MoHS Micrographic Surgery Service

Proposal:

Development of NOSCAN Macmillan Mohs Micrographic Surgery Service (MMS)

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Item: 41/13
1. Summary

This proposal considers steps to develop the existing NOSCAN Macmillan Mohs surgery service (MMS).

The original case presented to NoSPG indicated the rising incidence of skin cancer and stated ‘It is intended that in time the service will explore needs and evolve accordingly.’ We are now at that stage. Skin cancer continues to rise faster than any other cancer type, and the benefits of Mohs surgery are being recognised more broadly across the region. We would predict a similar pattern of increase in workload over the next 5 years as the past 5 years i.e. in excess of 300 -350 patients per year.

MMS is recognised globally as the gold standard treatment for large, recurrent, infiltrative and aggressive non melanoma skin cancer. The technique allows precise identification and removal of entire tumours, leaving healthy tissue unharmed. It is used to treat basal cell cancer, squamous cell cancer, melanoma, and rare aggressive tumours such as dermatofibromasarcoma protuberans and microcystic adnexal carcinoma. It is highly effective, providing 99% cure rates in some instances and is recommended treatment in national guidelines. NICE recommends that each region has a Mohs service.

The NOSCAN Macmillan MMS service was first established in 2003, funded by Macmillan from 2006-2009 and is presently funded through the NoSPG. It has been conspicuously successful. It is housed in a state of the art dermatology cancer centre in Ninewells, and continuous audit since inception has demonstrated 99% cure rates for some of the most aggressive forms of non melanoma skin cancer, and very high levels of patient satisfaction. The service has runs successful Mohs training fellowships, attracted international commendation (recently a Mohs Surgeon from the Mayo clinic came across to see our service), and has taken a lead in a number of areas of service development e.g. we have developed the UK minimum data set for MMS.

The costs of skin cancer to the NHS are continuing to rise- non melanoma skin cancer, mainly basal cell and squamous cell carcinomas, is increasing at a rate of 5% per annum. The incidence in Scotland is around 15,000 patients per annum at present. New treatments for malignant melanoma, likely to be available in the near future, may cost £40k per annum. Mohs is a cost effective treatment, particularly for recurrent or aggressive tumours, which are one of the main types of tumour treated in Dundee. This cost effectiveness comes from a reduction in further operations and treatment in comparison with standard procedures; and from a reduction in tissue removed in 4 out of 5 cases, which reduces reconstruction requirements.

The original predictions for the service were to manage 160 patients per annum but due to service efficiencies we have managed to treat around 240 patients per annum over the past 2 years on existing resource. Waiting times continue to rise with current decision to treat to surgery being 11 -12 weeks.

<table>
<thead>
<tr>
<th>Year</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013 (6 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>209</td>
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<td>214</td>
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<td>254</td>
<td>154</td>
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</table>

An increase in recurring funding of £116k per annum is required to meet the projected service demand for the North of Scotland. The costs are detailed in Appendix 6.
2. Background

Non melanoma skin cancer, mainly basal cell and squamous cell carcinomas, is increasing at a rate of 5% per annum. The incidence in Scotland is around 15,000 patients per annum at present. At the time of setting up the NOSCAN MMS service around 10,000 patients were seen yearly and all forecasts of skin cancer incidence predict a growing rise, greater than for any other cancer (ISD).

Most of these tumours can be treated with relatively straightforward treatments but a minority have aggressive tumours. These tumours may metastasise early or cause significant local damage around the face. Standard treatment of these tumours results in either excessive removal of normal healthy tissue, with subsequent damage to surrounding structures, or incomplete removal of tumours. MMS is the gold standard for these more aggressive tumours.

The original predictions for the service were to manage 160 patients per annum- the service however has managed to treat around 240 patients per annum over the past 2 years on existing resource. Despite this waiting times are rising, due to increased acceptance of the primacy of this treatment, rising incidence of disease and new indications for MMS.

