BRITISH ASSOCIATION OF DERMATOLOGISTS

WORKING PARTY REPORT ON SETTING STANDARDS FOR MOHS MICROGRAPHIC SURGERY SERVICES

Recommendations of the British Society for Dermatological Surgery and British Association of Dermatologists

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SUMMARY

Mohs Micrographic Surgery (MMS) is a highly effective and cost-effective technique for removing non-melanoma skin cancer (NMSC) by microscopic examination of 100% of the surgical excision margin[1,2].

At present there are no agreed service framework guidelines for setting up and managing a Mohs Micrographic Surgery (MMS) service. Lead clinicians for skin cancer tumour site specific groups (TSSG) in cancer networks may not be dermatologists or dermatological surgeons and therefore may have limited experience of MMS. It is also important that this is defined for commissioners, trusts and lead clinicians to understand the specialist requirements and resources needed for a MMS service.

The British Society for Dermatological Surgery (BSDS) and British Association of Dermatology (BAD) have agreed the need for national guidelines relating to standards for MMS in the United Kingdom (UK).

A working group of BSDS members with expertise in MMS has been asked to develop a set of recommendations. The remit of this Working Party was to provide a consensus statement for the BAD on minimum standards for MMS provision in the UK.

The group is chaired by James Langtry and includes representation from England (Raj Mallipeddi), Wales (Richard Motley), Scotland (Colin Fleming), Northern Ireland (Olivia Dolan) and Ireland (Patrick Ormond). It also includes both American College of Mohs Surgery (ACMS) trained (Drs Olivia Dolan, Raj Mallipeddi and James Langtry) and non-ACMS trained colleagues (Drs Colin Fleming, Patrick Ormond and Richard Motley).

The BAD Skin Cancer Sub-Committee and the Dermatology SAC supports the development of clear quality standards for MMS. Consultation beyond these groups will be sought from other colleagues.

The following areas were reviewed by the working group and agreed as essential standards for a Mohs surgeon and service operating in the UK, Northern Ireland or Eire. These are viewed as minimum requirements which should be achieved for any service providing Mohs surgery for the treatment of skin cancer and meeting the NICE IOG[4].

A. Definition of a Mohs Surgeon

A Mohs surgeon will normally be a consultant dermatologist who has undertaken a period of additional training in advanced dermatologic surgery including the Mohs Micrographic Surgery technique [appendix 1]. Mohs surgeons are expected to play a leading role in the diagnosis of skin cancer and offer a full range of appropriate treatment options, including MMS, reconstruction, and follow up of patients treated.

The Mohs surgeon role includes Mohs micrographic staged excision of skin cancers, preparation and reading of Mohs microscopic slides (Mohs sections) and the use of the mapped microscope findings to guide further excision in order to achieve 100% tumour-free surgical margins.

All Mohs surgeons are expected to undertake annual audit and submit to revalidation of their skills.

It is desirable for Mohs surgeons not to work in isolation and therefore work as a team of two or more with a leading role in the skin cancer MDT. Where this is not possible the Mohs surgeon will meet with colleagues of the nearest Mohs surgery service on a regular basis to discuss aspects of Mohs surgery cases, in particular near misses, Mohs pathology challenges, learning points and reconstruction.

B. Caseload requirements of a Mohs Surgeon

A Mohs surgeon should regularly undertake a caseload that is sufficient to maintain and develop Mohs surgery skills, Mohs pathology interpretation and run a high quality Mohs laboratory. The number and complexity of skin tumour caseload undertaken by a Mohs surgeon is a key factor in maintaining and developing these skills. It is recommended that an individual Mohs surgeon will undertake a minimum of 2 PAs (programmed activities) including associated administration per week of Mohs surgery. In the UK at present, it would be anticipated that a Mohs surgeon would normally treat 3 to 5 tumours per week (depending on the tumour size and complexity). There will be some Mohs surgeons who primarily operate on very complex and large cases as part of a multidisciplinary approach, and it may be that these individuals will routinely treat fewer than 3.

