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Skin Cancer Excision Is More Efficient and Cost Effective in a Specialist Secondary Care Service

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Abstract

Aim
To compare the relative efficiencies of skin excisions in primary and secondary care.

Methods
We compared the benign: malignant ratio for specimens referred by General Practice, General Surgery and the Skin Cancer Service to the regional pathology laboratory over one month. We used cost minimization analysis to compare the relative efficiencies of the services.

Results
620 excisions were received: 139 from General Practice, 118 from General Surgery and 363 from the Skin Cancer Service. The number (%) of malignant lesions was 13 (9.4%) from General Practice, 18 (15.2%) from General Surgery and 137 (37.7%) from the Skin Cancer Service. Excision was cheaper in General Practice at €84.58 as compared to €97.49 in the hospital day surgical unit. However, the cost per malignant lesion excised was €1779.80 in general practice versus €381.78 in the Skin Cancer Service.

Conclusion
Our results indicate that moving skin cancer treatment to General Practice may result in an excess of benign excisions and therefore be both less efficient and less cost effective.

Introduction

Skin cancer is a growing problem in Ireland. It is by far the commonest cancer accounting for 26% of all malignancies.[1] Melanoma incidence and mortality have more than doubled between 1994 and 2013 and it is now the 5th commonest cancer in men and women.[2] Because of this, melanoma treatment is deemed to be best managed by specialist skin cancer services in secondary care.[3] Optimal service management of non-melanoma skin cancer is less clear-cut. Excision biopsies of non-melanoma skin cancer could be conducted by General Practitioners rather than in secondary care. This would have the advantages of rapid, apparently effective treatment, satisfying the General Practitioner and patient alike. Several studies have assessed adequacy of excision as an index of efficiency in primary care with varying results.[4-7] Diagnostic accuracy has not previously been assessed and would have a bearing in terms of the number of unnecessary excisions performed.

We used the pathology database at Cork University Hospital, which processes all specimens for the Cork region, to compare the relative efficiencies of the various services in the management of all skin cancers. To examine cost effectiveness a cost minimisation analysis was performed.

Methods

The pathology database at Cork University Hospital was searched to extract all skin biopsy specimens received during the month of October 2016. Diagnostic punch and incision biopsies were excluded. Benign and malignant excision biopsies were assessed. The source of the biopsy was classified according to origin into the following groups: General Practice, General Surgery or the Hospital Skin Cancer Service (Dermatology, Plastic surgery, specialist skin cancer surgery). Specimens were grouped as follows: invasive melanoma, in situ melanoma, benign pigmented lesions, non-melanoma skin cancer, SCC in situ (Bowen's disease) and other benign lesions.

To examine cost effectiveness, a cost minimization analysis was performed. This is a type of economic evaluation wherein the two alternatives have equivalent outcomes and so the service that delivers the outcome at the least cost is considered to be the more cost effective.[8] Here, then, the outcome is a malignant lesion and the cost of a biopsy in hospital was compared to that in general practice using micro costing techniques (see Table 1).[9,10] The GP and Nurse time, direct and indirect administration work, practice management, day-to-day running costs etc were assessed as outlined previously.[11] This was complemented by consultation with a local General Practitioner, Hospital Human Resources and Service Planning departments.

Table 1. Cost of Biopsy

Cost of Biopsy in Primary Care	**Minutes**	**Rate**	**Cost**
Locum GP	30	1.84	55.20
Practice Nurse	20	0.54	10.80
Equipment			18.58
Total			**84.58**
Cost of Biopsy in Secondary Care			
Nurse (x2)	30	0.52	30.08
Registrar	30	0.95	28.00
Clerical Grade 3	22	0.35	7.57
Clerical Grade 4	10	0.41	4.10
Supplies & Pharmacy			27.74
Total			**97.49**

Results

In October 2016, 620 skin excision biopsies were received in the Pathology Dept. at CUH: 139 from general practice, 118 from general surgery and 363 from the skin cancer service. The number (percentage) of malignant lesions was 13 (9%) from general practice, 18 (15%) from general surgery and 137 (37%) from the skin cancer service (table 2).

Table 2. Number (percentage) of malignant and benign lesions excised in General practice and secondary care.

	General Practice	**General Surgery**	**Skin Cancer Service**
Malignant	13 (9%)	18 (15%)	137 (38%)
Benign	126 (91%)	100 (85%)	226 (62%)
Total	139	118	363

One in situ melanoma was received from General Practice, 4 invasive melanomas were received from General Surgery and 10 invasive melanomas plus 13 in situ melanomas from the Skin Cancer Service (table 3). Four SCCs and 8 BCCs were received from General Practice, 6 SCC plus 8 BCCs from General Surgery, and 43 SCC plus 71 BCCs from the Skin Cancer Service.

Table 3. Diagnosed malignancies from General Practice, General Surgery and the Skin Cancer Service.

	General Practice	General Surgery	Skin Cancer Service
Invasive melanoma	0	4	10
In-situ melanoma	1	0	13
BCC	8	8	71
SCC	4	6	43
Benign	126	100	226

126(91%) benign skin lesions were excised in General Practice, 100(85%) by General Surgery and 226(62%) by the Skin Cancer Service.