The present service consists of Dr Alan Evans, consultant pathologist, 4 Mohs trained Biomedical Scientists who work on rota, Dr Colin Fleming and Dr Andrew Affleck, Consultant Mohs surgeons/dermatologists, dedicated theatre nurses and administrative staff. Dr Sanjay Rajpara (from NHS Grampian) is currently near completion of training in the technique.


Grampian and Tayside are the 2 largest referrers to the service. Internal review of the service with NOSCAN in 2011 considered the possibility of creation of a 2 centre model for NOSCAN Mohs. The need to provide ease of access for Grampian patients for preoperative and post operative care was recognised, as was the need to have a critical mass to develop and maintain skills. The optimum size of the unit to meet UK standards is around 400-500 patients per annum. The agreed outcome was to train up a Grampian based consultant dermatologist, Dr Sanjay Rajpara, in Mohs, and include him in the surgical rota, but also to bring pre and post operative care closer to home using teledermatology referrals and through creation of a Grampian based pre and post operative clinic in ARI, which will be run by Dr Fleming and Rajpara together. This is due to commence in September 2013.

4. Service Improvement /Redesign

A recent test of change has been carried out utilising the non-recurring funding allocation received from NOSCAN of £22k, where, by increasing the skilled workforce (band 5 nurse) supporting each of the two current surgical lists enabled patient throughput to increase from 3 to 4 cases per day. With effect from October 2012, the running of these lists with 4 cases instead of 3 will be a consistent feature of the service and allow a further 84 patients to be treated annually. The funding allocation of £22k will cover the additional Band 5 nurse as well as instrumentation costs associated with the additional cases for two years until March 2014.
5. Future Developments

The current service model involves a significant level of support from middle grade medical staff. Given the changing picture in terms of availability as well as the increasing demands on other elements of the wider Dermatology Service, it would be beneficial to look to secure a more robust level of support at this level by introducing a Skin Cancer Fellow post to the service. This post provide long-term service sustainability, removing the dependence on current SpR service contribution.

6. Alternative sources of service

Standard treatment of recurrent basal cell cancer results in either excessive removal of normal healthy tissue, with subsequent damage to surrounding structures, or incomplete removal of tumours. A service based in Glasgow, for patients from the West of Scotland, has existed since 2005, and a MMS service now exists in Edinburgh. New MMS consultants have been appointed in SCAN and WOSCAN in recent years and all MMS services in Scotland are presently under waiting times pressure.

7. Teaching and Research

The unit is active in teaching and research in the field of skin cancer therapy, and aims to continue this activity, and its role as a beacon of modern skin cancer practice.

8. Training

Dr Rajpara (who has existing sessions funded for this service and sessions in his job plan) will be ready to work independently later this year.
Mohs microsurgery

**Introduction:** Mohs micrographic surgery is an advanced treatment for skin cancer. This procedure is state-of-the-art treatment in which the dermatologist serves as surgeon, pathologist and reconstructive surgeon. It relies on the accuracy of a microscope to trace and ensure removal of skin cancer. This procedure allows dermatologists to identify precisely and remove the entire tumour, leaving healthy tissue unharmed. This procedure is most often used in treating the most common form of skin cancer, basal cell carcinoma.

The cure rate for Mohs micrographic surgery is highest of all treatments for skin cancer - up to 99 percent even if other forms of treatment have failed. The procedure minimises the likelihood of tumour regrowth and reduces the potential for scarring or disfigurement.

**History:** The technique was developed by Frederic E. Mohs, M.D. in the 1930s, and has been gradually refined since. Initially, Dr. Mohs removed tumours with a chemosurgical technique. Thin layers of tissue were excised and frozen before being pathologically examined. He developed a unique technique of colour-coding excised specimens and created a mapping process to accurately identify the location of remaining cancerous cells. As the process evolved, surgeons developed the technique and now excise the tumour, remove layers of tissue and examine the fresh tissue immediately. This reduces the normal treatment time to one visit and allows for immediate reconstruction of the wound. The mapping of excised specimens and their thorough microscopic examination remains the cornerstone of the procedure.

**Effectiveness:** Clinical studies have shown the technique has a five-year cure rate up to 99 percent in the treatment of primary basal cell carcinomas.