Mohs units undertaking advanced dermatologic surgery training fellowships incorporating Mohs surgery will usually have Mohs caseloads around 400 Mohs cases per year, and Mohs surgery trainers each undertaking more than 200 cases per year (*see Appendix 1*). These numbers are easily achievable by a number of existing Mohs units Nationwide.

- Handling and recording Mohs specimens

Mohs surgeons should understand the process involved in producing high quality frozen section Mohs specimens and be able to supervise, train and direct the technicians within the Mohs laboratory. The Mohs surgeon will read their own slides and have access to second opinions on interpretations of slides with a Mohs surgery trained colleague and / or dermatopathologists.

Mohs surgery notes should be recorded in a standardised manner and be available to be submitted with microscope slides for third party audit / evaluation. A national minimum

dataset for Mohs has been developed and will record patient demographics, date of Mohs procedure, tumour diagnosis, diagnostic biopsy pre-Mohs where available, indications for Mohs procedure, anatomical site, number of stages and number of blocks to clearance, stain used for sections, tumour and defect sizes, method of reconstruction. Audit of the Mohs surgeon interpreted slides should be regularly undertaken in conjunction with a dermatopathologist and a record kept of the outcome. All Mohs units would be expected to complete the dataset for all cases and evaluate their service annually.

- Referral management

A Mohs service will provide skin cancer diagnosis and treatment to a Cancer Network on a sub-regional or regional basis, and take referrals from colleagues in dermatology, oculoplastic surgery, plastic surgery, maxillofacial surgery, ENT, GPwSI in dermatology and others involved in the diagnosis and treatment of skin cancer.

Referrals to the Mohs service will be in line with the recommendations of the skin cancer IOG[4] and represent the more challenging end of the NMSC spectrum, including high-risk basal cell carcinoma (BCC) involving the eyelid, nose, ear, lip; recurrent BCC; aggressive histological growth pattern BCC (morphoeic, infiltrating, micronodular, peri-neural invasion), BCC of the head and neck > 2cm diameter; as well as high risk squamous cell carcinoma (SCC), microcystic adnexal carcinoma (MAC), dermatofibrosarcoma protuberans (DFSP) and other NMSC that may have a improved outcome following MMS.

Where local anaesthetic reconstruction is not possible by the Mohs surgeon, for example if extensive reconstruction is required, or specialist site-specific repairs, it may be appropriate to enlist the help of surgical colleagues working closely with the Mohs surgeon, to undertake surgical repairs perhaps under general anaesthetic. These routes of referral must be agreed locally between the Mohs surgeon and the skin cancer MDT.

C. Facilities required for MMS

The Mohs surgery facility will consist of procedure rooms suitable for dermatological surgery located adjacent to (or in close proximity to) a fully equipped Mohs laboratory and ideally multi-headed microscope.

The facility for Mohs surgery will usually consist of two or more procedure rooms with all the necessary equipment for Mohs cases of all complexities and including access to appropriate surgical beds and recovery areas, electrosurgical equipment and surgical instruments for peri-ocular, peri-aural and fingertip tumours.

The Mohs laboratory will have one or more cryostats, along with staining facilities (manual and / or automated) for Haematoxylin & Eosin and / or Toluidine Blue staining of Mohs sections. Mohs laboratory technicians will be either dedicated or one of small team of biomedical scientists who regularly cut Mohs sections and do sufficient numbers per week to maintain a high technical expertise in preparing Mohs sections.

There should be access to appropriate immunohistochemical staining for selected Mohs cases.

- Risk Assessments

Formal written risk assessments of the Mohs unit must be carried out at least annually.

- This should include the current COSSH assessment of risks from exposure to liquid nitrogen and cell staining solvents, where used.
- All drugs and other chemicals used in the MMS unit must have a COSHH assessment and be stored in a secure place.
- Waiting areas must be separate from treatment areas.
- All entrances to treatment areas must have appropriate warning signs.
- An infection control and hygiene policy must be in place to ensure adequate cleaning of equipment and other surfaces in the MMS unit.

