F..., when I said 'Do you want to come and watch?', his attitude was very much 'Well you're probably better at it than me anyway, so carry on.'* (5)

Experiences had varied between being asked to assess a patient and then to inject after the physiotherapist had decided that an injection was the treatment of choice, and being asked to perform the injection as according to the decision of the medical practitioner, thus assuming a more technical role.

*'I was reasonably lucky because I was attached to an orthopaedic consultant's out patient clinic and I was just given patients as a normal physiotherapist. We would examine patients then go back to the consultant and say I've examined the patient I don't think an injection is appropriate and they should have ordinary physiotherapy – or I have examined the patient and they've got a bursitis and the consultant would come in and say well fine – and we went ahead and did it – it wasn't the consultant examining it and saying you do the injection'* (4)

*'I had twelve injections that I did for the course – supervised injections that I did with a GP in L..., which I found very useful although, because he was trying to cram a number of injections into one session I found myself injecting patients that I maybe wouldn't have injected in the circumstance'* (7)

In both instances the specific injection technique preferred by the medical practitioner was sometimes performed and the drugs and dosages were at variance with those that had been suggested during training.

There was full support amongst participants for physiotherapists being given prescribing rights, but with some reservations with regard to knowledge of pharmacology as mentioned below.

*'If we're trained to give injections of a certain drug I think we should be able to prescribe that certain drug that we've been trained to use'* (4)

*'My weakness is I don't understand drugs, I don't understand what reacts with what'* (1)

*'The more you know the more you realise that you don't know anything, and I*

*don't know how much you actually need to know to do what we have to do' (10).*

*'I've always been fighting for prescription rights but I'm not sure that's possible – because I'm not sure what knowledge is missing – I don't know how big that knowledge is and whether once you go down that area whether you have to carry the whole lot to be able to understand. I don't know. So certainly if prescription rights are coming you might need to do some solid pharmacology' (7)*

It was felt that some basic pharmacology could be introduced at undergraduate level, not just for training in injection therapy but as a starting point for prescribing in other specialisms.

### **Commentary**

The research was conducted with full awareness of the associated ethical issues.

The use of triangulation to ensure rigour in the research carried through into the analysis such that the reflections on observation of the informant, the interview itself and the subsequent analysis of each component supported the conclusions of the other. Any personal bias or perspective was considered through self-evaluation, even though the intention was to 'bracket' assumptions, as mentioned above.

It had been expected that there might be issues surrounding the actual 'invasiveness' of the technique but this was unsupported, other than with respect to producing pain or harm to the patient. Thoughts in connection with any possible gender issues were also not borne out by the participants' experiences.

The physiotherapists' motivation to pursue injection therapy had derived from an interest in extending scope of practice linked to an improved comprehensive service to patients. There was frustration in not being able to apply this technique that was perceived as an important component in the management of musculoskeletal lesions. The inability to prescribe had dented professional autonomy in the use of the skill.

Support from medical and physiotherapy colleagues was a crucial component in implementing skills, both throughout the clinical supervision stage of training and in subsequent clinical practice. Effective communication between professions had enhanced mutual respect and a spirit of co-operation between professions. Each

physiotherapist acknowledged a feeling of nervousness in embarking in injection therapy at the outset and a fear of doing harm to the patient, especially in respect of infection and anaphylactic shock. Confidence had developed from knowledge and continuing practice of the technique. Participants reflected that increased levels of supervision would have been desirable both throughout training and in the early stages of implementing injection therapy skills.

## **Conclusion**

The study set out to investigate the experience of physiotherapists in the implementation of their injection skills after training. From this investigation, fresh insights have emerged to provide a basis for an extension of the study, towards the development of theory to underpin the training of physiotherapists and to facilitate the implementation of injection therapy into professional practice.



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## **Key messages**

Injection therapy is innovative practice to which intrinsic and extrinsic facilitating factors and barriers may exist.

Investigation of the current status of a selection of physiotherapists trained in injection therapy can provide an initial step towards the identification of facilitating factors and barriers to practice.

