Review Article

Who Should Carry Out Skin Cancer Excisions? A Systematic Review

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Abstract

Background: The incidence of melanoma and nonmelanoma skin cancers is increasing in the United Kingdom. Surgical excision carries the highest cure rates for all skin cancers and is the first-line treatment for melanomas and high-risk nonmelanoma cancers. This is most commonly performed by general practitioners (GPs), dermatologists, and plastic surgeons. **Objective:** The aim of this study was to identify which health-care professionals achieve the best outcomes following surgical excision of skin cancer lesions. **Materials and Methods:** A comprehensive search of the Cochrane Library and PubMed databases was conducted. PRISMA guidelines were adhered to throughout. **Results:** Six studies were identified and reviewed. Dermatologists were most likely to excise lesions adequately, and GPs were the least likely. Dermatologists displayed the greatest diagnostic accuracy, and excisions led by them had the highest overall and disease-free survival rates. Plastic surgeons were most likely to excise complex lesions on difficult-to-treat areas. **Conclusion:** Dermatologists can excise many skin lesions adequately, but plastic surgeons should continue to take an active role in complex or anatomically challenging lesions. There is a need for more validated training for GPs in the management of skin cancers. Further studies incorporating a randomized control protocol are needed to definitely assess who is best placed to surgically excise these lesions.

Keywords: Dermatologist, excision, plastic, skin cancer, surgery

Introduction

Over the last decade, the incidence of malignant melanoma (MM) and nonmelanoma skin cancers has risen by more than 50% in the United Kingdom.[1,2] Nonmelanoma skin cancers, more specifically basal cell carcinomas (BCCs), are the most common malignancy in the country, accounting for 20% of new cancer diagnoses.[3] Generally, mortality rates associated with are very low; however, morbidity rates can be high, depending on where lesions are located. Typically, high-risk locations for BCCs are by the eyes, ears, nose, lips, and chin where the tumor can infiltrate and destroy the surrounding tissues. MMs are considered to be the fifth most common cancer in the United Kingdom[1] and are more likely to spread and metastasize. Therefore, mortality rates for MMs are higher, making early intervention essential.

There are a number of nonsurgical treatments available for cutaneous malignancies, including topical anticancer treatments, cryotherapy, radiotherapy, and photodynamic therapy. Surgical excision carries the highest cure rates for all skin cancers and is the first-line treatment for melanomas and high-risk nonmelanoma cancers.[4,5] The current guidelines for the surgical management of primary cutaneous melanoma recommend a two-stage procedure, whereby an excision biopsy of the suspected lesion with a narrow margin is carried out as the first step. This allows for confirmation of diagnosis and permits the second stage of a wider local excision. The wider excision can, therefore, take into account the Breslow thickness when planning surgical margins. Surgical excision can be performed in the form of a simple excision, curettage, electrodissection, and Mohs surgery, depending on the severity and location of the lesion.

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In the United Kingdom, surgical excision of cancerous lesions can be performed by a member of the skin cancer multidisciplinary team. This includes dermatologists, plastic surgeons, and oncologists.[6] A study looking at histopathology reports in the South East of England found that most skin cancers were excised or biopsied by dermatologists, followed by general practitioners (GPs) and plastic surgeons.[7] GPs are able to excise small, low-risk skin cancers in the community, and this is being encouraged as a cost-effective solution that is more convenient for patients.[6] Excisions of such lesions in secondary care are performed by specialists that offer different skill sets that may be useful in the management of skin cancers. Dermatologists are trained in early recognition and diagnosis of cancerous lesions, whereas surgeons display better surgical ability. This article aimed to evaluate which health-care professional is most appropriate to excise skin cancer lesions.

Materials and Methods

A thorough search was conducted on the Cochrane Library and PubMed databases. Combinations and synonyms were entered as part of a logical search approach. Search terms were as follows: *skin cancer, cutaneous cancer, cutaneous malignancy, melanoma, non-melanoma, basal cell carcinoma, squamous cell carcinoma, excision, surgical excision, surgery, dermatologist, GP, general practitioner, or plastic surgeon.* These terms were joined together in different combinations as part of an advanced search. The papers were then assessed using a series of screening questions [Table 1]. The lowest level of evidence accepted was a case series. Each included article must have studied a minimum of 10 patients with one of the following outcome measures recorded: adequacy of excision, excision margins, overall survival, disease-free survival, or requirement of further excision. No restriction was placed on the geographic location of published work, although papers published only in the English language were accepted. No specific date range was used, and papers dating back to 2004 were found. The reference list of all papers was screened for outstanding articles, and papers using repeating data sets were removed to avoid duplication. Before analysis of the full text, another independent author was used as referee for the initial screening process. This cycle was then repeated for the full-text analysis. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, which are an evidence-based minimal set of requirements to aid authors constructing systematic reviews, were adhered to throughout this article.