D. Equipment and Safety

A Mohs laboratory is a dedicated room, equipped with several critical pieces of equipment including a low-temperature cryostat microtome, cell strainers using volatile solvents, and heat plates. Liquid nitrogen is frequently used to freeze tissue blocks. Tissue inks can be toxic if ingested.

The protection of the MMS Unit staff is necessary to comply with safety standards. Protective clothing including theatre gowns, gloves, eye protection and cryo-protective clothing must be used where required.

Following the procedure, all laboratory equipment must be cleaned and decontaminated, including the operating theatre in line with local policies.

Patients and their relatives, or other members of the public should not be allowed into the Mohs laboratory under normal circumstances.

E. Clinical Governance

MMS services should operate in an environment that is determined by adherence to the principles of existing clinical governance. It is recommended as a minimum a clinical governance framework for a local MMS service should include, at least, the following elements:

- The service should have a **named MMS lead clinician**. The role of the lead clinician is to take clinical responsibility for ensuring that the service is safe and effective and complies with:
    - national service delivery standards
    - treatment-specific guidelines
    - disease specific guidelines

- The MMS service is delivered by a **multi-professional team**. Members of the team and their roles in contributing to the service should be recorded. Team members would typically include the following: MMS lead clinician; Lead laboratory technician, senior staff nurse +/- trainee grade for any of the above.

- The MMS team should have **regular team meetings**. The broad aim of these meetings is to ensure that the service is focused on the need to provide timely, safe and effective MMS services to local patients.

The **agenda for these regular MMS clinical governance meetings** should include the following elements:

- **Review of MMS activity** since the previous meeting (in other words, summary of treatment numbers for each clinician).
- **Review of MMS waiting list data** (if a waiting list exists) to assess demands on the service and issues for service delivery.
- **Review of adverse events**. All adverse events should be discussed by the team. Where patient safety is an issue, the team need to consider the cause of the adverse event, and measures to be taken if necessary to avoid a repeat in the future.
- **Discussion of difficult or instructive cases.** As with any clinical therapy service, there may be some cases that are atypical or unusual. Discussion of these few cases is often instructive for team members. Furthermore, such discussion is usually helpful in order to improve patient outcomes generally.

F. Training the Supporting Team

MMS services require staff to have specialist training, knowledge and clinical skills appropriate to the role they are undertaking to support the Mohs surgeon. Staff must be assessed as being competent and safe in order to provide treatments that maximise benefit and minimise the potentially serious acute and chronic adverse effects of therapies.

The minimum standards required include:

- Dermatology nursing staff should ideally be qualified and registered with the Nursing and Midwifery Council, or in some cases appropriately experienced Health Care Assistants.
- Training and experience in dermatology is important to provide holistic patient care. This knowledge includes:
    - Anatomy and Physiology of the skin
    - Recognition and understanding of skin diseases
    - Skin assessment
    - Understanding skin cancer
    - Patient education regarding skin care and use of topical therapies
    - Understanding the psychological impact of skin cancer and its treatment
- Attendance at a recognized surgical course to gain the necessary theoretical education and knowledge may be required for new MMS-naïve staff.

- Surgical Assistant

- During Mohs procedures a surgical assistant would be expected to be more involved than during routine dermatologic surgical procedures.
- A period of supervised practice for approximately 3 months with a competent practitioner may be required to develop the necessary clinical skills to be safe and effective as a surgical assistant.
- Will provide wound care and dressings advice, undertake suture removal, microbiological swabs where required, and other appropriate pre- and post-op advice.

G. Audit standards for MMS

The MMS service should undertake regular audit. The following audit standards are a recommended starting point;

- Do the indications for MMS follow guidelines (BAD guidelines for treatment of BCC, skin cancer IOG guidance)?
- Tumour recurrence rates.
- Mohs section histology review.
- Post-operative wound infections.
- Mohs minimum dataset documentation.
- Case audit of adverse event outcomes.