Extended study will aim to develop theory to underpin injection therapy courses and to facilitate the integration of injection therapy into professional practice

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Grateful thanks are extended to Dr Kathy Doncaster and Professor David Teager for their advice during its preparation.

## APPENDIX

I am appending the initial acknowledgement of the receipt of my paper by 'Physiotherapy' on 6 April 2001, prior to the submission of my project, with the feedback received on 30 August 2001. I shall be resubmitting the paper having made the amendments suggested.



# PHYSIOTHERAPY Journal

Scientific and Clinical Editor: **Michèle Harms** PhD MSc MCSP

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Ms Elaine Atkins MCSP  
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6 April 2001

01/25

Dear Ms Atkins

**An investigation of the experience of physiotherapists in implementing their injection therapy skills**

Thank you for submitting your paper to *Physiotherapy* Journal.

It has now been sent out for review and I hope to be able to let you know the outcome of review in about 8/10 week's time. Please quote the above manuscript code in all correspondence.

Yours sincerely

BB Michele Harms PhD MSc MCSP  
Scientific and Clinical Editor of *Physiotherapy*

Dictated by Dr Harms and signed in her absence



# PHYSIOTHERAPY Journal



Scientific and Clinical Editor: **Michèle Harms** PhD MSc MCSP

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Elaine Atkins  
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August 28, 2001

Dear Ms Atkins

**Paper 01/25 An investigation of the experience of physiotherapists in implementing their injection therapy skills**

Thank you for submitting this interesting article for consideration for publication in '*Physiotherapy*'. I have received reports from the reviewers and the specialist associate editor and I am now able to let you know of the outcome of the review process.

We are all agreed that your paper has a place in the literature particularly because it focuses on a relatively new area of practice. However, there are a number of relatively minor issues that will need addressing before I can accept it for publication.

Both referees and the associate editor have provided useful reviews. I hope you will find their comments both helpful and constructive.

A minor point – could you omit reporting in the first person. There are a few sections where you refer to “my” (area of study, p2 for example).

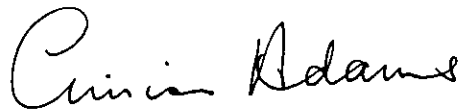
I believe that your paper will be strengthened by addressing these issues and that a revised submission will contribute to the literature. When you resubmit, could you also provide a list of how each point has been addressed to assist the reviewing process. Please take care to ensure *all* points are adequately



addressed, the reviews are relatively brief and I do not anticipate that this will take you too long to revise. You may of course, justify your original argument if necessary. One copy should be highlighted to show where changes have been made.

I look forward to receiving your revised paper.

Yours sincerely

A handwritten signature in black ink that reads "Ciriaco Adams". The signature is written in a cursive style with a large initial 'C'.

Pp Michele Harms PhD MSc MCSP  
Scientific and Clinical Editor

Dictated by Dr Harms and signed in her absence

## ASSOCIATE EDITORS COMMENTS

Manuscript 01/25 Date: 20/8/01

Type of manuscript: research

Received by Associate Editor August 14<sup>th</sup> 01

### General Comments:

This paper provides very interesting information about a comparatively new area of physiotherapy practice. It is appropriate to carry out an exploratory study of the early experience of physiotherapists engaging in these techniques and to share the findings so that they may help inform future training and practice.

I agree with the comments of both reviewers. I endorse in particular those of reviewer 2 who suggests a number of specific amendments including methodological. I think it is important to take note of the comments of reviewer 1 who represents many readers who will not have expertise in either the field of practice or the qualitative research approach.

A number of areas within the text need to be tightened up with more clarity of expression and I think this could then produce a submission worthy of publication in Physiotherapy.

### Specific Comments:

#### P.2.

Top para. needs a ref. to CSP 1995 document.

Bottom para. should give the years of the search

#### P.3

Top para. It is not made clear why these two papers were selected for study.

Para.4 the distinction between this level of analysis and that of 'pure grounded theory' needs to be made clear if the author thinks this is an important and relevant point to raise here.