Table 1: Screening questions

Question	Minimum criteria
Does it address the study topic?	Dermatologist and plastic surgeon skin cancer excision performance
What is the level of evidence?	Case series
How many patients were included?	$N > 10$
Does it address the outcome measures?	Any of adequacy of excision, excision margins, overall survival, disease-free survival, disease-free interval, or requirement of another excision

Results

An advanced search on the Cochrane Library found 31 results, which after screening did not meet the inclusion criteria. An advanced search on PubMed found 28 results, and after screening the abstract of each of these, 8 results appeared to match the inclusion criteria. After analyzing the papers in more depth, two papers were excluded, as they did not address the specific study topic [Figure 1]. All of the studies included are retrospective observational studies looking at histopathology reports [Table 2]. This review therefore has a cumulative cohort of 8848 reports and 7487 skin cancer excisions [Table 2].

In total, 4797 BCCs, 1608 MMs, and 1082 squamous cell carcinomas were evaluated in this study. Of these excisions, 1894 (25.30%) were performed by GPs, 2505 (33.46%) by dermatologists, and 2737 (36.56%) by plastic surgeons, with 351 (4.68%) excised by other hospital specialists. No benign lesions were included in this study. All of the studies included were retrospective observational studies. Five of the six studies focused on retrospective histopathology reports sent in to one laboratory over a set time frame. The last study included compared the excisions sent in from GPs over the course of a year and compared it to those sent in by dermatologists and plastic surgeons over the course of the month, with the aim to allow for proportionate analysis of specimens by specialty. Patients whose lesions were excised by the GPs were, on average, younger than those with lesions excised by dermatologists and plastic surgeons.[8,9,11,12]

Four of the six studies looked at adequacy of excision by different specialties [Table 3]. These studies found that

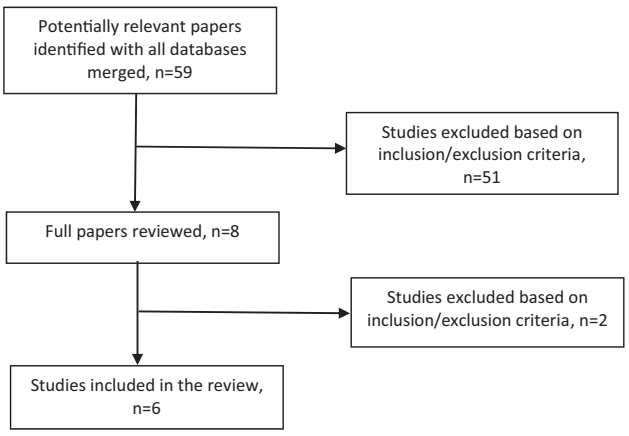

Figure 1: PRISMA flow diagram outlining article selection process

Table 2: Study type, sample size, location, and length of follow-up of each included study

Study	Study type	MRC level of evidence	Sample location	Sample size	Length of follow-up (dates)
McKenna *et al.*[8]	Retrospective cohort	3	Scotland (Lothian and South East region)	1536 excisions (all primary cutaneous lesions without evidence of metastases at the time of surgery)	19 years (1979–1997)
Murchie *et al.*[9]	Retrospective cohort	3	Scotland (Aberdeen, University of Aberdeen)	1087 excisions (all BCC episodes)	1 year (2005)
Goulding *et al.*[10]	Retrospective cohort	3	England (London, Royal Free Hospital)	1111 excisions	3 months (1 October to 31 December 2006)
Delaney *et al.*[11]	Retrospective cohort	3	Scotland (Aberdeen Royal Infirmary)	1184 reports and 900 excisions in sample (all SCC episodes)	1 year (2005)
Haw *et al.*[7]	Retrospective cross-sectional	3	Scotland (East and South East regions)	944 excisions (skin cancer reports from GPs compared with skin cancer reports from hospital specialists)	GP sample: 1 year (2010) Hospital samples: 1 month (November 2010)
Ramdas *et al.*[12]	Retrospective cross-sectional	3	Netherlands (Southwest region)	2986 reports and 667 excisions (all BCC episodes)	6 years (2008–2014)