Summary

In summary, these minimum standards for Mohs Micrographic Surgery services have been written with the intention of ensuring that patient care in this important area of skin cancer treatment is optimal. In particular, the Working Party expects that these standards will help inform commissioners of the requirements and service standards for providing MMS services in the UK. Additionally, the Working Party anticipates a benefit from these minimum standards for existing MMS services as a guide to improving standards. These recommendations are based on the knowledge and expertise of this multidisciplinary group, whose members were chosen on the basis of their experience of this therapeutic area. The need for a formal, evidence-based clinical governance guideline document to cover this subject area is acknowledged by the working party, and should now be a priority for the British Association of Dermatologist (BAD) and British Society for Dermatologic Surgery (BSDS).

EXECUTIVE SUMMARY OF THE REPORT ON MINIMUM STANDARDS FOR MOHS MICROGRAPHIC SURGERY SERVICES

- MMS is a method of skin cancer excision which examines 100% of the surgical margin.
- Patients with skin cancer treated by MMS have a very low recurrence rate.
- The skin cancer IOG (2006) recommends MMS for skin cancers at higher risk of recurrence.
- A Mohs surgeon does a minimum of 2 Mohs PAs per week (approximately 3 to 5 cases Mohs cases per 2 PAs depending on tumour size & complexity).
- MMS training units will usually do > 400 Mohs cases per year and MMS trainers > 200 cases per year.
- MMS training will usually be undertaken during an advanced dermatologic surgery / cutaneous oncology fellowship of 12 months duration.
- MMS trainees will be expected to do > 100 MMS cases independently and experience > 250 MMS cases during training.

Appendix 1: Mohs Surgery Training curriculum

The Mohs trainee will normally hold a NTN in Dermatology or have completed the Certificate of Completion of Training (CCT) in Dermatology (or equivalent). Entry into an advanced Dermatologic Surgery training programme requires previous training in lesion recognition and diagnosis, non-surgical treatments, dermatopathology and basic dermatologic surgery, as detailed in the 2010 Dermatology Speciality Curriculum[3]. MMS training will be for a specified duration, above and beyond any opportunities usually available during specialist registrar training in dermatology. An advanced dermatologic surgery fellowship should be of at least 12 months duration, and follow a structured syllabus as defined by the Dermatology SAC and the BSDS/BAD. Mohs training should be curriculum based and cover all aspects of work of the skin surgical oncologist, including diagnosis of skin cancer, anatomy, surgical and non-surgical options for treatment of skin cancer (including for example in depth knowledge of topical treatments, photodynamic therapy, radiotherapy etc). Training will be in a Mohs unit with instruction in all the technical, surgical and laboratory aspects of Mohs excision, Mohs laboratory (presentation of Mohs layer, cutting of Mohs sections on the cryostat, staining of sections), interpretation and reporting of Mohs section pathology as well as reconstruction of the resulting surgical wounds.

Mohs surgery training should develop along the lines of progressive competency. There is an initial period of observation, followed by supervised procedures and finally independent surgery (with the Mohs trainer available to read the Mohs sections and discuss any technical aspects of the Mohs excision and reconstruction). Mohs training is competence based and Mohs trainees are expected to keep an anonymised log book of all procedures. This should include anonymous patient reference details, date of birth, gender, date of procedure, tumour diagnosis, size, site, histology, primary or recurrence, stain used, number of stages, Mohs wound size, reconstruction and space for comment (e.g. Gorlin's syndrome, solid organ transplant recipient). Trainees should undertake skin cancer or skin surgery audits and academic work in skin cancer and skin surgery.

Trainee Mohs surgeons should have undertaken at least 100 varied cases independently and have experience of at least 250 cases at the end of training.

A curriculum for a twelve month dermatological surgery fellowship has been developed, a major part of which is training in Mohs surgery.