**Treatment Issues:** Common treatment procedures often prove ineffective because they rely on the human eye to determine the extent of the cancer. In an effort to preserve healthy tissue, too little tissue may be removed resulting in recurrence of the cancer. If the surgeon is overcautious, more healthy tissue than necessary may be removed, causing excessive scarring or damage to vital structures. Some tumours do not respond to common treatments, including those greater than two centimetres in diameter, those in difficult anatomical locations and tumours complicated by previous treatment.

**Indications:** Mohs micrographic surgery is primarily used to treat basal cell carcinomas, but can be used to treat less common tumours. Mohs surgery is indicated for recurrent basal cell cancers, tumours where it is important to preserve healthy tissue for maximum functional and cosmetic result, such as eyelids, nose, ears, lips, large or aggressive tumours.

**Procedure:** The Mohs process includes a specific sequence of surgery and pathological investigation and relies on the contiguous growth pattern of the tumour. Mohs surgeons examine the removed tissue for evidence of residual tumour. Once the visible tumour is removed, Mohs surgeons trace the path of the tumour using a map of the surgical site and a microscope. Thin layers are removed, mapped, and the whole of each layer is examined histologically. Normal pathology technique allows visualisation of around 3% of the base and sides of a tumour- the Mohs technique permits 99% to be seen. Areas of tumour are mapped and subsequent layers are removed only at the site of the mapped tumour, thus normal tissue is retained. The process continues layer-by-layer until the cancer is completely excised.

**Reconstruction:** The best method of managing the wound resulting from surgery is determined after the cancer is completely removed. When the final defect is known, management is individualised to achieve the best results and to preserve functional capabilities and maximise aesthetics. The Mohs surgeon is also
trained in reconstructive procedures and often will perform the reconstructive procedure necessary to repair the wound. Mohs surgery often results in reduction in wound size, and therefore easier reconstruction. A small wound may be allowed to heal on its own, or the wound may be closed with stitches, a skin graft or a flap. Another surgical specialist may complete the reconstruction.

**Cost Effectiveness:** Besides its high cure rate, Mohs micrographic surgery has been shown to be cost effective. In a study of costs of various types of skin cancer removal, the Mohs process was found to be comparable when compared to the cost of other procedures, such as electrodessication and curettage, cryosurgery, excision or radiation therapy. Mohs micrographic surgery preserves the maximum amount of normal skin and results in smaller scars. Repairs are more often simple and involve fewer complicated reconstructive procedures. With its high cure rate, Mohs surgery minimises the risk of recurrence and eliminates the costs of larger, more serious surgery for recurrent cancers.

MMS has a five-year cure rate up to 99 percent in the treatment of primary basal cell and 95% for recurrent tumours (Shriner DL et al. Mohs Micrographic Surgery. JAAD, 1998;39:79-97). In comparison, other forms of surgery have 5 year cure rates of up to 82% for recurrent basal cell cancers. The patients most likely to benefit from MMS are those with recurrent or infiltrative basal cell cancers. In addition, the cost benefits of MMS are significant. (Cook J and Zitelli, JA. Mohs micrographic surgery: a cost analysis. JAAD, 1998; 39:698-703, Surgical excision vs Mohs’ micrographic surgery for basal-cell carcinoma of the face: randomised controlled trial. Smeets et al, Lancet 2004 Nov 13-19; 364(9447):1766-72.)
Appendix 2

Referral Pathway and Criteria

Skin cancer surgeons\(^1\) treat most primary tumours as per standard protocols
  ↓
Basal cell cancer best treated with Mohs? \(^2\)
  ↓
Refer Mohs
  ↓
One-stop reconstruction or return patient to referring surgeon for reconstruction
  ↓
Follow up with referring clinician

1 Dermatologists, Plastic Surgeons, Occuloplastic Surgeons, other reconstructive surgeons

2 see referral criteria
Is the tumour, which is a histologically proven basal cell cancer, on the following site?
- eyelid
- ear
- lip
- nose
- nasolabial fold

YES

Does the histology report confirm basal cell cancer occurring with 1 cm of scar site of a previously treated basal cell carcinoma?