Para.5 For the benefit of overseas readers and others, 'Frontline' needs to be described as the fortnightly news letter of the Chartered Society of Physiotherapy in the text and referenced as the Frontline publication with full reference details in the reference list.

#### P.4

Para 3. n.b. the instructions to participants is not a question as such.

Para.4 the use of 'bracket' needs to be explained here to distinguish from the use of bracket mentioned on p. 5.

#### P.5

Para. 2 it is misleading to state that the 'reader may reach another conclusion' - the purpose of this paper is to show the process of analysis of the author.

#### P.10

Note repetition of quote (5)

#### P.11

Conclusion it may be less confusing to talk of the development of a theoretical framework at this stage of the research.



# Physiotherapy

## Referee's Comments

Manuscript Code: 01/25
Date: <u>  3  </u> May 2001
Type of manuscript: <b>Research</b>
Referee <u>  1  </u> <u>  2  </u>
Type of review: <u>  Blind  </u> <u>  O  </u>
Received by Associate Editor

### TITLE OF MANUSCRIPT:

An investigation of the experience of physiotherapists in implementing the injection therapy skills

### GENERAL COMMENTS

- Presentation *This is presented clearly - a few repetitions have been needed in the text.*
- Content *This is not my area of specialisation seems alright.*
- Appropriateness to 'Physiotherapy'  
*I feel this study has used the expanded approach in that it is a "bottom-up" discovery way. The concluding comments suggest a 'theory' which if it was more - an approach' to suitable them.*
- Summary Observations  
*Highlight it is part of phase one in conclusion* *the work*

This form is sent to authors

## **General Comments**

### **Presentation**

The paper is generally well laid out, well written and progresses in a logical manner.

### **Content**

The purpose is properly stated and relevant. The article is arguably under-referenced in places.

The author appears to have drawn out relevant findings from his/her data. However there are some issues that I believe the Author needs to develop.

- 1) If the number of participants was determined in advance (the arbitrary 10/11), is there any evidence that saturation was reached? This needs a fuller discussion. (eg can you substantiate that a gender issue is unlikely to have arisen with more participants?) ✓
- 2) It would be helpful for the reader if the process of triangulation was explicitly detailed. Perhaps include examples to explain to the reader exactly how the various components of the triangulation interacted.
- 3) The section concerning professional relationships is viewed in the context of other literature and this adds an important dimension. It would be helpful if other findings were also set in context in this way.
- 4) It is unclear whether all the participants were injecting — this should be clarified and any implications commented on as necessary.
- 5) Was it made clear to participants that they could withdraw at anytime, even after the interview had started?

### **Appropriateness to Physiotherapy**

I think this is an entirely valid topic that is relevant to injectors and to the wider issues surrounding extending scope of practice.

### **Summary Observations**

I think this is a relevant and generally well written paper. I think that the paper would be improved if the Author develops the 3 main points mentioned above.

### **Specific Comments**

Page 1 last sentence of introductory paragraph unclear

Page 3, para 1 Is this your opinion on a gender issue. The issue needs to be clarified and its source made clear.

Page 4, para 3 Can you elaborate on the prompts used?

Page 4, paras 5&7 Why use informants — better to stick to participants

Page 4 Para 5 can you rephrase begged for — (colloquial)

Page 4, para 8 Can you elaborate on the unethical behaviour issue bit — did you have preconceptions? Did you explore or avoid these deliberately?

Page 8, para 9 Can you reword the sentence beginning A general finding . I was not sure what you meant. Could you give examples of the overlapping competencies?

Page 10, para 1 Could you go further into the issue of unconscious ignorance etc

Page 10, para 8 The relationship of training to level of confidence is not brought out by the ensuing quotes — they only appear to substantiate that the training was sometimes lacking. Is it necessary to repeat participant 5 s wording (it appears 3 paras above)?

Page 11 and 12 the commentary and conclusion are a little light. You could reiterate key issues and findings a little more fully.