Appendix 2: References and Notes

1. Surgical excision versus Mohs' micrographic surgery for primary and recurrent basal-cell carcinoma of the face: a prospective randomised controlled trial with 5-years' follow-up.
Mosterd K, Krekels GA, Nieman FH, Ostertag JU, Essers BA, Dirksen CD, Steijlen PM, Vermeulen A, Neumann H, Kelleners-Smeets NW. Maastricht, Netherlands.
Lancet Oncol. 2008 Dec;9(12):1149-56. Epub 2008 Nov 17.

2. Cost effectiveness of Mohs micrographic surgery: review of the literature.
*Tierney EP, Hanke CW**. J Drugs Dermatol. 2009 Oct;8(10):914-22.***

3. General Medical Council Specialty Training Curriculum for Dermatology August 2010
http://www.gmc-uk.org/Dermatology_curriculum_2010.pdf_32485914.pdf

4. Mohs Micrographic Surgery and the NICE skin cancer Improving Outcomes Guidance (IOG) document

The only nationally approved guide to the role of Mohs micrographic surgery is to be found in the 2006 IOG for skin cancer guidelines produced by NICE in the document 'Improving Outcomes for People with Skin Tumours including Melanoma'.

Mohs surgery: *A surgical technique used to treat skin cancer. Individual layers of cancerous tissue are removed and examined under a microscope one at a time until all cancerous tissue has been removed.*

Introduction
Mohs micrographic surgery is a precise technique in which excision of the skin lesion (usually a BCC) is carried out in stages and each stage checked histologically. It is advocated for use in cases where it is critical to obtain a clear margin while preserving the maximum amount of normal surrounding tissue, in particular for recurrent and high-risk aggressive growth pattern BCCs such as morphoeic type BCCs. The main problems with this technique include the length of the procedure, the need for special equipment and training, and the relatively high cost. The availability of the procedure in the UK is, at present, limited.

A. Recommendations
Mohs surgery should be available in each cancer network and only carried out by those who have received training approved by the lead clinician of the skin cancer site-specific network group.

B. Anticipated benefits
Increased access for Mohs surgery will improve outcomes for some patients.

C. Evidence
There is systematic review evidence to support the use of Mohs surgery for large, high-risk BCCs located at surgically complex regions of the face. Systematic review evidence also exists for the use of

Mohs surgery in patients with recurrent NMSCs, in patients with tumours with aggressive growth pattern.

Improving Outcomes for People with Skin Tumours including Melanoma – definitions of high risk BCCs and SCCs

High-risk basal cell carcinoma: *Those that have a high recurrence rate after treatment. There are several factors that may have an effect on recurrence rate including histological sub-type, other histological features, site, and other patient and tumour features.*

Histological sub-type

- *Morphoeic – linear groups of cancer cells with surrounding scarring; clinically this causes a thickened and hardened skin*
- *Infiltrating – like morphoeic but with less scarring*
- *Micronodular – very small groups of cancer cell*
- *Basosquamous carcinoma – a skin cancer with both basal and squamous elements*

Histological features

- *Perineural invasion*
- *Invasion below dermis*

Sites

- *Nose and paranasal folds*
- *Periocular*
- *Ears*
- *Scalp and temples*
- *Lips*

Other factors

- *Size > 2 cm*
- *Immunosuppression*
- *Genetic disorders such as Gorlin's syndrome*
- *Previously treated lesion*

High-risk squamous cell carcinoma: *Those that are high risk have a high recurrence rate after treatment and may metastasise.*

Histological features

- *Poorly differentiated, perineural invasion, depth greater than 4 mm or extending to subcutaneous tissue (Clark level 5)*

Sites

- *Lip, ears, non-sun-exposed sites, e.g. penis, scrotum and soles of feet; in areas of previous injury, e.g. burns, irradiation and chronic ulcers*

Other factors

- *Greater than 2 cm diameter, immunosuppression, previously treated lesion*