NO

YES

Does the histology report of basal cell cancer on the excision biopsy specimen suggest a high probability of incompletely excised tumour
- of an aggressive histological type
- a previously excised tumour
- Incomplete excision at the deep margin?

NO

YES

Is the tumour a primary basal cell cancer more than 2 cm of aggressive histological type, or other tumour demonstrated to benefit from Mohs?

NO

YES

Refer for standard treatment

Refer for Mohs
Explanatory notes
Appendix 3

Synopsis of Mohs process

Patient arrives
Clerk in
Consent
Assessment and photography
Into surgery suite
Local anaesthetic
Curettage
1st layer
Technician takes specimen
Specimen mapped then taken for processing in lab
Patient wound haemostasis and dressing
Patient waits in waiting area
Specimen processed and read
Further sections cut if necessary
Specimens read again if necessary
Repeat tumour mapping
2nd layer if necessary and repeat process until tumour margins clear
Once tumour margins clear, then wound reconstruction in dermatology or transfer to reconstructive surgeons if required
All sections stored in pathology
Tumour margin specimens confirmed as tumour free by pathologist – routine workload at later date
Patient follow up with referring doctor
Appendix 4

Personnel

Core personnel- Dundee
Dr Colin Fleming, Consultant Dermatologist, Ninewells Hospital
Dr Affleck Consultant Dermatologist, Ninewells Hospital
Dr Sanjay Rajpara Consultant Dermatologist, ARI
Dr Alan Evans, Consultant Pathologist, Department of Pathology, Ninewells Hospital
Mr David Allan, Biomedical Scientist, Department of Pathology, Ninewells Hospital

Key partners- Dundee
Department of Plastic and Reconstructive Surgery, Ninewells Hospital
Department of Otolaryngology, Ninewells Hospital
Department of Ophthalmology, Ninewells Hospital
Department of Pathology, Ninewells Hospital
NOSCAN

Key partners- national
Scottish Dermatology Society
British Society of Dermatology Surgeons
ENT, ophthalmology, maxillofacial and plastic surgeons
Appendix 5

As the service matures there has been a steady rebalancing of the sources of referral. The indications for 2013/14 suggest 80-100 patients from Grampian will be referred.

<table>
<thead>
<tr>
<th>Region</th>
<th>Beg April ’10-end March 2011</th>
<th>Beg April ’11-end March ’12</th>
<th>Beg April ’12-end March ’13</th>
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<tbody>
<tr>
<td>Tayside</td>
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<td>Grampian</td>
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<td>Fife</td>
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<tr>
<td>Lothian</td>
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<td>Highlands</td>
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<tr>
<td>Orkney</td>
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<td>Borders</td>
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<td>Western Isles</td>
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<tr>
<td></td>
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Appendix 6

Costs Associated with Increasing MOHS Service by 1 Additional Day

<table>
<thead>
<tr>
<th>Resource Requirements</th>
<th>2013/14 £000's</th>
<th>2014/15 £000's</th>
<th>2015/16 £000's</th>
<th>2016/17 £000's</th>
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<tr>
<td><strong>Pay</strong></td>
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<tr>
<td>Consultant Pathologist - 1 session per month</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Biomedical Scientist (Band 7)</td>
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<tr>
<td>Skin Cancer Fellow</td>
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<td>Nurse (Band 5)</td>
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<tr>
<td>Nurse (Band 5)</td>
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<td>Nurse Auxiliary (Band 2)</td>
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<td>Nurse Band 6</td>
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<td>Admin (Band 2)</td>
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<td><strong>Total Pay Costs</strong></td>
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<td><strong>99</strong></td>
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<td><strong>Non-Pay Costs</strong></td>
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<td>Training Budget</td>
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<td>CSSD</td>
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<td>Medical Photography</td>
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<td>Travel</td>
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<td><strong>Total Non-pay Costs</strong></td>
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<td><strong>Total Cost of Increased MOHS Service</strong></td>
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<td><strong>less</strong> non-recurring allocation from NOSCAN</td>
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