BCC = basal cell carcinoma, GP = general practitioner, SCC = squamous cell carcinoma

dermatologists completely excised lesions in 83.8–94.1% of cases, plastic surgeons completely excised 83.6–89.3% of lesions, and GPs excised 67.9–81% of lesions.[7,9,11,12] Dermatologists and plastic surgeons were found to excise lesions more adequately than GPs, and this difference was statistically significant.[7,9,12] Goulding *et al.*[10] found that excisions performed by dermatologists were more likely to have clear excision margins: 8% margin involvement in dermatologist's excisions, compared to 19% by plastic surgeons and 68% by GPs, and this was statistically significant ($P < 0.001$). Dermatologists were also found to have greater diagnostic accuracy than plastic surgeons and GPs and were less likely to perform inappropriate procedures.[10] Overall and disease-free survival rates were found to be highest in those whose lesions were excised by a dermatologist, and this difference was statistically significant.[12]

Of the excisions performed by plastic surgeons, 63.1–82.1% were on the head and neck compared to 40.4–68.6% by dermatologists and 40.9–62.7% by GPs.[7,9,11] McKenna *et al.*[8] found that most wide local excisions were performed by plastic surgeons (69%), and this was followed by dermatologists (7%) and GPs (3%). It was found that plastic surgeons are more likely to excise more complex lesions, with higher infiltration and ulceration rates, and these lesions were more likely to be in difficult-to-treat areas.[8,12]

Discussion

On the basis of the available data, it can be inferred that dermatologists have been found to excise skin cancer lesions more adequately than GPs and plastic surgeons.[7,9,11,12] The difference in performance was most obvious between dermatologists and GPs, and less obvious between dermatologists and plastic surgeons as one study found the difference in performance between plastic surgeons and dermatologists was not statistically significant.[7] Dermatologists were least likely to have margin involvement in their excisions, and GPs were most likely.[10] This may reflect the large number of skin cancer lesions diagnosed and managed by dermatologists. Greater experience with cancerous lesions is likely to improve diagnostic accuracy and skills required to excise lesions efficiently.

The studies also found that plastic surgeons were most likely to excise complicated and aggressive tumors in more difficult locations,[8,9,11,12] and this is likely to reflect unfavorably in the performance of surgeons. For lesions of the head and neck, narrower margins may have been used to maintain aesthetics and to safeguard vital neurovascular structures. It is also important to note that a study recording the grade of the doctor performing excisions recorded that most excisions performed by dermatologist are senior-led, whereas surgical juniors excise many in plastic surgery,[7] and this is likely to skew the results in favor of dermatologists. This trend is likely to be the similar in hospitals across the United Kingdom.

Overall and disease-free survival was found to be highest in those whose lesions were excised by a dermatologist. It is important to note that those with more complicated lesions were referred to surgery and were more likely to be treated with wide local excision, when compared to those with lesions excised from dermatology.[8]

Currently, GPs are advised to excise only low-risk BCC lesions and refer more complex or high-risk cases to secondary care. Theoretically, this should reflect favorably in GP excision outcomes; however interestingly, they were still found to have the lowest accuracy in surgical excision. This may reflect an overall inadequacy of training and operating experience in the GP cohort, when compared to dermatologists or plastic surgeons. The lack of clinical