Biopsy Costings

Resources used in an excision biopsy in primary care included each piece of equipment as well as the costs of both the GP and practice nurses' time - 30 minutes and 20 minutes respecively.[11, 12] The estimated rate per minute of a Principal GP and Practice Nurse was €1.84 and €0.54, taking into account additions for PRSI, pensions and overheads. Thus, the cost in primary care was estimated to be €84.58 (See Table 1).

The cost of providing a biopsy in a hospital Day Surgery setting was calculated on the basis that the average biopsy takes 30 minutes and involves two nurses (30 minutes x 2 = 60 minutes) and a registrar doctor (30 minutes), as well as clerical costs and overheads, supplies and pharmacy consumables. Using the mid-point wage rates and accounting for PRSI, the cost of nursing is €0.52 per minute and a registrar doctor was €0.95 per minutes. Clerical costs, including hospital chart preparation, lab paperwork and filing were costed for a Grade 3 Clerical Officer rate of €0.35 and typing was calculated for a Grade 4 Clerical rate of €0.41 per minute. The total cost of a biopsy in secondary care was calculated at (See Table 1).

The cost of processing each specimen in the pathology lab was estimated at €93.40 (processing €50, pathologist review €43.40). This cost would be identical regardless of whether the biopsy originated in primary or secondary care.

Cost Minimisation Analysis

To examine cost effectiveness a cost minimisation analysis was utilized; wherein the two alternatives have equivalent outcomes and so the service that delivers the outcome at the least cost is considered to be the more cost effective.[8] Here the cost of performing a biopsy in General Practice was less expensive than in secondary care (€84.58 v €97.49). Adding the cost of processing a pathology specimen, the cost of biopsy in General Practice was €177.98 v €190.89 in the Skin Cancer Service. However, the ratio of benign to malignant lesions was over 9:1 in General Practice versus just under 2:1 in the Skin Cancer Service. That is to say, for every 10 biopsies in General Practice on average only one will be malignant, where as in the Skin Cancer Service on average five out of every 10 would be malignant. Therefore the cost per malignancy excised in General Practice was €1,779.80 versus €381.78 in the Skin Cancer Service.

Discussion

Skin cancer is a growing problem Worldwide. In Ireland, the most recent annual incidence of melanoma (2016-18) is 1110 and for non-melanoma skin cancer 10,816.[1] The incidence of melanoma is rising faster than most other cancers and doubling every 15 years. This is putting a strain on healthcare resources in primary and secondary care. Because of the potential for metastases and associated mortality, the NCCP recommends that all suspect pigmented lesions should be referred to secondary care for assessment by Dermatology or Plastic Surgery at the regional skin cancer service.[3]

The optimum approach for non-melanoma skin cancer is less certain. A number of issues arise in deciding who should excise these lesions. The issue of adequate excision has been explored by several authors in the UK, Australia and Holland.[4-7] Maguire and Maguire[7] also examined the results of surgery, over 1 year, at their practice in Dublin. While some authors found problems with excision margin, many did not and the overall impression is that low risk lesions could easily be excised in General Practice.

The second issue relates to diagnostic accuracy. Koehling *et al.*[13] reported that 9 out of 10 lesions suspected of malignancy in General Practice were in fact benign. More recently Ahmadi *et al.*[14] appeared to show better diagnostic accuracy in Dutch General Practice. Diagnostic accuracy is important because it has cost and manpower implications. If too many benign lesions are excised, apart from the impact on patients, this will result in increased cost and unnecessary extra workload for an already stretched healthcare system.

Our study was designed to look at the existing practice of General Practitioners in relation to skin lesion excision in our region. We found that there was an excess of benign lesions excised. While, it is not possible to determine whether this was due to diagnostic difficulty, many seborrhoeic keratoses were excised in the general practice cohort. These lesions would not normally be excised unless there was diagnostic uncertainty as they are generally only of cosmetic concern and often best left untreated. If bleeding or catching in clothing, they can be treated with liquid nitrogen, which is widely available in Primary Care. While a greater percentage of benign lesions (cysts, skin tags and warts) were excised by General practitioners, the fact that almost 50% of lesions were pigmented and a significant number of malignancies were excised also suggests that the lesions were excised because of concern about malignancy.

Our results indicate that movement of excision of non-melanoma skin cancers to the community would be costly. Based on the ratio of benign to malignant lesions excised, we estimate that the cost to the health service would increase over 4 fold (from €381.78 to €1779.80). The extra cost per non-melanoma skin cancer excised would be almost €1400. Given that almost 9000 non-melanoma skin cancers were excised nationally in 2016, this would have significant budgetary implications. It could be argued that, with improved training of General Practitioners in the recognition of benign lesions, the ratio of benign to malignant excisions might be improved. However, the experience with the use of General Practioners with special interest in the UK has been disappointing and not cost effective. [15]

In the absence of an Irish reference cost list, as is available in the UK, a micro-costing analysis was performed here. This is the most precise method of costing, as advocated by Drummond et al [8]. In conducting the micro-costing expert opinion was elicited and local cost estimates were applied, thus while the best available the estimates are subject to uncertainty. Also, compared to the UK costs for general minor surgery in primary and secondary care settings the estimates in this study are conservative.

In summary, we have found that an excess of benign skin lesions are excised in General Practice in our region. Cost minimisation analysis indicates that the skin cancer service in secondary care is more cost effective.

Declaration of Conflicts of Interest:
The authors have no conflicts of interest to declare.

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