Table 3: Demographics, outcomes measured and main finding of each included paper

Study	Demographics: average age (years), gender (%, female)	Outcomes measured	Main findings
McKenna *et al.*[8]	GP: 47, 60% Dermatologist: 47.4, 70% Plastic surgeon: 58.7, 64%	Overall survival and disease-free survival	Improved overall survival and disease-free survival rates for lesions excised by dermatologists compared to plastic surgeons ($P = 0.02$ and $P < 0.003$, respectively) Surgeons found to treat more complicated lesions with higher median thickness, lesion diameter, and frequency of ulcerations Most wide local excisions performed on patients presenting to GPs were performed by plastic surgeons (69%), and this was followed by dermatologists (7%) and GPs (3%)
Murchie *et al.*[9]	GP: 67.7, 44.4% Dermatologist: 71.7, 57.3% Plastic surgeon: 70.6, 52.6%	Adequacy of excision	Dermatologists and plastic surgeons found to excise lesions more adequately than GPs ($P < 0.05$) Plastic surgeons more likely to excise lesions from head and neck (81.1% compared to 47.2% of dermatologists and 62.7 % of GPs)
Goulding *et al.*[10]	Data not provided	Diagnostic accuracy	Dermatologists had a diagnostic accuracy of 69.5%, compared to 62.9% for plastic surgeons and 42.8% for GPs ($P < 0.0001$) Dermatologists had 8% margin involvement, plastic surgeons had 19% margin involvement, and GPs had 68% margin involvement ($P < 0.001$) 0% of procedures in dermatology were inappropriate, 2.9% of procedures in surgery (including plastic surgery) were deemed inappropriate, and 3.6% of procedures performed in general practice were found to be inappropriate ($P < 0.001$) 13.8% of tumors excised by GPs should have been conducted in secondary care
Delaney *et al.*[11]	GP: 75.6, 55.5% Dermatologist: 76.9, 48.1% Plastic surgeon: 78.9, 35.8%	Adequacy of excision	Dermatologists excised 83.8% of lesions adequately, compared to 85.2% by plastic surgeons and 81% by GPs Plastic surgeons excised more head and neck lesions than any other specialty (63% compared to 40.4% of dermatologists' excisions and 40.9% of GPs' excisions)
Haw *et al.*[7]	Data not provided	Adequacy of excision	Dermatologists completely excised 94.1% of cancers, plastic surgeons excised 89.3%, and GPs 76.9% of skin cancers Found that the difference in adequacy between GPs and secondary care was statistically significant ($P < 0.05$), but the difference in adequacy between dermatologists and plastic surgeons was not ($P > 0.05$) For SCCs, BCC and MM plastic surgeons excised more skin cancers on the head and neck than any other specialty.
Ramdas *et al.*[12]	GP: 67, 50% Dermatologist: 70, 40% Plastic surgeon: 69, 55%	Adequacy of excision	Adequacy of excision was found in 93% of excisions performed by dermatologists, 83% performed by plastic surgeons, and 70% performed by GPs ($P < 0.001$) Dermatologists excised more lesions from the head and neck adequately when compared to GPs and plastic surgeons ($P < 0.001$)

BCC = basal cell carcinoma, GP = general practitioner, MM = malignant melanoma, SCC = squamous cell carcinoma

experience with skin cancers is likely to be a factor leading to GPs having the lowest level of diagnostic accuracy.

The studies followed guidelines from the Scottish Intercollegiate Guidelines Network (SIGN), the National Institute for Health and Care Excellence (NICE), and the Dutch BCC. One study found that 13.8% of the reports evaluated from excisions performed by GPs should have been treated in secondary care in accordance with NICE guidelines.[10] NICE guidelines explain that unless a diagnosis of BCC can be made confidently, the patient must be referred to secondary care.[13] This may represent the lack of diagnostic accuracy, aided by use of the dermatoscope, that GPs may have in regard to skin cancer. As the incidence of BCCs is high across the United Kingdom, more training should, therefore, be offered to GPs to ensure that patients are referred to the appropriate specialists and low-risk/benign lesions can be treated in the community safely.

The studies included did, however, have various limitations. The studies looked at samples from 1979 to 2014 and were taken from histopathology departments from England, Scotland, and the Netherlands. Both the year and the country of the reports may have influenced the outcome of the studies. As common practices have changed, new guidelines have been introduced, and excision techniques have improved, the data cannot be assessed against the latest standards. All of the papers obtained data from pathology reports. This may represent a key limitation,

as these reports often omit pertinent information. These include the respective referral indications to specific specialties, intraoperative factors, and excision techniques. Comorbidities were also not accounted for and may produce significant confounding. The use of these data sets also make it difficult to establish whether any patient had multiple skin cancer lesions, which may skew overall disease-free survival rates. The grade of the doctor was not recorded in five of the six studies, which could be a limiting factor, as Haw *et al.*[7] found that of the plastic surgeons excising skin cancers, the majority were juniors, whereas most dermatologists performing excisions were consultants. The difference in the grade of the doctor is, therefore, likely to have skewed the results and should be accounted for. It is also important to note that the studies used were retrospective observational studies and so the results are liable to selection bias.

Although the included studies reveal that dermatologists may excise many skin lesions adequately, plastic surgeons should continue to take an active role in complex or anatomically challenging lesions. Owing to the lack of randomized controlled trials quantifying the overall adequacy of differing professionals in skin cancer excision, the overall benefit to patients and possible complications cannot be ascertained. Well-designed, randomized controlled trials are required to elucidate the efficacy of dermatologists and plastics surgeons in skin cancer excision to establish more evidence-based guidance. The authors recognize the need for more validated training for GPs in the formal diagnosis, excision, and referral of more complex lesions, which may improve patient outcomes in this cohort.

Conclusion

Dermatologists can excise many skin lesions adequately, but plastic surgeons should continue to take an active role in complex or anatomically challenging lesions. There is a need for more validated training for GPs in the management of skin cancers. Further studies incorporating a prospective observational methodology or randomized control protocol are needed to definitely assess who is best placed to surgically excise these lesions.

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Conflicts of interest

There are no conflicts of interest.

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